



DELAGUA CLEAN COOKING GROUPED PROJECT IN SIERRA LEONE

Document Prepared by

Carbon Check (India) Private Ltd.



Project Title	DelAgua Clean Cooking Grouped Project in Sierra Leone
Report Title	Delagua clean cooking grouped project in Sierra Leone
Version	08
Report ID	CC IPL 1688/VCS/VAL-VER/DCPSL/20221212
Verification Period	22-February-2023 to 30-April-2023
Client	DelAgua Health Rwanda (Voluntary) Limited
Pages	90
Date of Issue	09-August-2024
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Summary:

- **A description of the project**

Project: The project “DelAgua Clean Cooking Grouped Project in Sierra Leone” employs VCS methodology; VMR0006 version 1.1 /B02. The project involves distribution of high thermal efficiency fuel-efficient improved cookstoves (ICS) to replace the baseline cookstoves at household level in Sierra Leone. It is intended that under this project high thermal efficient cookstoves will be distributed which will burn wood more efficiently thereby improving thermal transfer to pots, hence saving fuel wood. Apart from halting the progressing deforestation in Sierra Leone, this project will also reduce health hazards from indoor smoke pollution and time spent on collecting firewood.

- **A description of the validation and verification**

Validation and Verification: DelAgua Health Rwanda (Voluntary) Limited has appointed Carbon Check (India) Private Ltd., to carry out the combined validation and verification of the project “DelAgua Clean Cooking Grouped Project in Sierra Leone”, with regards to the relevant requirements of VCS Standard Version 4.4 (dated 17-January-2023). The combined validation and verification are based on the site visit, desk review of the VCS Joint PD & MR /01/and the corresponding supporting emission reduction calculation spread sheets /02-and other relevant supporting documents made available to the validation and verification team by the project proponent accompanied by on-site interviews. The first crediting renewal period is from 22-February-2023 to 21-February-2030, including both the dates. The first monitoring period for the project activity is 22-February-2023 to 30-April-2023.

- **The purpose and scope of validation and verification**

Purpose: The purpose of a validation is to have a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, particularly the project’s baseline, monitoring plan and compliance with the relevant VCS and host party criteria. These are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. 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 emission reductions. Carbon Check’s objective is to perform a thorough, independent assessment and validation of the project activity.

The purpose of the verification is to review the monitoring results and verify that monitoring methodology was implemented according to monitoring plan and monitoring data, used to confirm the reductions in anthropogenic emissions by sources is sufficient, definitive, and presented in a concise and transparent manner. In particular, monitoring plan, monitoring report and the project’s compliance with relevant VCS, UNFCCC and host party criteria are verified in order to confirm that the project has been implemented in accordance with registered design and conservative assumptions, as documented.

Scope: Validation scope is defined as an independent and objective review of the Project Description section of the Joint PD & MR. The Joint PD & MR is reviewed against the relevant criteria and guidance documents provided by VCS which include the following: VCS Program Guide (v4.3, dated 17-January-2023), VCS Standard (v4.4, dated 17-January-2023), Program Definitions (v4.3,

dated 21-December-2022), Registration & Issuance Process (v4.3, dated 17-January-2023) VCS Validation and Verification Manual (v3.2, dated 19-October-2016) applicable at the time in order to confirm that the project meets the applicability conditions of the selected baseline and monitoring VCS methodology VMR0006 (version 1.1), also assess the claims and assumptions made in the PD without limitation on the information provided by the project participants.

The scope of the verification is:

- To verify the project implementation and operation with respect to the VCS Joint PD & MR.
- To verify the implemented monitoring plan with the VCS Joint PD & MR and applied baseline and monitoring methodology.
- To verify that the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that the reported emission reductions are complete and accurate in order to be certified.

- The method and criteria used for validation and verification.

The validation consists of the following four phases:

I. A desk review of the project description documents.

- A review of data and information.
- Cross checks between information provided in Joint PD & MR and information from sources with all necessary means without limitations to the information provided by the project proponent.

II. Onsite interviews with project stakeholders

- Interviews with relevant stakeholders in host country with personnel having knowledge of the project development via telephone, email, or direct on-site visits.
- Cross checking between information provided by interviewed personnel with all necessary means without limitations to the information provided by the project proponent.

III. Secondary Information:

- Reference to available information relating to projects or technologies similar to projects under validation and review based on the approved methodology being applied for the appropriateness of formulae and accuracy of calculations.

IV. Issuance of Final Validation Report

- The resolution of outstanding issues and the issuance of the final Joint Validation & Verification report and opinion.

The verification consists of the following four phases:

I. (a) Desk review, involving:

- Review of the data and information presented to verify their completeness.
- Review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures.
- Evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

II. (b) Onsite assessment involving:

- Assessment of the implementation and operation of the proposed VCS project activity as per the VCS Joint PD & MR.
- Verification of implemented monitoring plan as per the VCS Joint PD & MR and applied baseline and monitoring methodology.
- Review of information flows for generating, aggregating, and reporting the monitoring parameters.
- Interview with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan in the VCS Joint PD & MR.
- A cross-check between information provided in the monitoring report and data from other sources such as inventories, purchase records, or similar data sources.
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the VCS Joint PD & MR and the selected methodology.
- Review of calculations and assumptions made in determining the GHG data and emission reductions.
- Identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

III. The number of findings raised during validation and verification.

- A risk-based approach has been followed to perform this Gap Validation & Verification. During the course of Joint Gap Validation & Verification, a total of 18 findings were raised, which includes:
- 13 Corrective Action Request (CAR); 05 Clarification Requests (CLs).
- All the raised findings have been successfully resolved by the PP.

IV. Any uncertainties associated with the validation and verification.

There are no uncertainties associated with the joint validation & verification of the project activity. The validation and verification have been done with a reasonable level of assurance. The VCS Joint PD & MR/01/, emissions reduction calculations /02 along with the supporting documents provided are in line with all the VCS requirements /B01/. The validation and verification team has detected no further uncertainties or quality restriction.

- **Summary of the validation and verification conclusions**

Carbon Check (India) Private Ltd. concludes the validation and verification with a positive opinion that the VCS Project “ DelAgua Clean Cooking Grouped Project in Sierra Leone ” as described in the Joint PD and MR (version 5, dated 08-November-2023)/01-c /, meets all applicable VCS requirements, including those specified in the VCS Standard (v4.4, dated 17-January-2023), relevant methodology, tools, and guidelines.

The selected baseline and monitoring methodology (VMR0006 version 1.1) is applicable to the project and correctly applied. Carbon Check (India) Private Ltd., therefore, requests the registration of the project as a VCS project.

In CCIPL's opinion, the emission reductions reported for the “DelAgua Clean Cooking Grouped Project in Sierra Leone” in the Joint PD and MR are fairly and correctly stated. CCIPL is therefore able to certify that the emission reductions for the project “DelAgua Clean Cooking Grouped Project in Sierra Leone e” during the first crediting renewal period is from 22-February-2023 to 21-February-2030, including both the dates. The total emission reductions during the crediting period amounts to 16,907,902tCO₂e. And, the first monitoring period for the project activity is 22-February-2023 to 30-April-2023. The actual emission reduction achieved during the current monitoring period is 2,078 tCO₂e.

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1 INTRODUCTION

1.1 Objective

DelAgua Health Rwanda (Voluntary) Limited has appointed the VVB, Carbon Check (India) Private Ltd. to perform a joint gap validation and verification of the VCS project “DelAgua Clean Cooking Grouped Project in Sierra Leone”. This report summarizes the findings of validation verification of the project, performed based on the VCS Program Guide (v4.3, dated 17-January-2023), VCS Standard (v4.4, dated 17-January-2023), Program Definitions (v4.3, dated 21-December-2022), Registration & Issuance Process (v4.3, dated 17-January-2023), VCS Validation and Verification Manual (v 3.2, dated 19-October-2016). Validation is required for all VCS project activities intending to register project under the VCS program. The purpose of a joint gap validation and verification is to have a thorough and independent assessment of the proposed project against the applicable VCS requirements, in particular, the project’s baseline, monitoring plan and the project’s compliance with relevant VCS and host Party criteria. These are validated in order to confirm that the project design and monitoring report, as documented, is sound and reasonable and meets the identified criteria. Validation and verification are 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 emission reductions, VCU.

Through this joint validation and verification activities, it is to be confirmed that:

- The project is implemented as described in the VCS Joint PD & MR /01 /
- The monitoring system is implemented and fully functional to generate emission reductions without any double counting, and
- The data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reductions calculation.

The joint validation and verification followed the requirements of the current version of the VCS standard version 4.4 and VCS program guide (version 4.3)/B02/ to ensure the quality and consistency of the joint validation and verification work and the report.

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the project description section of the joint PD & MR/01/, project design, ex-ante emission reduction calculation spreadsheet/02/, the project’s baseline study and monitoring plan and other relevant documents. The joint PD & MR is reviewed against the relevant criteria and decisions by the VCS Program, and against the approved baseline and monitoring methodology. The verification of this project is based on the Monitoring Report section of the joint PD & MR for this monitoring period, ex-post emission reduction calculation

spreadsheets /02/, supporting documents made available to the validation and verification team and information collected through performing on-site interviews. Furthermore, publicly available information was considered as far as available and required. Carbon Check has employed a risk-based approach in the combined validation and verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

The combined validation and verification of this project is based on the Joint PD & MR /01/ emission reduction calculation spreadsheets /02/, supporting documents made available to the validation and verification team /02 – 17/ and information collected through performing onsite visit interviews. Furthermore, publicly available information was considered as far as available and required.

The joint validation and verification are carried out on the basis of the following requirements, applicable for this project:

- VCS Program Guide v4.3
- VCS Standard v4.4
- Program Definitions v4.3
- Registration & Issuance Process v4.3
- VCS Validation and Verification Manual v 3.2
- VCS Methodology: VMR0006.: Methodology for Installation of High Efficiency Firewood Cookstoves” (Version 1.1)/B02/.
- Other relevant rules, including the host country legislation.

The scope of this verification, by independent checking of objective evidence, is as follows:

- To verify that the project is implemented as described in the joint VCS Joint PD & MR.
- To assess the project's compliance with other relevant rules including the host country legislation.
- To confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions without any double counting.
- To establish that the data reported are accurate, complete, consistent, transparent, and free of material error or omission by checking the monitoring records and the ex-post emissions reduction calculation.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.
- The verification shall ensure that the reported emission reductions are complete and accurate in order to be certified.

The method and criteria used for verification consisted of the following phases:

1. Completeness check and desk review
2. On site interviews with stakeholders
3. Resolution of outstanding issues and issuance of final validation and verification report and applicable VCS Validation and Verification Deeds of Representation.

CCIPL conducts all its work under strict rules to safeguard impartiality and ensure the independence of the combined validation and verification team. The VVB does not provide any consulting or recommendations to the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring activities.

1.3 Reasonableness of Assumptions and Level of Assurance

The joint gap validation and verification report is based on the Joint PD & MR /01/, supporting documents /02//17/ made available to the Validation and Verification team and information collected through performing interviews.

The combined validation and verification have been planned and organized to achieve a:

☒ Reasonable level of assurance as per VCS Standard (v4.4)

☐ Limited level of assurance

The threshold for quantitative materiality with respect to the aggregate of errors, omissions, and misrepresentations, relative to the total reported GHG emission reductions and/or removals was limited to one percent, as required by section 4.1.8 of the VCS Standard version 4.4 /B01/.

1.4 Summary Description of the Project

The project “DelAgua Clean Cooking Grouped Project in Sierra Leone” is a grouped project Throughout this Project Description, this grouped project may be interchangeably referred as “program”. The project activity includes the DelAgua Clean Cooking Grouped Project in Sierra Leone. The ICS distributed through this project will replace the baseline cookstoves i.e., three-stone fire or conventional open fire. The project activity is planning to distribute a total of 480,000 ICS throughout the program’s lifetime. PP has now updated the distribution estimates detailed in the following table.

S. No.	Year		Kuniokoa ICS		S-32X ICS		Annual Distribution
			Distribution for ICS	estimates	Distribution for ICS	estimates	
1	22/02/2023 31/12/2023	-	26,753		0		26,753
2	01/01/2024 31/12/2024	-	93,247		110,000		203,247
3	01/01/2025 31/12/2025	-	130,000		120,000		250,000
Total			250,000		230,000		480,000

It is intended that under this GP two types of single pot portable stoves will be distributed, which are SSM S32 X stove and Burn Kuniokoa G2. Each household will receive 1 ICS, as provided in Joint PD & MR section 1.11 PP has considered each ICS distributed as a project activity instance. VVB has validated the technology distribution during site audit through distribution database and screenshot of data collection app., interview of the implementation team and the distribution dates correspond with the carbon contract on the poster, The start date for this Grouped Project is 22-February-2023, which is the first date from which actual distribution of ICS started.

It is noted that as the first year has already been completed therefore the PP has presented the actual distribution data for year 2023 and for next two years the PP has projected the targeted number of ICS distribution.

VVB evaluated that as per 2019 Demographic and Health Survey (DHS) of Sierra Leone report, 95.8% of rural population of Sierra Leone uses firewood for cooking which is higher than the 95.2% reported for the rural population using firewood for cooking in 2018. The percentage of rural population using firewood as the main cooking fuel in 2011 is 97.2%. VVB has found an annual decrease in usage of firewood by 0.29% on an average from year 2011 to 2018 and slightly 0.6% increase in firewood consumption from 2018 to 2019. So, VVB found 2018 (95.2%) value more conservative. Hence, the % of rural population using firewood as the main cooking fuel in 2022 is conservatively estimated as

- $95.2\% - (4 * 0.29\%) = 94.06\%$

From the world bank data, total population of Sierra Leone is 2022³ is 8,605,718, out of which the rural population is 4,833,746⁴ which is approximately 56% of total population of Sierra Leone.

Parameters	Value	Unit
Total Population of Sierra Leone	8,605,718	Persons
Rural Population	4,833,746	Persons
Urban Population	3,771,972	Persons
persons per HH	8.4	
Total Rural HHs	575,445.952	No. of HHs

³ <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=SL>

⁴ <https://data.worldbank.org/indicator/SP.RUR.TOTL?locations=SL>

After applying the calculated % of rural population using firewood as the main cooking fuel in 2022 in rural population 4,546,483 ($4,833,746 * 94.06\%$) individuals in rural areas rely on firewood for cooking, equivalent to approximately 541,248 households ($4,546,483 / 8.4$). Thus, approximately 541,248 HHs are using firewood for cooking in rural areas of Sierra Leone from which PP proposes to distribute 480,000 Improved Cookstoves (ICS), which comes out to be approximately 88.68% of the rural HHs.

The average annual and total GHG emission reduction expected from the grouped project is expected to be 2,113,488 tCO_{2e} and 16,907,902tCO_{2e}, respectively, over the first 7-year crediting period. The project activity has been implemented as described in the VCS joint PD and MR /01/ and the emission reductions are calculated conservatively as per the applied methodologies /B07/. The first monitoring period for the project activity is 22-February-2023 to 30-April-2023. The actual emission reduction achieved during current monitoring period is 2,078 tCO_{2e}.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

DelAgua Health Rwanda (Voluntary) Limited has appointed the VVB, Carbon Check (India) Private Ltd., to carry out the joint validation and verification of the project “DelAgua Clean Cooking Grouped Project in Sierra Leone”, with regards to the relevant requirements of VCS Standard Version 4.4 /B01/.

The joint validation and verification include a thorough and independent assessment of the proposed project against the applicable VCS requirements/B01/, in particular, the project’s baseline, additionality, monitoring plan and the project’s compliance with relevant VCS and host party criteria. The validation involves assessment of the project and to confirm that the project meets the applicability conditions of the selected methodology, VMR0006, version 1.1 /B07/ and assess the claims and assumptions made in the Joint PD & MR /01/ without limitation on the information provided by the project participants. The overall joint validation and verification was conducted using Carbon Check’s internal procedures.

The Joint validation and verification consist of the following three phases:

1. Completeness check and desk review of the joint PD & MR, monitoring plan, monitoring methodology, applicable tools in particular attention to the frequency of measurements, quality of metering equipment including calibration requirements, QA/QC procedures and other relevant documents.
2. On-site visit interviews (including follow-up interviews with project stakeholders, when deemed necessary). The on-site interviews include the following:
 - An assessment of implementation and operation of project activity with respect to joint PD & MR.
 - Review of information flows for generating, aggregating, and reporting the monitoring parameters.
 - Interview with relevant personals to determine whether the operational and data collection procedures are implemented and in accordance with the monitoring plan of the project.
 - Cross check of information and data provided in the monitoring report with purchase records or similar data sources.
 - Review of assumptions made in calculating the emission reductions (if any).
 - Implementation of QA/QC procedure in-line with the VCS joint PD & MR and methodology requirements.

Resolution of outstanding issues and the registration and issuance of the final joint validation and verification report and as applicable the VCS validation and verification Deeds of Representation.

2.2 Document Review

During the document review, CCIPL has applied standard auditing techniques including but not limited to document reviews and on-site interviews, review of the applicable/applied methodology and its underlying formulae and calculations to assess the quality of information provided. The validation and verification were performed primarily based on the review of the VCS joint PD & MR and the supporting documentation. This process included:

- A review of data and information presented by the PP to verify their completeness
- A review of the MP and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the QA/QC procedures, and
- An evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of ERs.

The Joint PD and MR /01/ was initially reviewed and CCIPL requested the PP to present the supporting information and documents /02/-/17/. The documents were reviewed by CCIPL. Through the process of the validation and verification, the revised Joint PD & MR, monitoring report and the supporting documents were evaluated to confirm the actions taken by the PP to the CARs and CLs issued by the CCIPL team.

The list of documents referred during the course of this verification has been provided in Appendix-1.1.

2.3 Interviews

The table below describes the on-site interview process and further identifies personnel, including their roles, who were interviewed and/or provided information additional to that provided in the joint PD & MR /01/ and any supporting documents.

Table 01: On-site interview process

Sr.No.	Date	Name	Organization	Topic	Interviewer
1	12th May 2023 -13 th May 2023	Mr. Ajay Dixit	DelAgua	1. Project Design 2. Project Implementation status 3. Project start date and Project Location 4. Baseline	Mr. Harish Sharma, Mr. Jonathan Brython Baion
2		Ms. Anju Kamara	DelAgua		
3		Mr. Abusakar Johan	DelAgua		
4		Mr. Abraham Manch	DelAgua		

Sr.No.	Date	Name	Organization	Topic	Interviewer
5		Mr. Alhasan Bangwat	DelAgua	Scenario 5. Baseline Identification and Additionality 6.Qualification and Training 7. Monitoring and reporting documentation 8.Quality Assurance – Management and operating system 9.Social and Environmental Impacts 10. Local Stakeholders meeting process 11. Compliance with relevant laws 12. Roles and responsibility, Data Management and Reporting	
6		Mr. Jonathan Brython-Baion	DelAgua		
7		Mr. Mohamed Koroma	DelAgua		
8					
9					
10					
11		Mr.Bernadette Tommy	DelAgua	1. Project Design 2. Project Implementation status 3. Project start date and Project Location 4. Baseline Scenario 5. Baseline Identification and Additionality 6.Qualification and Training 7. Monitoring and reporting documentation 8.Quality Assurance – Management and operating system 9.Social and Environmental Impacts 10. Local Stakeholders meeting process 11. Compliance	
12		Mr.Aminata Ann Kamara	DelAgua		
13		Mr.Umu Barrie	DelAgua		
		Mr.Aminata Ann Kamara	DelAgua		
		Mr. Bernadette Tommy	DelAgua		
		Ms. Aisha Sahid Kamara	DelAgua		

Sr.No.	Date	Name	Organization	Topic	Interviewer
				with relevant laws 12. Roles and responsibility, Data Management and Reporting	
14		Alhahi Franklyn (TG000516)	HHs	KPT Questionnaire	
15		Dukulay Hawa (TG000823)	HHs		
16		Kawa Tailu (TG000217)	HHs		
17		Sarah Dongboi (TG001975)	HHs		
18		Aminata D Sillah (TG001767)	HHs		
19		Victoria Irrenie Edwine (TG000609)	HHs		
20		Fatmata Tarawally (TG001132)	HHs		
21		Bintu Kallon (TG002005)	HHs		

Apart from the monitoring survey, VVB has also interviewed the beneficiary and confirmed the baseline cookstove (i.e., Three stone fire) used prior to the implementation of the project stove. Furthermore, through document review registration certificate cum consent deed signed by the beneficiary, VVB could verify that all new instances comply with the 10% efficiency requirement as per the applied methodology /B07/.

2.4 Site Visits

Carbon Check has conducted an on-site inspection to confirm the implementation and operation status of the grouped project. A reasonable level of assurance has been maintained through the on-site visit for the purpose of validation and verification as follows:

- An assessment of the implementation and operation of the grouped project through on-site interviews with the representatives of project proponent and end users.
- Confirmation of the pre-project scenario
- Confirmation of the applicability of the methodology and monitoring and controlling instruments and operational arrangements.
- Confirm the data collection procedures are implemented in accordance with the MP
- Assessment of the project boundaries
- Assessment of the monitoring provisions by checking the monitoring arrangement.
- A review of information aggregating and reporting of the monitoring parameters

- A check of the observations of monitoring practices against the requirements of the VCS joint PD & MR and the applied monitoring methodologies
- A review of calculations and assumptions made in determining the GHG data and ERs, and
- An identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters.

2.5 Resolution of Findings

This section summarizes the findings from the joint validation & verification of the project activity. In this section the findings from the document review, assessments and onsite interviews are provided. Material discrepancies identified in the course of the validation are addressed either as CARs, CLs or FARs.

- Clarification requests (CLs): Project reporting lacks transparency and further information is needed to determine if a material discrepancy is present.
- Corrective action requests (CARs): The VVB has identified a material discrepancy or non-conformance that the project proponent must address.

The validation & verification team identified 13 CARs and 05 CLs. All CAR and CLs raised by Carbon Check during this joint validation & verification have been resolved by the PP. Please refer to Appendix 4 below for the details of the CARs/CLs and their closure. If this was not completed, the ERs cannot be certified and recommended for issuance to the VCS Registry.

2.5.1 Forward Action Requests

A forward action request (FAR) should be issued, where:

Forward Action Request (FAR) is to be raised when the monitoring and reporting require attention and/or adjustment for the next verification period. FARs VVBs not relate to VCS requirements for issuance of ERs achieved during subject monitoring.

CC IPL has raised one FAR during this joint gap validation and verification.

3 VALIDATION FINDINGS

3.1 Project Details

The project “DelAgua Clean Cooking Grouped Project in Sierra Leone” employs baseline and monitoring methodology; VRM0006 version 1.1 /B02/. The project activity includes the DelAgua Clean Cooking Grouped Project in Sierra Leone. The ICS distributed through this project will replace the baseline cookstoves i.e., three-stone fire or conventional open fire. The project proponent “DelAgua Health Rwanda (Voluntary) Limited” (DelAgua) is planning to distribute a total of 480,000 ICS throughout the program’s lifetime. . It is intended that under this GP two types of single pot portable stoves will be distributed, which are SSM S32 X stove and Burn Kuniokoa G2. Each household will receive 1 ICS will be distributed, as provided in Joint PD & MR section 3.2/01. The project results in reducing the amount of non-renewable biomass used for cooking. Through reduction in non-renewable biomass consumption, the program will decrease greenhouse gas emissions. The Kuniokoa Generation 2 with Pot Skirt rocket Stove will burn the wood efficiently, which improves the thermal energy direct to the pot, so conserving non-renewable biomass.

ICS	Efficiency of ICS with pot skirt	Efficiency of ICS without pot skirt
SSM S32X	50.1%	45.7%
Burn Kuniokoa G2	51.3%	43.4%

Furthermore, the cookstoves being distributed under the project are upgraded improved cookstoves with high thermal efficiency. These are generation 2 stoves using Pot Skirt which has a major impact on the improvement in thermal efficiency. VVB has referred to the latest projects from the VCS database and did not find any project using SSM S32X with Pot Skirt and Burn Kuniokoa G2 with Pot Skirt for comparison.

Section 1.1. of the VCS Joint PD & MR contains a clear summary description of the projects. The completeness and accuracy of the project description was validated through on-site interviews.

The project proponent is DelAgua Health Rwanda (Voluntary) Limited which will be holding the carbon credits generated form the project activity as per section 1.7 of VCS joint PD & MR /01/.

The start date for this Grouped Project is 22-February-2023, which is the first date from which actual distribution of ICS started. The first crediting renewal period is from 22-February-2023 to 21-February-2030, including both the dates.

The first crediting renewal period is from 22-February-2023 to 21-February-2030, including both the dates. The PP has chosen a renewal crediting period of seven years, twice renewable, for a maximum total of 21 years. This is in accordance with paragraph 3.9.1 of the VCS standard version 4.4/B01/ for non-AFOLU projects.

The indication of the project activity, instance location and the geographic boundaries is provided in section 1.12. of the VCS Joint PD & MR. They are in accordance with paragraph 3.11.1 of the VCS

Standard and can confirm that the project activity boundary is uniquely defined. The project location and geographic boundary of the project is of Sierra Leone. The KML file will indicate the geographical boundaries of the host country Sierra Leone. This is in accordance with paragraph 3.6.10 of the VCS standard version 4.4 /B01/, which requires projects to have one or more clearly defined geographic areas within which new project activity instances may be developed.

The VCS Joint PD & MR clearly indicates the project scope, which is scope 3: Energy demand, and more specifically demand-side energy efficiency project. The project includes multiple project activity instances or locations but is developed as a grouped project, this is indicated in section 1.2. of the VCS Joint PD & MR /01/.

The proposed project is an energy efficiency project activity and is located in a non-Annex I country. Therefore, the ER generated would not be part of an emission trading program, nor it is located in a jurisdiction or sector with binding limits. The project proponent intends to claim carbon credits under the VCS program only for the emission reductions achieved. The PP states in the VCS Joint PD & MR that the emission reductions generated by this project will not be used for compliance with an emission-trading program or to fulfil binding commitments. In fact, at the time of this combined validation and verification, no binding targets have been set by Sierra Leone under the Kyoto protocol, as indicated in the UNFCCC website /B09.

The project proponent has declared that the grouped project activity is not registered under any other GHG Programs. The validation and verification team has checked the UNFCCC database of registered projects.

The proposed project activity instances do not generate another form of environmental credit. The project proponent indicates in the VCS Joint PD & MR that the project does not intend to generate any other form of GHG related environmental credit other than those claimed under this VCS project.

PP will inform the manufacturers of the project stoves and the implementation partner that the Verified Carbon Units (VCUs) may be issued for the greenhouse gas emission reductions and removals under this grouped project. For these VCUs, the PP will be claiming carbon credits under VERRA. PP will further apprise that the ownership of these credits lies exclusively with DelAgua Health Rwanda (Voluntary) Limited to avoid any potential risk of double claiming of Scope 3 energy demand. During the distribution of the improved cookstoves, the participating households sign an end user agreement between the customer and Delagua. The end user agreement has customer information, unique identification number, product details etc. The agreement follows the requirements of para 3.7.1 of the VCS Standard ver4.4 which states the evidence to establish project ownership should be “An enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the plant, equipment or process that generates GHG emission reductions and/or removals which vests project ownership in the project proponent.”

The agreement confirms that the ownership rights of the VERRA project and the carbon assets generated from this project lie with the project proponent. The customer under the End User Agreement “releases all rights to the greenhouse gas reductions and carbon credits produced by the use of the clean energy product in the favor of Delagua and agree to not sell or transfer the GHG or carbon credits to any other third party or use these credits for any other purposes.

3.2 Participation under Other GHG Programs

No. This proposed VCS Grouped Project is neither registered nor is seeking registration under any other GHG programs. Additionally, VVB has checked various registry webpages like UNFCCC, VERRA, GCC etc. to confirm that no project with similar title or project existed in these registries. There is no other registered project for ICS in Sierra Leone across registries,

3.3 Safeguards

3.3.1 No Net Harm

As identified by PP in section 2.1 of the Joint PD & MR /01/, the project has no negative impact.

The validation and verification team confirms that the project does not pose any potential negative environmental and socio-economic impacts. A local stakeholders meeting was conducted for the project and there was no negative feedback.

3.3.2 Local Stakeholder Consultation

The local stakeholder consultation was held between October 24, 2022, details of which have been provided in the section of 2.2 of the joint PD & MR /01/.

The key comments made by the local stakeholders were all answered during the local stakeholder consultation meetings and have also been provided in the section of 2.2 the joint PD & MR /01 /.

The Project Proponent has reported its feedback and grievance redressal procedure in Section 2.2 of the joint PD & MR /01/, and the policy is outlined in the document “Project Grievance Redress Mechanism”. In the opinion of the assessment team, based on the onsite inspection interviews and observations, the grievance redressal procedure will address issues that may arise during project planning and implementation.

The grievance redressal process has been designed where beneficiaries and stakeholders have PP’s contact information and the understanding that they should contact the organization with any problems, questions, or grievances. During the onsite inspection interviews and based on document review, it can be confirmed that grievance addressal procedure has been designed and is implemented according to section 2.2 of the Joint PD & MR /01/ and that it is effective in its aim.

VVB confirms the procedure and method for engagement, method for documenting the outcomes of local stakeholders’ consultation and account of all inputs received. VVB confirms that the project proponent has taken due account of all input/ feedback received during the monitoring process (positive or negative) have been compiled in the survey results spreadsheet/02/, this has been checked by the validation and verification team during the on-site inspection interviews. During the current monitoring period, no feedback/grievances were raised. Hence VVB deemed the local stakeholders ongoing communication as appropriate.

3.3.3 Environmental Impact

No negative environmental impacts have been identified from the project and Environment Impact Assessment is not required for the project.

3.3.4 Public Comments

No public comments received during the 30 days listing period on VERRA registry. The VCS PD was made available for the public comments from 16 January 2023 to 15 February 2023.

3.3.5 AFOLU-Specific Safeguards

This section is Not Applicable, since this a Non-AFOLU VCS Grouped Project Activity.

3.4 Application of Methodology

3.4.1 Title and Reference

The Project provides for projects that use one of the VCS approved methodologies:

- VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1

The associated tools and guideline documents in the Project include:

- CDM TOOL01 “Tool for the demonstration and assessment of additionality” Version 07;
- CDM TOOL30 “Calculation of the fraction of non-renewable biomass” Version 04;
- Standard: Sampling and Surveys for CDM project activities and programmes of activities, Version 09.0

3.4.2 Applicability

Table 1: The applicability criteria of the applied methodology VMR0006 version 1.1 is justified as below:

Eligibility criteria as per section 3.6.16 and 3.6.17 of the VCS Standard v4.4:

S. No.	Applicability Condition	Justification of applicability
1	Project activities shall be implemented on domestic premises or in community-based kitchens.	Each PAI will distribute technology that is appropriate for domestic use to household end users
2	The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer’s specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove	ICS distributed in each PAI will have a thermal efficiency of at least 25%

S. No.	Applicability Condition	Justification of applicability
	replacing fossil fuel baseline stove, it shall exclusively use renewable biomass.	Each PAI will record the baseline and project fuel use to ensure that wood fuel is the sole source of energy.
3	Both 'Projects' and 'Large Projects' can use the methodology	The grouped project activity falls under large projects.
4	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	Proof that non-renewable biomass has been used in the project region i.e. in host country Sierra Leone since 31 December 1989 is available through widespread documentation of more biomass being consumed than is sustainably harvested, and is specifically outlined in an information note for the CDM which estimates fraction of non-renewable biomass for Least Developed Countries⁹, wherein fraction of non-renewable biomass usage in Sierra Leone is established as 97%. Wood fuel being main source for households cooking need and for other sectors as well even before 1989. There is no change in source of energy, however in urban areas the consumption of charcoal has increased significantly. The total dependence of wood biomass energy by over 90% of the population has impacted Sierra Leone negatively. According to reports, Sierra Leone's Forest area is declining as the demand for forest products and wood fuel increases¹¹. Also report warned that the current high deforestation rate, due to harvesting of traditional fuels, can lead to environmental, health and social impacts on the 65 % of the population living in rural areas. The FAO survey reveals that between 1990 and 2010, Sierra Leone lost an average of 20,000 hectares per year. In total, between 1990 and 2010, Sierra Leone lost 14% of its forest cover. The recent survey shows the deforestation rate is further increasing. Deforestation continues to

S. No.	Applicability Condition	Justification of applicability
		rise in Sierra Leone with primary forest losses increased, the report reveals that total primary forest losses averaged around 12.2% from 2001 to 2020, wherein around 50% losses occur between 2016 to 2020. Further, the tree cover losses between 2001 to 2020 averaged around 30%, wherein more than 50% tree cover lost between 2016 to 2020. The demand of fuel wood will further increase with increasing population as no alternatives in near future. The above clearly shows that the rural areas in the host country are dependent on biomass since and before 1989 with not much change in the trend which clearly depicts the dependence of the people of the host country on woody biomass as fuel for meeting thermal energy requirement for cooking at households.
5	For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded.	The group project activity doesn't involve fuel switch and the biomass used in project are not processed.
6	The Project Design Document shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo)	In order to avoid double counting of emission reductions through the method of distribution, each cookstove has a unique identifier number and the distribution of each stove is logged onto a database which includes unique information for each recipient.

S. No.	Applicability Condition	Justification of applicability
		Each PAI will have system for avoiding double counting with data being collected via a smartphone app (where possible), or via paper forms, including: 1. Date of distribution 2. A unique serial number on each technology Available end-user data: name, phone number, address/physical location, ID number
7	The CDM-PDD or CDM-PoA-DD/CPADD shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission. reductions from the project devices.	The End User Agreement confirms that the ownership rights of the ER/VCUs generated by the PAI reside with the PP. The signature of each end user confirming their understanding of this agreement will be collected at the point of distribution. The End User Agreement will be in English and translated into a local language where required. If necessary, it will be read out to the End User. All rights to distribute the delivered stoves and claim the resultant emissions reductions belong to the PP. The GP does not include any PAI that has been rejected by another GP, or CPA/VPA-DDs of any other GHG programs..

Table 2:Tool 30 - Calculation of the fraction of non-renewable biomass

S. No.	Applicability criterion	Justification of applicability
1	This tool may be used by: (a) DNAs to submit region- or country-specific default f_{NRB} values, following the procedures for development, revision, clarification and	Option (b) applied to calculate the project specific f_{NRB} value as described under in the separate f_{NRB} spreadsheet submitted to VVB.

S. No.	Applicability criterion	Justification of applicability
	update of standardized baselines (SB procedures); or (b) project participants to calculate project or PoA-specific fNRB values.	
2	Project participants and DNAs shall identify and clearly delineate the applicable area for which fNRB is determined. For project- or PoA specific fNRB values, project participants shall assess and use the area from which woody biomass is sourced for end-users included in the project activity and justify the selection of the area in CDM project design documents. For region- or country-specific fNRB values, DNAs shall specify the applicable area.	The PP has chosen host country Sierra Leone as region for the grouped project activity.
3	Project participants and DNAs may choose between the following two options to determine the value of fNRB: (a) Use the default value as provided in TOOL33; or (b) Calculate fNRB by determining the share of renewable and non-renewable woody biomass in the total quantity of woody biomass consumption for the country/region or the project area (hereinafter referred as the applicable area) following the procedure and requirements in the paragraphs below. The project participants shall compare and analyse the calculated values against the values for fNRB reported in relevant scientific literature and justify any differences. This analysis shall be included in the appropriate section of the PDD. The relevant scientific literature should include at least:	The PP has chosen option b), wherein a third-party consultant has established the fNRB for host country.

S. No.	Applicability criterion	Justification of applicability
	(i) Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015). The carbon footprint of traditional woodfuels. Nature Climate Change, 5(3), pp. 266–272.	
4	If the fNRB value is estimated at the national level, as a cross check, project proponent shall compare the value of estimated NRB with the product of: i) total average above ground biomass tonnage of the area of forest areas deforested in recent past (tonnes/ha), and ii) most recent available observed annual rate of deforestation (ha/yr). If the estimated NRB value is more than 10% above the value calculated as per the product of biomass and deforestation rate, justification shall be provided for the higher value for NRB	PP has chosen f _{NRB} 68% .

3.4.3 Project Boundary

The Project boundary is defined as per VMR0006. “Methodology for Installation of High Efficiency Firewood Cookstoves, (Version 1.1)”.

The sources of greenhouse gas identified in the Joint PD & MR /01/ are deemed to be appropriate and assessed below:

Table 3:Project Boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	Source 1 – Emission from burning of non-renewable Biomass, i.e., Woody Biomass for household cooking requirements	CO ₂	Yes	Major source
		CH ₄	Yes	Major source
		N ₂ O	Yes	Major source
		Other	No	No other source identified
Project	Source 1 – Emission from burning of non-renewable Biomass,	CO ₂	Yes	Major Source
		CH ₄	Yes	Major Source
		N ₂ O	Yes	Major Source

Source		Gas	Included?	Justification/Explanation
	i.e., Woody Biomass for household cooking requirements	Other	No	Not applicable

Project boundary showing physical locations of the Host country, where Grouped Project distribution is planned. This includes: “The Nonrenewable biomass used by the project cooking system”.

3.4.4 Baseline Scenario

The project activity will use methodology VMR0006 version 1.1/B07/. This is the most recent valid version available on the VERRA site at the time of this combined validation and verification. Since the project activity that apply the indicative simplified methodology VMR0006 version 1.1, the baseline scenario for this project activity is the one indicated by this methodology, i.e. ***“The baseline scenario is the continued use of non-renewable wood fuel (firewood/charcoal) or fossil fuel (coal/kerosene) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity”***. The baseline described in the PD complies with the requirements of the methodology, as the energy baseline is the existing level of consumption of non-renewable biomass used by the cooking systems currently in use and which is used in the absence of the project activity.

VVB based on review of the VCS Joint PD & MR /01/ confirms that the documentary evidence used in determining the above baseline scenarios are relevant, and correctly quoted and interpreted in the project description. The baseline scenario for the applied methodology were also confirmed through on-site interviews with the end users of technologies and representatives of PP.

According to the applied methodology on page 19 “A default value of 0.1 shall be used if baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney”. The baseline three-stone cookstove has an efficiency of 10% .

PP conducted baseline survey and baseline KPTs between October to November 2022, to assess the type & quantity of fuels consumed and the cooking technologies in use in pre-project scenario. The PP initially conducted a desk-research to identify regions (districts) where use of traditional cookstoves and wood fuel is predominant. This was followed by designing a survey questionnaire to validate the baseline scenario in the selected regions.

The survey focused on a total of 6 districts of Seirra Leone. Samples were randomly selected from for conducting the baseline survey and baseline KPTs. Enumerators were given adequate training in relation to data collection and quality checks by the PP.

PP used guidance provided in para 8.4-b of VMR0006 version 1.1. to conduct the baseline survey. Sample size was determined using CDM Guideline: Sampling and Survey for CDM PA and PoA version 4.0. Sample size for as per CDM Guideline on 95/10 precision confidence was 30 across Northern, Southern and Eastern Provinces of Seirra Leone for the baseline survey. PP has simple random sampling tp select 43 samples from Northern, 41 samples from Southern and 51 samples from Eastern province. Samples were

randomly picked from 6 districts across these provinces totalling to 139 households. Baseline KPTs were also conducted on 137 households which is also in line with CDM guidelines.

Province	Sample Covered	Sample Requirement
Eastern	51	30
Northern	43	30
Southern	41	30
Total	139	90

As per the baseline survey, 100% of the households were found using simple wood stove (i.e. either 3-stone fired or Rondereza) as their primary cooking device.

Baseline Survey Results	
Local improved wood stove	0%
Traditional metal stove	0%
Simple wood stove	100%
Local improved charcoal stove	0%
LPG Stove	0%
Imported Improved wood stove	0%
Imported Improved charcoal stove	0%
Other	0%

Samples for baseline KPTs were picked from the baseline survey. Total households who participated in the baseline KPT were 137 households. PP followed the KPT protocol to conduct the baseline KPTs⁵. The project KPT was conducted in-house by trained enumerators. VVB checked the training material and certificates to check the competence of the team who conducted KPT/11/. Sampled households were visited for 4 consecutive days to collect the data on the fuel consumption for cooking. The average fuel consumption per household per year was derived based on KPT result from 137 households. The result of the KPT conducted for 137 households was 22.80 kg/HH/day i.e. 8.321 tonnes/HH/year. The baseline fuel consumption value was within the 95/10 confidence/precision. The summary of the results is provided below:

Mean Consumption (kg/HH/day)	22.80 (8.321 tonnes/HH/Year)
Standard deviation	7.82

⁵ <https://cleancooking.org/binary-data/DOCUMENT/file/000/000/83-1.pdf>

CoV (Standard Error)	34%
Precision (95/10)	5.94%
Result	Ok Acceptable

Since the grouped project activity provides improved cookstoves to households where there was only firewood was used as the cooking fuel, and the cooking device was a traditional cooking device such as three-stone fired, traditional stove without chimney etc., it is considering the burning of firewood, and usage of unimproved cooking devices as the baseline. Also, PP verifies this for every individual household where distribution of project ICS is taking place, that they were using unimproved cooking device using firewood as fuel prior to receiving it. This is acknowledged by the end-user in the form of a signed ICS usage practices poster where the information is written down. This information can be checked through the sample posters. The poster is in local language Kinyarwanda, which makes it clearly understandable for the end user.

VVB used acceptance sampling during validation of baseline surveys for checking the PP's sample size. In accordance with the §31 and §32 of the sampling standard, version 09/B08-1/, a sample size of 8 was required based on an AQL of 0.5 % and UQL of 20 %, producer risk 5 % and consumer risk 20 %. The AQL and UQL selected is based on the Table 2 of the sampling standard, version 09/B08-1/ and complies with the requirements provided in §31 and §32 of the sampling standard, version 09/B08-1/. Acceptance number (c) thus determined for the sample is 0. The baseline survey results were cross-checked with the household respondents, and it was confirmed that the baseline KPTs were conducted at the households. It was observed that out of the 8 samples for baseline surveys and KPTs, the responses matched with the PP's record. Thus, PP's sample has been accepted with an acceptance number of c=0.

VVB confirms that the baseline scenario opted by the grouped project activity is in accordance with the requirements of the applied methodology /B07/ and is justified.

3.4.5 Additionality

The additionality of the grouped project has been demonstrated by the PP as per the methodology section 7 /B07/. The methodology uses an activity method for the demonstration of additionality. As per the methodology, the grouped project activity falls under the active method and positive list of technologies and project activity types that are defined as automatically additional. PP has demonstrated regulatory surplus in accordance with the rules and requirements regarding regulatory surplus set out in the latest version of the VCS Standard and it can be confirmed that the project is not mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework.

Furthermore, the project meets all the applicability conditions of the applied methodology VMR0006, version 1.1 /B07/ and distributes stoves at zero cost to the end users to the end-users and has no other source of revenue other than the sale of GHG credits. The grouped project is not implemented as a part

of any government scheme or supported by multilateral funds. Hence the project qualifies under positive list and deemed additional. The additionality has also been included in the eligibility criteria in the PD. Each project activity shall meet the requirements of eligibility criteria.

It was confirmed from the end users during the on-site visit whether they were charged anything for the stoves. In response to the question, it was clearly mentioned by the end users that the stoves were provided to them completely free of cost. The same was also discussed with the PP and the implementation partners during the closing meeting of the on-site visit. Therefore, the validation team confirms that the grouped project is additional, and all the project activities that will be included in the grouped project will meet the eligibility criteria.

3.4.6 Quantification of GHG Emission Reductions and Removals

The equations and choices provided in the methodology and all other methodological tools are correctly quoted in the Joint PD & MR /01/. The emission reductions of the project instances of the project would be calculated using the formulae mentioned in the applied methodology; VMR0006 (version 1.1) /B07/.

VVB based on the review of the Joint PD & MR /01/, confirms that the formulae are correctly presented for the determination of emissions reductions at project instance level. The parameters and equations presented in the Joint PD & MR /01/, as well as other applicable documents, have been compared with the information and requirements presented in the methodology respectively. An equation comparison has also been made to ensure consistency between all the formulae presented in the Joint PD & MR/01/ and ER spreadsheet/v1.1/ and methodology VMR0006 (version 1.1) /B07/.

The improved cookstove is introduced as energy efficiency measure in the project, therefore equations 1 and 2 of the methodology VMR0006 will be applied to calculate the net GHG emission reductions.

$$ER_y = \sum_i \sum_j ER_{y,i,j} \quad \text{Equation (1)}$$

Where

i	=	Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire.
J	=	Indices for the situation where there is more than one batch of improved cookstove of type i .
ER_y	=	Emission reductions during year y in t CO ₂ e
$ER_{y,i,j}$	=	Emission reductions by improved cookstove of type i and batch j during year y in t CO ₂ e

$$ER_{y,i,j} = B_{y,savings,i,j} \times NCV_{wood\ fuel} \times f_{NRB,y} \times (EF_{wf,CO_2} + EF_{wf,non\ CO_2}) \times N_{y,i,j} \times 0.95 \quad \text{Equation (2)}$$

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per improved cookstove of type i and batch j during year y
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})
$NCV_{wood\ fuel}$	=	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)
EF_{wf,CO_2}	=	CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO ₂ /TJ)
$EF_{wf,non\ CO_2}$	=	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO ₂ /TJ)
$N_{y,i,j}$	=	Number of improved cookstoves of type i and batch j operating during year y
0.95	=	Discount factor to account for leakage

The quantify of woody biomass saved due to implementation of improved cookstoves to be estimated using equation below:

$$B_{y,savings,i,j} = B_{old} \times \left(1 - \frac{\eta_{old}}{\eta_{new,i,j}}\right) \quad \text{Equation (3)}$$

Where

η_{old}	=	Efficiency of baseline cookstove
$\eta_{new,y,i,j}$	=	Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y Alternatively, efficiency may be determined using Equation 4.
$B_{y=1,new,i,j,survey}$	=	Annual quantity of woody biomass used by improved cookstoves in tonnes per device of type i and batch j , determined in the first year of the implementation of the project through a sample survey.

$$\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94 \quad \text{Equation (5)}$$

Where,

η_p = Efficiency of project stove (fraction) at the start of project activity.

$(DF_n)^{y-1}$ = Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on

manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.

0.94 = Adjustment factor to account for uncertainty related to project cookstove efficiency test.

If project households continue to use baseline cookstoves along with improved cookstoves, *Bold* shall be adjusted ex-post based on the percentage of project households found to continue such practice according to Equation 6 below. For such cases, the quantity of woody biomass saved *By,savings,i,j* due to implementation of improved cook stoves shall be calculated using an adjusted value to account for ex-post use of baseline stoves in addition to improved cookstove.

$$\text{Bold,adjusted} = \text{Bold} \times (1 - \mu_y) \quad \text{Equation (6)}$$

Where:

Bold,adjusted = Adjusted *Bold* to account the ex-post usage of firewood in baseline cookstove(s) by project households in addition to improved cookstove (in tonnes per device)

μ_y = Baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves

Sample VCU estimates (based on the calculation for first year of ICS monitoring estimates):

For the estimation of emission reduction, μ_y has been considered as 0.19. This is a monitored parameter and the value will be updated based on ex-post monitoring during ex-post calculation And based on that,

$$\text{Bold,adjusted} = 8.321 - (1 - 0.23) \text{ tonnes/year}$$

$$\text{Or } \text{Bold,adjusted} = 6.41 \text{ tonnes/year}$$

The project stove efficiency as per manufacturer taken as 51.3% and 43.4% for usage with pot skirt and without respectively for Burn Kuniokoa stove. For estimation of ERs, it is assumed that 5% user may not use pot skirt due to various reasons/occasions, hence weighted average efficiency for year 1 is calculated as below.

Year 1 efficiency of project stove with pot skirt- 48.22%

Year 1 efficiency of project stove without pot skirt- 40.80%

Hence, effective efficiency is calculated as

$$\text{Project stove efficiency in year 1} = 48.22\% \times 0.86 + 40.80\% \times 0.14 = 46.24\% \quad \text{By,savings,i,j} = 6.41 \times (1 - (0.113/0.4624)) \text{ ton firewood/household/annum}$$

$$\text{Or } \text{By,savings,i,j} = 4.842 \text{ ton firewood/household/annum}$$

Further, it is assumed that 2% project stove might not be operational by end of Year-2023. Total stoves planned to be distributed is 250,000.

$$ER_{y,i,j} = B_{y,savings,i,j} \times f_{NRB,y} \times NCV_{woodfuel} \times (EF_{wf\ CO2} + EF_{wf\ non-CO2}) \times N_{y,i,j} \times 0.95$$

$$ER_{y,i,j} = 4.842 \times 0.68^6 \times 0.0156 \times (112+26.23) \times (250,000 \times 98\%) \times 0.95$$

$$ER_{y,i,j} = 1,652,545^7 \text{ -ton CO}_2\text{/annum.}$$

This project will achieve an estimated total emission reduction of 16,907,902tCO₂e in the 7-year crediting period and an average of 2,113,488 tCO₂e per year, as indicated Joint PD & MR /01/ and also in the ex-ante ER spread sheet /02/.

In conclusion, all values used in the VCS Joint PD & MR to calculate emission reductions are considered reasonable in the context of the proposed project “DelAgua Clean Cooking Grouped Project in Sierra Leone” and calculation approach is correct.

3.4.7 Methodology Deviations

No methodology deviations have been applied to the project activity.

3.4.8 Monitoring Plan

The project employs baseline and monitoring methodology namely VMR0006, version 1.1 /B07/. According to section 7.5 of Joint PD & MR /01 / the parameters determined ex-ante and those to be monitoring ex-post as per the requirements of the methodology are given below.

The following parameters are determined ex-ante and ex-post mentioned in section 7.5 of the PD:

⁶ f_{NRB} value is established as per third party report for host country.

⁷ The sample calculations are for Kuniokoa ICS distribution plan, and ER estimates are made for its third year of operations.

Table 4:Parameters Determined ex-ante

Data Ex Ante	Unit	Value	Source
B_{old}	tonnes/HH/year	8.321	Sourced from KPT survey in host country
η_p	Fraction	Kuniokoa Generation 3: · 0.434 for project stove without skirting · 0.513 for project stove with pot skirting S32-X : · 0.457 for project stove without skirting · 0.5010 for project stove with pot skirting	Manufacturer's Specifications
$f_{NRB,y}$	Fraction	0.68	fNRB survey on the country basis established by third party as per the tool 30 furnished to VVB.
$E_{wf,non-CO_2} + E_{wf,CO_2}$	tCO ₂ e/TJ	138.23 (26.23+112)	As per the methodology
Leakage factor	Fraction	0.95	As per the methodology
$NCV_{biomass}$	TJ/tonne	0.0156	As per the methodology
$\eta_{old,l,j}$	Percentage	0.1130	As per the methodology

Table 5:Parameters Determined ex-post

Data Ex Post	Unit	Value	Source
$N_{y,i,j}$	Number	480,000	The project implementor maintains a database for distribution record to calculate this parameter. The sampling was undertaken by complying the 95/10 confidence precession, which is conservative. The required precision level achieved with sample size determined. All the ICS units distributed during M.P.-1 are considered for the VCU calculation, as the monitoring surveys conducted from 18 April 2023 to 26 April 2023 provide a 100% operational rate (i.e. there is no drop-off observed during M.P.-1). However, three users were discarded from the group as they denied consent as per requirement of grouped project.
η_{old}	Fraction	0.1130	This value is obtained from the Household (HH) visit forms that are recorded for each HH at the time of distribution. The average of the baseline device efficiency is used to calculate the parameter value.
$\eta_{new,i,j}$	Fraction	0.4707 The pot skirt usage rate was 84.55%. Hence weighted average value was calculated = $(0.4822 * 84.55\%) + (0.4080 * (1 - 84.55\%)) = 0.4707$	As per the methodology
Life span	Years	1) Burn Kuniokoa Generation 2 = 10 years 2) SSM S32X = 10 years	Manufacturer's specifications
Date of commissioning of batch j	Date	22-February-2023 (date when the first ICS under the PAI-1 is commissioned)	Distribution database

Data Ex Post	Unit	Value	Source
μ_y	fraction	0.19	Monitoring

Other parameters reported in the ER sheet and MR:

Data Ex Post	Unit	Value	Source
N_y	Number	2,090	ICS Installation database; Monitoring Surveys
B_{old}	Tonnes/HH/year	8.321	Baseline KPT
η_{new}	Percentage	0.4707	Calculated using the Eq. 5 provided in the applied methodology
$B_{y,saving}$	Tonnes/year	4.63	Calculated as per equation 3 of VMR0006 by using the above input values
μ_y	fraction	0.27	Monitoring survey records, refer the ex-post ER sheet for the details of survey
ER_y	tCO ₂	2,078	Calculated, refer the ex-post ER sheet for the details of survey

Assessment of B_{old}

VVB through its assessment noted that in Sierra Leona there are no comparable projects registered with VCS or CDM for which B_{old} can be compared as a cross check measure. However, VVB found a Gold Standard registered VPA GS7475 and VPA GS7480 of POA titled “GS1247 VPA 208 Sierra Leone Safe Water”. VVB evaluated the wood consumption estimates of the project to check the plausibility of PP’s assumption. The data from the project is tabulated below.

Year	2019 (VPA 7475)	2019 (VPA 7480)
Quantity fuel consumed in baseline scenario (tonnes) ⁸	10,242	9,829
Person Days	2,244,621	2,154,044
Quantity fuel consumed in baseline scenario (tonnes/person/day)	0.0046	0.0046
Quantity fuel consumed in baseline scenario (tonnes/person/year)	1.67	1.67
HH size	8.4	8.4
Total wood consumption for boiling water (ton/HH/year)	13.99	13.99

⁸ <https://platform.sustain-cert.com/public-project/1746> - File Emission Reduction Calculation Excel File (SL_MP4_ER Calcs_v6(1).xlsx)

The wood consumption as per VPA GS7475 and GS7480 comes out to be 13.99 t/HH/Year which is significantly higher if compared to PPs annual baseline fuelwood consumption (i.e., 8.321 t/HH/year).

This reinforces the significance of the data provided by the PP. Further, during the site visit VVB observed the higher usage of firewood is due to the higher size of HHs thereby increasing the household fuel consumption significantly.

Thus, the calculated value of Bold through KPT tests is deemed reasonable and appropriate for Sierra Leone.

Assessment of f_{NRB}

PP has contracted an independent party “C4Ecosolutions” for a study and calculation of f_{NRB} as per CDM Methodological Tool: “Calculation of fraction of non- renewable biomass” (v04.0). Validation team confirms that it has checked f_{NRB} calculation spread sheet /11/ prepared by C4Ecosolutions. As per the applied methodological tool, In the case of ex ante calculation of f_{NRB} , the parameter f_{NRB} shall be estimated using the most recent historical year for which data is available. Review of f_{NRB} report /11/ prepared by C4Ecolution revealed that all the data used for the calculation is latest available data at the time of validation.

Review of f_{NRB} calculation spread sheet /11/ prepared by C4Ecosolutions reveals that the total woody biomass consumption in a country comprises its domestic, non-domestic energy and non-domestic non-energy consumption. For Sierra Leone, this total is estimated using consumption data sourced from the FAO Forest Products Databases and World Bank. population statistics. The reported volumes of fuelwood consumed in cubic meters are converted to metric tonnes using the FAO default conversion factor. The reported value of charcoal consumption is converted to the equivalent woody biomass using the latest CDM Tool 30 v04.0 2022, default charcoal-to-wood biomass conversion factor. Finally, consumed volumes of commercial forest products – including industrial roundwood, sawn wood, veneer sheets and wood-based panels— are converted to metric tonnes using a biomass conversion and expansion factor provided for the region.

Domestic woody biomass consumption is the combination of fuelwood and charcoal consumption by rural and urban populations. Rural fuelwood and charcoal consumption are estimated by multiplying the respective per capita consumption rates obtained by the KPT survey (Table 1) and Sierra Leone’s 2021 total rural population. Urban fuelwood and charcoal consumption are estimated from per capita consumption rates sourced from literature and multiplied with Sierra Leone’s 2021 urban population. Accordingly, the total domestic woody biomass consumption is conservatively estimated to be 11,515,164 t/yr.

The non-domestic woody biomass consumption is estimated using 2019 per capita consumption rates provided by the FAO (Table 1) and disregards the deforestation likely occurring because of shifting agriculture and informal or illegal harvesting, as available data for these activities are scarce. Non-domestic energy consumption is reported as the quantity of wood charcoal and non-domestic non-

energy consumption is reported as the quantity of industrial roundwood, sawn wood, veneer sheets, and wood-based panels. The per capita consumption rates were multiplied by the national 2021 Sierra Leonian population for each consumption category and the required units' conversions completed. Sierra Leone's non-domestic energy and non-domestic non-energy consumption values are estimated to be 1,953,922 t/yr and 169,034 t/yr, respectively. Sierra Leone's total woody biomass consumption is the sum of domestic, non-domestic, non-energy, and non-domestic energy consumption, estimated to be 13,638,120 t/yr.

In Sierra Leone three ecological zones have been found i.e., Tropical moist forest, Tropical Mountain system forest and Tropical rainforest, the same was verified by referring the Sierra Leone ecological zones for FAO forest reporting. The resulting average MAI estimates for Gambia are 0.92, 1.61 and 3.38 t/ha/year for the Tropical moist forest, Tropical Mountain system forest and Tropical rainforest respectively. Table below provides the validated total, protected and remote forest cover extent, mean annual increment and renewable biomass by ecological zone for Sierra Leone.

Table 6: Total, protected, and remote forest cover extent, mean annual increment (MAI)

Ecological Zone	Total forest cover (ha)	Protected area cover (ha)	Remote area cover (ha)	MAI(t/ha/yr)	Annual growth (t/yr)
Tropical moist forest	1,132,693	51,513	176,030	0.92	836,708
Tropical mountain system	15,678	-	4,741	1.61	17,556
Tropical rainforest	1,202,574	65,625	97,890	3.38	3,512,627
Total	2,350,945	117,138	278,661	-	4,366,891

The quantity of renewable biomass (RB) for Sierra Leone as per the verified f_{NRB} report and calculation sheet /11/ is estimated to be 4,366,891 t/yr. The calculation is based on the equation -04 of tool 30 v04. /B10/, checked and deemed appropriate by the VVB.

The difference between woody and renewable biomass consumption is non-renewable. Non-renewable biomass utilisation in Sierra Leone is estimated at 9,271,229 t/yr.

The fraction of non-renewable biomass is the quotient of the non-renewable and the total biomass. The fraction of non-renewable biomass for Sierra Leone is, therefore, validated as 0.68. From the review of this report/spread sheet /11/ and interviews with the CME and C4 EcoSolutions (Pty) Ltd, validation teams confirm the following:

The report has been prepared by an independent party (i.e., C4 EcoSolutions (Pty) Ltd.), who is experienced in conducting such study.

The detailed methodology (including the calculation) of conducting the study has been provided in the report /spread sheet /11/.

The study has been done in accordance with the CDM Methodological Tool: “Calculation of fraction of non- renewable biomass” (v4.0) including the equitation used and the data source as required by the tool.

All the reference and data source used for the calculation/study has been listed and assessed by the VVB.

In line with §6 of tool 30 v4 /B10/, $fNRB$ value has been compared with peer reviewed literature such as “The carbon footprint of traditional wood fuels” by Bailis and colleagues using the WISDOM method”. It has also been observed by the VVB that the resulting value is higher than the expected as per the cited peer reviewed literature. While direct comparisons between the WISDOM and CDM methodologies are only sometimes appropriate, given the different approaches of the methodologies, the following factors can contribute to variations in the $fNRB$ estimates between the two methods:/11/

More recent population statistics (2021) for Sierra Leone were used in the present study. The more recent data represents an increase in population numbers since the 2009 data utilised in the study by Bailis and colleagues.

Updated 2019 FAO forest products statistics were used in the present study, whereas the study conducted by Bailis and colleagues used 2013 FAO forest products statistics.

The approach used to determine the amount of forest that is accessible yields lower estimates in the present study when compared to the study by Bailis and colleagues. This results in a lower estimated RB and consequently increased NRB and $fNRB$.

In the present study, MAIs were calculated by means of a weighted average that is based on the forest area of three categories (i.e., primary forests, above and below 20 years secondary forests). Data from the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for “Above-ground biomass growth rates for different ecological zones” was utilised. As per the Bailis and colleagues’ article, MAI values were derived from field observations followed by an estimation of growth rates as a percentage of standing stock and IPCC values. This approach yields higher MAIs compared to IPCC values leading to lower estimations of non-renewable biomass (NRB).

On the basis of the review of the tool 30 version 4, and the $fNRB$ report provided by the PP the above information is deemed acceptable. Thus, in the opinion of validation team, the calculation of $fNRB$ is correct and in line with the CDM Methodological tool: Calculation of the fraction of non-renewable biomass (v4.0) and thus acceptable to the validation team.

This project activity would achieve a total emission reduction of 16,907,902tCO₂e in the 07-year crediting period and an average of 2,113,488 tCO₂e per year as indicated in the Joint PD & MR /01/ and also in the ex-ante ER spread sheet/02/.

In conclusion, all values used in the Joint PD & MR /01/ to calculate emission reductions are considered reasonable in the context of the proposed grouped project “DelAgua Clean Cooking Grouped Project in Sierra Leone” and calculation approach is correct.

Table 7:Parameters ex-ante and ex-post.

Sl.No.	Parameters/01/	Methodology(B02)	Description/01/
1	Bold	VMR0006	Description: Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices Monitoring Method and Frequency of monitoring: This parameter has been fixed ex-ante. The survey revealed that the average wood consumption in the Seirra Leone 8.321 tonnes/device/year. The sampling was done in line with para 8.4-b of applied methodology using CDM guideline: Sampling and Survey for CDM project activity and programme of activity, version 4.0. Quantitative measurement of fuel wood which is the primary fuel, done with a weighing scale and moisture meter⁹ and its consumption was measured for 3 consecutive days in the sampled households, visiting those households on 4 consecutive days.
3	np	VMR0006	Description: Efficiency of project stove at the start of project activity Monitoring Method and Frequency of monitoring: This data is fixed ex-ante as per applied methodology VMR0006 ver. 1.1.
4	NCV_{biomass}	VMR0006	Description: Net calorific value of the non-renewable woody biomass
5	<i>EF_{wf CO2}</i>	VMR0006	Calculation of emission reductions
6	<i>EF_{wf non-CO2}</i>	VMR0006	Description: Non-CO2 emission factor for woody biomass

⁹ The moisture meters employed were newly acquired on July 12, 2022, and were therefore under factory calibration at the time of the KPTs. The subsequent calibration is due on July 11, 2023.

Sl.No.	Parameters/01/	Methodology(B02)	Description/01/
7	Leakage Factor	VMR0006	Description: net to gross adjustment factor to account for the leakage
8	$f_{NRB,y}$	VMR0006	Description: Fraction of woody biomass that can be established as non-renewable biomass The value is sourced from third party report by C4 EcoSolutions for host country Sierra Leone, is prepared in line with TOOL30 version-04.
9	η_{old}	VMR0006	Description: If the device is a three stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney, a default value of 0.1 is used as per the applied methodology; for other types of devices, a default value of 0.2 is used. Calculation Method: During the ICS distribution, the PP ensures that ICS are distributed only to users who's primary cookstove was a 3-stone fire or traditional wood stove by signing a poster agreement (carbon rights agreement). Some households might also have charcoal stoves alongside the 3-stone fire stove or traditional wood stove, but their primary stove remains the 3-stone fire stove or traditional wood stove. After receiving the ICS, these households might stop using the 3-stone fire and use the improved wood stove (DelAgua stove) but may occasionally use the traditional charcoal stove. Given that the DelAgua ICS only replaces 3-stone fire stoves or traditional wood stoves in the household, the use of an efficiency value of 0.1 for η_{old} is appropriate. However, as a conservative measure, the PP has decided to incorporate the 12% usage of traditional charcoal stoves and 1% of other type of stoves into the nold calculation by applying a value of 0.2 for

Sl.No.	Parameters/01/	Methodology(B02)	Description/01/
			these 13% and calculating the weighted average values as follows: Weighted average value of nold $= (2090 * 0.87 * 0.1 + 2090 * 0.13 * 0.2) / 2090$ $= 0.1130$
10	$\eta_{new,y,i,j}$	VMR0006	Description: -Efficiency of the improved cookstoves will be estimated each year using equation (5) above where loss in efficiency per year is calculated, and therefore no direct measurement is involved. Monitoring Method and Frequency of monitoring: - To adopt Option V given in the methodology: "Efficiency of the improved cookstoves to be estimated using equation 6 above where loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored" can be used by PP.
11	Life Span	VMR0006	Description: - State the operating lifetime of project device for projects opting Equation 6 (above) for updating project stove efficiency during project crediting period. Monitoring Method and Frequency of monitoring: - Manufacturer's specification has been checked once at the time of project stove installation. -The manufacturer's specifications mentions the operational lifetime of both the stove models included under the grouped project activity as 10 years which founds to be appropriate. Once the project stove has been operational for 10 years from the date of commissioning, the emission reduction from each stove can be claimed. For further claiming VERs, PP will replace the project stove with newer, improved cookstoves, subject to baseline applicability at the time of replacement. The value applied was found valid and correct.
12	Date of commissioning of batch j	VMR0006	Description: To establish the date of commissioning, the Project Participant may opt to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch. Monitoring Method and Frequency of monitoring: - The start date for this Grouped Project is 22-

Sl.No.	Parameters/01/	Methodology(B02)	Description/01/
			February-2023, which is the first date from which actual distribution of ICS started. However, the first crediting renewal period is from 22-February-2023 to 21-February-2030, including both the dates.
13	μy	VMR0006	Description: This parameter should be monitored using one of the following methods: If the baseline cookstoves are decommissioned and no longer used, as determined by the monitoring survey its value is 0 and Bold, adjusted is equal to Bold. If both the improved cookstove and baseline cookstoves are used together then surveys shall be conducted to record the average continued operation of baseline cookstoves in a sample of households. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline cookstoves, by formulating questions and/or collecting evidences to determine the frequency of usage of both the improved cookstoves and baseline cookstoves Monitoring Method and Frequency of monitoring: Calculation of emission reductions and annually.

In accordance with section 3.25.1 of the VCS Standard (version 4.4) /B01/ all documents and records will be kept in a secure and retrievable manner for at least two years after the end of the project crediting period. The data collecting and management methods as provided in section 5.3 of the VCS Joint PD & MR /01/ are acceptable to the validation and verification team. The validation and verification team interviewed representatives of PP and it was established that the database of all the project equipment distributed by PP is created and maintained. The entire database will be kept protected by PP for a period of more than two years after the end of crediting period.

The validation and verification team considers that the means of implementation of the monitoring plan, including the data management, monitoring equipment and quality assurance and quality control procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the proposed project therein can be reported ex post and verified. In addition, the sampling plan meets the requirements of the monitoring methodology VMR0006 (version 1.1) /B02/ and the Standard of Sampling and Surveys of CDM project activities and Programme of Activities (version 09.0) /B04/ and Guidelines for sampling and surveys for CDM project activities and Programme of Activities (version 04) /B08 /.

Validation and verification team confirms that the overall monitoring plan complies with the requirements of the methodology VMR0006 (version 1.1) /B07, the monitoring arrangements describes in the monitoring plan are feasible within the project design and the project proponents will be able to implement the described monitoring plan. All relevant data will be archived electronically and further maintained for the entire crediting period plus two years. Based on the above assessment the validation team concludes that the PP is capable of implementing the monitoring plan and hence confirms compliance of VCS guidelines and the applied methodology /B07/.

3.5 Non-Permanence Risk Analysis

This is not applicable to the project activity as the Project is not an AFOLU (Agriculture, Forestry and Other Land Use) project.

4 VERIFICATION FINDINGS

4.1 Accuracy of GHG Emission Reduction and Removal Calculations

The equations and choices provided in the methodology and all other methodological tools are correctly quoted in the Joint PD & MR /01 /. The emission reductions of the project instances of the project and project activity instance are calculated using the formulae mentioned in the applied methodologies; VMR0006 version 1.1/B07/. The validation and verification team has reviewed the emission reduction spread sheets (ER sheets) and checked all the formulae and found they are correct and are in accordance with the monitoring plan of the PD and the applied monitoring methodology.

According to applied methodology VMR0006 (version 1.1) /B07/ the emissions are calculated as below:

Baseline Emission

The improved cookstove is introduced as energy efficiency measure in the project, therefore equations 1 and 2 of the methodology will be applied to calculate the net GHG emission reductions.

$$ER_y = \sum_i \sum_j ER_{y,i,j} \quad \text{Equation (1)}$$

Where:

i	=	Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire
j	=	Indices for the situation where there is more than one batch of improved cookstove of type i
ER_y	=	Emission reductions during year y in t CO ₂ e
$ER_{y,i,j}$	=	Emission reductions by improved cookstove of type i and batch j during year y in t CO ₂ e

and;

$$ER_{y,i,j} = B_{y,savings,i,j} \times NCV_{wood\ fuel} \times f_{NRB,y} \times (EF_{wf,CO_2} + EF_{wf,non\ CO_2}) \times N_{y,i,j} \times 0.95 \quad \text{Equation (2)}$$

Where,

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per improved cookstove of type i and batch j during year y
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (fNRB)
$NCV_{wood\ fuel}$	=	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)
$EF_{wf,CO2}$	=	CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO ₂ /TJ)
$EF_{wf,non\ CO2}$	=	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO ₂ /TJ)
$N_{y,i,j}$	=	Number of improved cookstoves of type i and batch j operating during year y
0.95	=	Discount factor to account for leakage

The quantify of woody biomass saved $B_{y,savings,i,j}$ due to implementation of improved cook stoves will be estimated using Equations 3 of applied approved methodology:

$$B_{y,savings,i,j} = B_{old} \times \left(\frac{1-\eta_{old}}{\eta_{new,i,j}} \right) \quad \text{Equation (4)}$$

Where,

$\eta_{new,y,i,j}$	=	Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y Alternatively, efficiency may be determined using Equation 4.
B_{old}	=	Annual quantity of woody biomass that would have been used in the absence of the project activity (in tonnes per device) to generate useful thermal energy equivalent to that provided by the improved cook stove. The value of Bold can be sourced from historical data or baseline surveys.

The efficiency of the project stoves can be estimated using equation below

$$\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94 \quad \text{Equation (5)}$$

where,

η_p = Efficiency of project stove (fraction) at the start of project activity.

$(DF_n)^{y-1}$ = Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.

0.94 = Adjustment factor to account for uncertainty related to project cookstove efficiency test.

In order to address the potential source of leakage which can be attributed to diversion of non-renewable biomass saved by project devices to non-project households which previously used renewable biomass; a net to gross adjustment factor of 0.95 is applied to $ER_{y,i,j}$.

If project households continue to use baseline cookstoves along with improved cookstoves, B_{old} shall be adjusted ex-post based on the percentage of project households found to continue such practice according to Equation 6 below. For such cases, the quantity of woody biomass saved $B_{y,savings,i,j}$ due to implementation of improved cook stoves shall be calculated using an adjusted value to account for ex-post use of baseline stoves in addition to improved cookstove.

$$B_{old,adjusted} = B_{old} \times (1 - \mu_y) \quad \text{Equation (6)}$$

Where:

$B_{old,adjusted}$	=	Adjusted B_{old} to account the ex-post usage of firewood in baseline cookstove(s) by project households in addition to improved cookstove (in tonnes per device)
μ_y	=	Baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves.

The calculation for MP-1 has been reproduced below:

Data Ex Ante	Unit	Value	Source
B_{old}	tonnes/HH/ year	8.321	Baseline KPT.
$f_{NRB,y}$	Fraction	0.68	Fixed ex ante.
$E_{wf,non\ CO_2} + E_{wf,CO_2}$	tCO ₂ e/TJ	138.23	As per the methodology
LE	Fraction	0.95	As per the methodology
$NCV_{biomass}$	TJ/tonne	0.0156	As per the methodology
$\eta_{old,i,j}$	Percentage	11.30%	Project Survey

Data Ex Post	Unit	Value	Source
N_{total}	Number	2,090	ICS Installation database
$\eta_{new-skirt}$	Fraction	0.4822	Calculated using Eq.5 of VMR0006
$\eta_{new-nonskirt}$	Fraction	0.4080	Calculated using Eq.5 of VMR0006
% usage-Skirt	Percentage	84.55%	Monitoring survey
$\eta_{new,i,j}$	Fraction	0.4707	Calculated
μ_y	Fraction	0.27	Monitoring survey
Bold_adjusted	Tonnes/year	6.09	Calculated
$B_{y,saving}$	Tonnes/year	4.63	Calculated as per equation 3 of VMR0006 by using the above input values.
$ER_{y,i,j}$	tCO ₂	2,078	Calculated
Emission Reduction (ER)	tCO₂e	2,078	

Sample VCU estimates (based on the calculation for first year of ICS monitoring estimates):

If the baseline stove usage is 27% of the total cooking in the first year, then the factor μ_y will be 0.27.

Sampling Plan:

The sampling plan is intended to enable the discovery of unbiased and reliable estimates of monitored parameter values used in the GHG emission reduction calculations. The sampling plan design is based on the CDM Guideline: Sampling and surveys for CDM project activities and programmes of activities, version 4.

Sampling Design:

Objectives and Reliability Requirements –

The Sampling activities are defined at the Grouped Project-level and the sampling plan presented here will apply to assess parameter values in PAIs to be included in the GP, either individually or in groups.

Samples will be calculated on a 95/10 confidence/precision for individual PAIs on an annual basis, or 95/10 confidence/precision basis for groups of PAIs or sampling on a biennial basis. This is in accordance with Para 11 of the CDM Sampling Standard, ver. 09.0.

In cases where the confidence/precision are not achieved, the lower bound of the confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts.

Parameter values may be estimated by applying a sampling in accordance with the latest version of the CDM Sampling Standard for a single PAI or a group of PAIs. A single sampling plan covering

a group of PAIs is justified when either the homogeneity of included PAIs relative to the parameters of interest can be demonstrated or the differences among the included PAIs is taken into account in the sample size calculation.

Target Population –

The target population is the combined unique entries of ICS users by PAI in the monitoring database from which the sample is being drawn.

Sampling Method –

For each survey, the sampling method is determined by using a random sample of the total population of distributed ICS from records generated in the monitoring database and based on the precision requirements listed above, and as required by the methodology and guidance in the CDM Sampling Standard.

Cross-PAI sampling may be carried out. In such cases, 95/10 confidence/precision will be applied.

The monitoring parameters to be monitored through the sampling plan are:

Table 4:- Parameters monitored ex-post

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of VCS PD):	Number of project devices of type i and batch j operating during year y ($N_{y,i,j}$)
Measuring frequency/Time Interval:	At least once every two years
Reporting frequency:	At least once every two years
Reported value:	PAI1: $2,090 * 88\% = 1,838 * 88\%$ - Factor accounting for the drop-off of the project ICS during the monitoring period.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from monitoring survey of samples
Is accuracy of the monitoring equipment as stated in the	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with VCS PD
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR has been compared with monitoring survey records /08/ and the ER sheet /02/.
How were the values in the monitoring report verified?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of VCS PD):	Efficiency of the improved cookstove type i and batch j during year y ($\eta_{new,y,i,j}$)
Measuring frequency/Time Interval:	Annually
Reporting frequency:	Annually

Monitoring Parameter Requirement	Assessment/ Observation by the VVB			
Reported value:	Crediting Period Year	Kuniokoa Efficiency value		
		With pot skirt	Without pot skirt	Weighted Average
	Year-1	0.4822	0.4080	0.4707
	0.51 at start of operation. The project stove efficiency as per manufacturer taken as 51.3% and 43.4% for usage with pot skirt and without respectively for Burn Kuniokoa stove. For estimation of ERs, it is assumed that 5% user may not use pot skirt due to various reasons/occasions, hence weighted average efficiency for year 1 is calculated as below. Year 1 efficiency of project stove with pot skirt- 48.22% Year 1 efficiency of project stove without pot skirt- 40.80% Hence, effective efficiency is calculated as The pot skirt usage rate was 84.55%. Hence weighted average value was calculated = $(0.4822 * 84.55\%) + (0.4080 * (1 - 84.55\%)) = 0.4707$			
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes			
Details of monitoring equipment:	Value is calculated in the ER spread sheet /02/			
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA			
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA			

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Is the calibration interval in line with the monitoring plan of VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with VCS PD
Company performing the calibration (internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR/01/ has been compared with the ER sheet /02/.
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Kuniokoa ICSs were only distributed under the PAI. Hence, $\eta_{new,i,j}$ value is determined in line with equation 5 of the applied methodology for year 1 for Kuniokoa ICS model. The usage of pot skirts by the households was recorded during the monitoring survey and was taken into account for calculating the ERs. During the current MP, 84.55% of users are using Pot Skirt, while the remaining 15.45% are using without pot skirt. The $\eta_{new,i,j}$ value during ex-post computation has been changed to accommodate for this and the ER sheet. The values provided by the PP were verified from the ER sheet and the calculations were checked which was found to be appropriate. The values

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
	were also found to be consistent with the JPD-MR and the ER sheet/02/. VVB has assessed the ER sheet version 7 where PP has captured the information on use of pot skirt per week during the survey from Column CF in the excel worksheet/02/ "Ex-post Sample Survey "and cell D42 in the worksheet "Ex-post Survey results". The respective column and cell were accidentally hidden previously and hence the wrong data was linked to cell C10 of the worksheet "Data & Parameters-MP1". Now. PP has corrected the references, resulting in usage of pot skirt is being 84.55% against 92.31% in the earlier version.

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of VCS PD):	<i>η_{old}</i> Efficiency of baseline stove
Measuring frequency/Time Interval:	Annually
Reporting frequency:	Annually
Reported value:	11.30%
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value is calculated in the ER spread sheet /02/
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of VCS PD? If the VCS PD does	NA. QA/QC procedures stated in MR comply with VCS PD

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	
Company performing the calibration (internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR/01/ has been compared with the ER sheet /02/.
How were the values in the monitoring report verified?	The monitoring samples checked by VVB at the time of on-site visit were questioned on the baseline device and baseline fuel type and all the responses were checked with the available information in the monitoring survey. VVB has assessed the results of the baseline survey along with KPT result provided by the PP in the Excel worksheet "KPT_DataAndCalc_SierraLeone". With baseline survey results it is confirmed that in 100% of household's surveys, primary cooking device was an unimproved wood fuel stove. VVB confirmed the same through carbon rights agreement. However, during this joint validation & verification, Monitoring surveys, results show that along with project ICS, 13% of end users have secondary stoves in their households. Specifically 12% charcoal stoves and 1% another type of stoves as continued usage of baseline stoves (refer "Column BK" of the tab Ex-post Sample Survey and CELL D33 TAB:Expost survey results). Whilst the project baseline focused on primary stoves and found 100% of households cooking on unimproved wood devices, the PP took a conservative approach to incorporate the presence of these secondary stoves into the calculation for n_{old}. The efficiency of 10% for unimproved wood stove and 20% for the other stove uses as per VMR0006 version 1.1 methodology. The PP then took the weighted average of the project population

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
	(2,090) with 13% of stoves at 0.2 and 87% of stoves at 0.1 of baseline thermal efficiency to calculate n_{old}. This resulted in the use of a value of 0.1130 for the parameter n_{old}. VVB has updated the same in section 4.1 of the JVVR, version 8. Furthermore, VVB has raised a FAR in Appendix 4 of version 3 of the validation report to evaluate the conservativeness of the n_{old} value in future monitoring periods.
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of VCS PD):	Date of commissioning of batch j
Measuring frequency/Time Interval:	Annually
Reporting frequency:	Annually
Reported value:	22-February-2023 (date when the first ICS under the PAI-1 is commissioned)
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value is calculated in the ER spread sheet /02/

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with VCS PD
Company performing the calibration (internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR/01/ has been compared with the ER sheet /02/.
How were the values in the monitoring report verified?	Through distribution database and carbon contract.
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
been applied or has a request for deviation been approved?	

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of VCS PD):	μy
Measuring frequency/Time Interval:	At least once every two years
Reporting frequency:	At least once every two years
Reported value:	0.27
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from ER calculation /02/
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration of weighing scales used for measuring the fuel wood was done in house before start using on site. QA/QC procedures stated in MR/01/ comply with VCS PD.
Company performing the calibration (internal or external calibration):	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR has been compared with the ER sheet /02/.
How were the values in the monitoring report verified?	As checked from the monitoring survey results carried out for the first monitoring period, the end users were using the pre-project devices at around 27% of the total cooking events. The value of the parameter was found as acceptable, and sufficiently fulfilling the methodological requirements.
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data from monitoring survey and reporting of emission reductions and all necessary QA/QC processes are in place.
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data from monitoring survey /08/ and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

VVB validated that as per the measurement method described in the methodology for the parameter, “The surveys should be designed to capture the cooking habits and stove usage of households in the

region, including quantification of use of baseline cookstoves, by formulating questions and/or collecting evidence to determine the frequency of usage of both the improved cookstoves and baseline cookstoves”.

Hence, PP has separate questions to capture the value for parameter μ_j . The 41% only indicates the percentage of households using baseline stove along with project stove but does not indicate the frequency of usage. However, the subsequent questions “How many times a week are you using a stove that is not the Live Well stove?” and “How many times a week are using the Live Well stove?” capture the frequency of usage and help quantify the use of baseline stove. The actual utilization of the baseline stove is determined by taking the ratio of “the number of times per week the stove is used, that is not the live well stove” to the “total number of cooking events per week” in line with the applied methodology. For a detailed calculation, refer to cell D39 on the ‘Ex-post Survey results’ tab in the ER sheet, version 7.

VVB confirms that all parameters are used correctly in the calculations, all results are verifiable and transparent, all assumptions are described and based on verifiable evidence and calculations are done in accordance with the pre-defined formulae from registered VCS Joint PD & MR /01/. The total number of emission reductions for the monitoring period from 22nd February 2023 to 30th April 2023 is 2,078 tCO_{2e}.

VVB has checked and confirmed the calculations in the spreadsheet and found to be accurate. The monitoring report is supported by an emission reduction spreadsheet and the selection of PP sampling plan with 95/10 precision confidence in line with CDM Guideline: Sampling and Survey for CDM PA and PoA version 4.0/B08/. The consistency and formula were verified and found to be accurate.

VVB has cross checked various registry webpages like UNFCCC, VERRA, GCC etc. to confirm that no project with similar project existed in any of the registries and confirmed that within the project boundary there is no other project registered or seeking registration under any GHG program, PP has updated this in section 1.15.1 of the JPD-MR.

4.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

When verifying the reported emission reduction, CCIPL ensured that there was a clear audit trail that contained the evidence and records that verify the stated figures. All source documents that form the basis for assumptions and other information underlying the GHG data are shown above.

When assessing the audit trails, CCIPL also examined:

1. whether sufficient evidence was available, both in terms of frequency and in covering the full monitoring period
2. the source and nature of the evidence
3. if comparable information was available from sources other than that used in the monitoring report, CCIPL cross-checked the monitoring report against the other sources to

confirm that the stated figures were correct. The sources and the data referenced are shown in Appendix 1 below.

CCIPL also assessed that the data collection system met the requirements of the monitoring plan as per the applied methodology.

Proper data management inclusive of data acquisition and aggregation, data management system is being followed for the project activity.

The monitoring personnel at site are well trained and follow reproducible routines. Thus, they are competent to carry out the relevant tasks with sufficient accuracy.

5 VALIDATION AND VERIFICATION OPINION

The Project Proponent, “DelAgua Clean Cooking Grouped Project in Sierra Leone”, has commissioned the VVB, Carbon Check (India) Private Ltd. to perform a Joint validation and verification of the VCS Project Activity “DelAgua Clean Cooking Grouped Project in Sierra Leone”. This report summarizes the findings of the validation and verification of the project, performed on the basis of VCS criteria, as well as criteria given to provide for consistent project operations, monitoring, and reporting.

The validation and verification process were performed on the basis of all guidance and criteria as provided in VCS Standard version 4.4 /B01/, VCS Program Guide version 4.3 /B02/, VCS Validation and Verification Manual version 3.2/B01/ and Registration & Issuance Process version 4.3/B02/.

The project activity provides the information in Joint PD & MR /01/ as required by the VCS Standard /B01/ and Validation and Verification Manual /B03/ and in Carbon Check’s opinion meets the requirements of the applied baseline and monitoring methodology, VMRO006 version 1.1 /B07/and is likely to achieve the estimated emission reductions. The joint validation and verification have been performed using a risk- based approach, as described above. The expected annual average emission reductions from the project activity are 2,113,488 tCO₂e and 16,907,902tCO₂e over the 7 years of crediting period.

Table 8:Estimated GHG emission reductions or removals (tCO₂e)

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
22 Feb 2023 – 31 Dec 2023	1,62,903
01 Jan 2024 – 31 Dec 2024	15,82,965
01 Jan 2025 – 31 Dec 2025	31,65,835
01 Jan 2026 – 31 Dec 2026	30,70,912
01 Jan 2027 – 31 Dec 2027	29,46,131
01 Jan 2028 – 31 Dec 2028	28,61,022
01 Jan 2029 – 31 Dec 2029	27,32,348
01 Jan 2030 – 21 Feb 2030	3,85,786
Total estimated ERs	16,907,902

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Total number of crediting years	7
Average annual ERs	2,113,488

VVB has referred country specific UN data¹⁰ and found that as per the estimates released in year 2022, 6,120 thousand Cubic metres of firewood is produced in the country. This corresponds to an annual production of 4,437,000 tons of firewood as shown in the table below:

Country or Area	Commodity - Transaction	Year	Unit	Quantity
Sierra Leone	Fuel Wood - Production	2022	Cubic metres, thousand	6,120

Parameters	Value	Unit
Annual Fuel Wood Production (excluding Commercial usage) ¹¹	6,120,000	Cubic Meters
Density of Wood ¹²	0.725	t/cubic meter
Annual Fuel Wood Production	4,437,000	t
NCV ¹³	0.0156	TJ/Ton
EF ¹⁴	112	tCO ₂ e/TJ
Emissions	7,752,326.4	tCO ₂ e

VVB evaluated that considering Wood density of 0.725 t/cubic meter, 0.0156 TJ/ton Wood NCV and 112 tCO₂e/TJ emission factor, the annual emission of Sierra Leone from firewood remains 7.75 million tCO₂e. whereas the average annual emission reduction estimated by PP is 2.19 million per annum which is approx. 28.26% of the total emissions from firewood only. Thus, the estimated yearly GHG emission reductions to be achieved by the project are plausible and feasible.

Carbon Check (India) Private Ltd concludes the validation with a positive opinion that the VCS Project Activity “DeAgua Clean Cooking Grouped Project in Sierra Leone”, as described in the VCS Joint PD & MR (version 5,) , meets all the applicable VCS requirements, including those specified in the Project Standard, relevant methodology, tools, and guidelines.

The selected baseline and monitoring methodology, VMR0006, Version 1.1/B07/ is applicable to the project and correctly applied. Carbon Check (India) Private Ltd therefore requests the registration of the project as a VCS project activity.

¹⁰ <https://data.un.org/Data.aspx?q=sierra+leone+datamart%5bEDATA%5d&d=EDATA&f=cmID%3aFW%3bcrID%3a694>

¹¹ <https://data.un.org/Data.aspx?q=sierra+leone+datamart%5bEDATA%5d&d=EDATA&f=cmID%3aFW%3bcrID%3a694>

¹² <http://www.fao.org/3/a-i6935e.pdf>

¹³ [IPCC default for wood fuel/ VMR0006-Methodology-for-Installation-of-High-Efficiency-Firewood-Cookstoves-v1.1.pdf \(verra.org\)](#)

¹⁴ [IPCC default for wood fuel/ VMR0006-Methodology-for-Installation-of-High-Efficiency-Firewood-Cookstoves-v1.1.pdf \(verra.org\)](#)

The VVB confirms that the project has been implemented in accordance with the Joint PD & MR/01/.

Monitoring period: From 22-February-2023 to 30-April-2023. During this monitoring period total 108 and 137 samples selected for monitoring and KPT survey respectively. And out of these samples DOE has selected 16 numbers of sample i.e., 8 for monitoring survey and 8 for KPT survey. All monitoring surveys were conducted between 22-February-2023 to 30-April-2023.

VVB used acceptance sampling during verification for checking the PP's sample size. In accordance with the §31 and §32 of the sampling standard, version 09/B08-1/, a sample size of 8 was required based on an AQL of 0.5 % and UQL of 20 %, producer risk 5 % and consumer risk 20 %. The AQL and UQL selected is based on the Table 2 of the sampling standard, version 09/B08-1/ and complies with the requirements provided in §31 and §32 of the sampling standard, version 09/B08-1/. Acceptance number (c) thus determined for the sample is 0. It was observed that out of the 8 samples for monitoring surveys, all 8 stoves were found to be operational and SDG responses also matched with the household respondents. Thus, PP's sample has been accepted with an acceptance number of c=0.

VVB used acceptance sampling during validation of baseline surveys for checking the PP's sample size. In accordance with the §31 and §32 of the sampling standard, version 09/B08-1/, a sample size of 8 was required based on an AQL of 0.5 % and UQL of 20 %, producer risk 5 % and consumer risk 20 %. The AQL and UQL selected is based on the Table 2 of the sampling standard, version 09/B08-1/ and complies with the requirements provided in §31 and §32 of the sampling standard, version 09/B08-1/. Acceptance number (c) thus determined for the sample is 0. The baseline survey results were cross-checked with the household respondents, and it was confirmed that the baseline KPTs were conducted at the households. It was observed that out of the 8 samples for baseline surveys and KPTs, the responses matched with the PP's record. Thus, PP's sample has been accepted with an acceptance number of c=0.

The first monitoring period for the project activity is 22-February-2023 to 30-April-2023. 2,090 improved cookstove distributed during current monitoring period and the actual emission reduction achieved during current monitoring period is 2,078 tCO₂e.

Table 9:Net GHG emission reductions or removals (tCO₂e)

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
22/02/2023 - 30/04/2023	2,078	-	-	2,078
Total	2,078	-	-	2,078

The verification team is of the opinion that the project has been implemented in accordance with the joint PD & MR. The monitoring complies with the MP and the monitored data and calculation of ERs are assessed and confirmed as correct.

Therefore, CCIPL hereby certifies, and requests the issuance of, the reported ERs during the monitoring period of 22-February-2023 to 30-April-2023 amounting to 2,078 tCO₂e to the VCS Registry.

Table 10:Percentage difference for ex-ante and achieved ERs with justification.

<u>Ex-ante emissions reductions /removals</u>	<u>Achieved emissions reductions /removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
31,425	2,078	-93.15%	The decrease in emission reduction is mainly due to ICS distributed in phases during current monitoring period and average operational age of ICS are significantly lower than number of days in current monitoring period, which is appropriate. Additionally, actual sales is also lower than the projected sales.

APPENDIX 1.1: REFERENCE DOCUMENTS

Ref	Document
/01/	Joint Project description and Monitoring Report titled: a) DelAgua Clean Cooking Grouped Project in Sierra Leone, Version 2 dated 17-June-2023 b) DelAgua Clean Cooking Grouped Project in Sierra Leone, Version 3 dated 19-June-2023 c) DelAgua Clean Cooking Grouped Project in Sierra Leone, Version 4 dated 27-June-2023 d) DelAgua Clean Cooking Grouped Project in Sierra Leone, Version 7 dated 01-April-2024 e) DelAgua Clean Cooking Grouped Project in Sierra Leone, Version 8 dated 21-June-2024
/02/	- ER calculation spreadsheet, version 4 dated: 26-June-2023 - ERS_3837_v7_public_01-April-2024 - ERS_3837_v8_public
/03/	Stove manufacturers emission and performance test protocol (EPTP)
/04/	Technical specifications of the project stoves including their efficiency 50.10% efficiency adjustable skirt
/05/	Clean cooking catalog - stove.
/06/	Declaration(s) from Project proponent on the following: DelAgua Clean Cooking Grouped Project in Sierra Leone
/07/	Double counting risk declaration
/08/	Local stakeholders meeting related evidence.
/09/	Global Forest Watch – Sierra Leone
/10/	Quality control organizational structure.
/11/	fNRB calculation done by C4 EcoSolutions (Pty) Ltd. KPTs, Monitoring Survey with Training and KPT Training Certificate
/12/	Total distribution Records (TDR)
/13/	Calculation of fNRB along with all supporting evidence: fNRB Sierra Leone_DelAgua_report_17 Mar 2023_CDM Tool30 v4.0
/14/	Evidence for the start date of the project activity for each district in Sierra Leone
/15/	Company registration certificate DelAgua
/16/	Declaration on no legal dispute/contest related to project.
/17/	WBT / Manufacturer stove – https://www.burnstoves.com/ Clean Cooking Catalog - Functional Demo (cleancookstoves.org)
/18/	KPTs_DataAndCalcs_SierraLeone_Annoymised_Submit to VERRA_050324
/19/	Sample size cal_BS
/20/	Rondereza Cookstove Photos

/21/	Purchase Receipt of _Moisture Meters (date: 11 th July 2022) and Extech M050 Moisture Meter _User Manual
/22/	SL Grievance Registry - Updated June 2023
/23/	Carbon Right Agreement Signed Copy

APPENDIX 1.2: BACKGROUND DOCUMENTS

Ref	Document
/B01/	VCS Standard (v4.4)
/B02/	VCS Program Guide (v4.3) and VMR0006 version 1.1
/B03/	VCS Validation and Verification Manual version 3.2
/B04/	Registration & Issuance Process (v4.3)
/B05/	VCS Programme Definitions version 4.3
/B06/	VCS JPD-MR template version 4.2
/B07/	Applied baseline and monitoring methodology, VMR0006 (version 1.1)
/B08/	a. "Standard for sampling and surveys for CDM project activities and programme of activities" (version 09.0) Guidelines for sampling and surveys for CDM project activities and Programme of Activities (version 04)
/B09/	https://cdm.unfccc.int/
/B10/	CDM Tool 30: Calculation of the fraction of non-renewable biomass, Version 4.0
/B11/	- CDM approved small scale methodology, AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass (version 11.1) - Sierra Leone Action Plan Agenda Document. - Grievance Log book - Carbon Contract/End user agreement

APPENDIX 2: ABBREVIATIONS

CDM	Clean Development Mechanism
BE	Baseline Emission
CAR	Corrective Action Request
CC IPL	Carbon Check (India) Private Ltd.
CDM	Clean Development Mechanism
CL	Clarification Request
CO ₂	Carbon Dioxide
CO _{2e}	Carbon Dioxide Equivalent
DPR	Detailed project report
DVR	Draft Validation Report
EB	CDM Executive Board
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
FVR	Final validation Report
GHG	Greenhouse gas(es)
GWh	Giga Watt Hour
IPCC	Intergovernmental Panel on Climate Change
MW	Mega Watt
MWh	Mega Watt Hour
NA	Not Applicable
OSV	On Site Visit
PD	Project Description
PP	Project Proponent
QC/QA	Quality control/Quality assurance
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VC SA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VVB	Validation Verification Body
VVM	Validation and Verification Manual
VVS	Validation and Verification Standard

APPENDIX 3: CERTIFICATES OF COMPETENCE



Carbon Check (India) Private Limited

Certificate of Competency

Mr. Harish Sharma

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC 14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

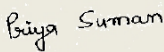
☒ Validator	☒ Verifier	☒ Team Leader	☒ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ CCB Expert	☐ Legal Expert	☒ Financial Expert	☐ Environmental, Health and Safety financial matters
☒ SDG+	☒ Social no-harm(S+)	☒ Environment no-harm(E+)	
☒ Local Expert for India			

in the following Technical Areas:

☒ TA 1.1	☒ TA 1.2	☐ TA 2.1	☒ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☒ TA 13.1	☐ TA 13.2
☐ TA 14.1	☐ TA 15.1	☐ TA 16.1		

Issue Date

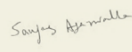
5th December 2023



Ms. Priya Suman
Compliance Officer

Expiry Date

31st December 2024



Mr. Sanjay Kumar Agarwalla
Technical Director

Revision date	Summary of changes
2022	Initial Adoption
Jan 2023	Annual revision
Dec 2023	Change in the template due to revision in TA and function

CC IPL FM 7.9 Certificate of Competency_V4.0_112023

¹ Please refer to previous version of FM 7.9 for the revision history



Carbon Check (India) Private Limited

Certificate of Competency

Mr. Siddhant Bankar

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC 14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

☒ Validator	☒ Verifier	☐ Team Leader	☒ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ SDG+	☐ Social no-harm(S+)	☐ Environment no-harm(E+)	☐ CCB Expert
☐ Financial Expert	☒ Local Expert for India		

in the following Technical Areas:

☐ TA 1.1	☒ TA 1.2	☐ TA 2.1	☒ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☒ TA 13.1	☐ TA 13.2
☐ TA 14.1	☐ TA 15.1			

Issue Date

1st January 2023

Expiry Date

31st December 2023



Mr. Vikash Kumar Singh
Compliance Officer



Mr. Amit Anand
CEO

CCIPL_FM 7.9 Certificate of Competency_V2.1_012023



Carbon Check (India) Private Limited

Certificate of Competency

Jonathan Brython-Baion

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC 14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

☐ Validator	☐ Verifier	☐ Team Leader	☐ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ CCB Expert	☐ Legal Expert	☐ Financial Expert	☐ Environmental, Health and Safety financial matters
☐ SDG+	☐ Social no-harm(S+)	☐ Environment no-harm(E+)	
☒ Local Expert for Sierra Leone			

in the following Technical Areas:

☐ TA 1.1	☐ TA 1.2	☐ TA 2.1	☐ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☐ TA 13.1	☐ TA 13.2
☐ TA 14.1	☐ TA 15.1	☐ TA 16.1		

Issue Date

1st December 2023

Priya Suman

Ms. Priya Suman
Compliance Officer

Expiry Date

31st December 2024

Sanjay Agarwalla

Mr. Sanjay Kumar Agarwalla
Technical Director

Revision History of the document:

Revision date	Summary of changes
May 2023	Initial Adoption
Dec 2023	Template changes to include additional functions and TA

CCIPL_FM 7.9 Certificate of Competency_V4.0_112023

¹ Please refer to previous version of FM 7.9 for the revision history



Carbon Check (India) Private Limited

Certificate of Competency

Mr. Anubhav Dimri

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

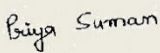
☒ Validator	☒ Verifier	☒ Team Leader	☒ Technical Expert
☒ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☒ Plastic Waste Expert
☒ CCB Expert	☐ Legal Expert	☒ Financial Expert	☒ Environmental, Health and Safety financial matters
☒ SDG+	☒ Social no-harm(S+)	☒ Environment no-harm(E+)	
☒ Local Expert for India, RSA and Spanish speaking countries			

in the following Technical Areas:

☒ TA 1.1	☒ TA 1.2	☐ TA 2.1	☒ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☒ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☒ TA 13.1	☒ TA 13.2
☒ TA 14.1	☒ TA 15.1	☒ TA 16.1		

Issue Date

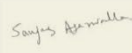
5th December 2023



Ms. Priya Suman
Compliance Officer

Expiry Date

31st December 2024



Mr. Sanjay Kumar Agarwalla
Technical Director

Revision History of the document:

Revision date	Summary of changes
2022 ¹	Annual revision
Jan 2023	Annual revision
Dec 2023	Change in the template due to revision in TA and function

CCIPL_FM 7.9 Certificate of Competency_V4.0_112023

¹ Please refer to previous version of FM 7.9 for the revision history



Carbon Check (India) Private Limited

Certificate of Competency

Mr. Campal Deepak Kadam

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

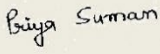
☒ Validator	☒ Verifier	☒ Team Leader	☒ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ CCB Expert	☐ Legal Expert	☐ Financial Expert	☐ Environmental, Health and Safety financial matters
☐ SDG+	☐ Social no-harm(S+)	☐ Environment no-harm(E+)	
☒ Local Expert for India			

in the following Technical Areas:

☐ TA 1.1	☒ TA 1.2	☐ TA 2.1	☒ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☒ TA 13.1	☒ TA 13.2
☐ TA 14.1	☐ TA 15.1	☐ TA 16.1		

Issue Date

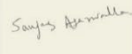
5th December 2023



Ms. Priya Suman
Compliance Officer

Expiry Date

31st December 2024



Mr. Sanjay Kumar Agarwalla
Technical Director

Revision History of the document:

Revision date	Summary of changes
Dec 2023	Initial Adoption

CCIPL_FM 7.9 Certificate of Competency_V4.0_112023

¹ Please refer to previous version of FM 7.9 for the revision history



Carbon Check (India) Private Limited

Certificate of Competency

Mr. Pankaj Kumar

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC 14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

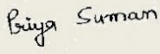
for the following functions and requirements:

☒ Validator	☒ Verifier	☐ Team Leader	☒ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ CCB Expert	☐ Legal Expert	☐ Financial Expert	☐ Environmental, Health and Safety financial matters
☐ SDG+	☐ Social no-harm(S+)	☐ Environment no-harm(E+)	
☒ Local Expert for India			

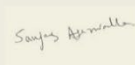
in the following Technical Areas:

☐ TA 1.1	☒ TA 1.2	☐ TA 2.1	☒ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☐ TA 13.1	☐ TA 13.2
☐ TA 14.1	☐ TA 15.1	☐ TA 16.1		

Issue Date
1st April 2024


Ms. Priya Suman
Compliance Officer

Expiry Date
31st December 2024


Mr. Sanjay Kumar Agarwalla
Technical Director

Revision History of the document:

Revision date	Summary of changes
Jan 2024	Initial Adoption

CCIPL_FM 7.9 Certificate of Competency_V4.0_112023

¹ Please refer to previous version of FM 7.9 for the revision history

APPENDIX 4: FINDINGS LOG

Table 4.1. :CLs from this Joint validation and verification

CL ID	01	Section no.	1	Date: 16/05/2023
Description of CL				
PP shall clarify the rationale behind the non-utilization of the latest version (V 4.2) of the "Joint Project Description and Monitoring Report."				
Project participant response				Date: 20/05/2023
The revised PD is prepared using latest version 4.2 available on VERRA site.				
Documentation provided by project participant				
<i>PD Version-1.2</i>				
VVB assessment				Date: 06/06/2023
VVB has assessed that the CME has now adopted latest template version 4.2, however, the template alignment is disturbed for the complete document. Also, serial number of the headings are missing from complete report. # CL 1 is open.				
Project participant response				Date: 07/06/2023
The corrected JPD/MR is attached with formatting.				
Documentation provided by project participant				
<i>PD Version-2</i>				
VVB assessment				Date: 16/06/2023
VVB has assessed the updated JPD/MR and found that the serial numbers and heading of the template are visible now. CL # 01 is closed.				

CL ID	02	Section no.	1.4	Date: 16/05/2023
Description of CL				

CL ID	02	Section no.	1.4	Date: 16/05/2023
In section 1.4 against evidence of eligibility condition 7 specific to inclusion of new PAIs. PP has proposed the sample list of the beneficiaries. PP shall clarify how the sample list can serve as evidence of eligible geographical area of new PAI?				
Project participant response				Date: 20/05/2023
There was typo error the same has been corrected in revised PD in line with VCS Standard version-4.4.				
Documentation provided by project participant				
<i>PD Version-1.2</i>				
VVB assessment				Date: 06/06/2023
Based on the response provided by CME, it is stated that all PAI within the grouped projects will be limited to the host country of Sierra Leone. CME assures that verification of this can be done through a distribution database, which will contain recorded location details of each end user.				
# CL is closed.				

CL ID	03	Section no.	2.2	Date: 16/05/2023
Description of CL				
PP shall clarify how the Continuous Input and Grievance Mechanism is ensured for stakeholders, what are the means by which a stakeholder can raise a grievance, how the stakeholders are made aware of grievance mechanism. Furthermore, PP shall submit Grievance register/logbooks snapshots for this monitoring period.				
Project participant response				Date: 20/05/2023
Measures for recording inputs and grievances from local stakeholders are already in place to account for a grievance through any media.				
The following are the channels through which the local stakeholder can communicate with the PP during the implementation of GP:				
PP (DelAgua) has a dedicated helpline for the relevant stakeholders to connect with them in case they require any assistance.				
The stakeholders may provide feedback through local representative of the DelAgua the team who are called Youth Volunteers across rural areas and are always ready to obtain any feedback from the end users and local authorities before reporting this back to a phone call to the Distribution Coordinators. Most of the feedback is expected through this medium, since a lot of people in rural area do not have access to phones.				
PP distribution team informs the end users during distribution that they may write their feedback on paper, and submit it to the nearest office, and PP team will receive it through the government officials who DelAgua				

CL ID	03	Section no.	2.2	Date: 16/05/2023
have worked closely with during the planning of the programme to identify beneficiaries and raise awareness prior to the distribution event.				
Documentation provided by project participant				
PD Version-1.2				
VVB assessment				Date: 06/06/2023
In conclusion, CME's response indicates that PP (DeAgua) has established multiple channels for stakeholders to raise grievances, including a dedicated helpline, communication with local representatives called Youth Volunteers, and the option to submit written feedback. These measures aim to ensure continuous input and address stakeholder concerns.				
#CL is closed.				

CL ID	04	Section no.	4.4	Date: 16/05/2023
Description of CL				
The VVB has identified a need for clarification from the Project Participant (PP) regarding the determination of the efficiency of the improved cook stove. Specifically, the PP should clarify whether the efficiency will be determined using the Water Boiling Test (WBT) or equation 5. Furthermore, it is recommended that from given two options, the PP consistently update and reflect the actual option chosen in all relevant sections of the Joint Project Description (PD) and Monitoring Report (MR).				
Project participant response				Date: 20/05/2023
Ex-post efficiency of the ICS will be determined using equation 5 as default degradation on a yearly basis. The same has been consistently reported in revised PD.				
Documentation provided by project participant				
PD Version-1.2				
VVB assessment				Date: 06/06/2023
VVB has updated and clarified that the equation 5 shall be used for the estimation of efficiency during project monitoring periods.				
#CL is closed.				

CL ID	05	Section no.	5.3	Date: 16/05/2023
Description of CL				
PP shall clarify for random sampling which method they have considered for generating random numbers. PP to submit the supporting evidence of the outcome of random number generator.				

CL ID	05	Section no.	5.3	Date: 16/05/2023
Project participant response				Date: 20/05/2023
The random number generated using RAND() function from distribution data to generate the required numbers as per calculated sample size.				
Documentation provided by project participant				
ER sheet				
VVB assessment				Date: 06/06/2023
Based on CME's response, it is stated that the random number generation for sampling was done using the RAND() function from the distribution data. While this provides some information, it would be necessary for PP to submit supporting evidence of the outcome of the random number generator. This evidence would help validate the randomness and integrity of the sampling process.				
In conclusion, further evidence is required to fully evaluate and confirm the appropriateness and effectiveness of the random number generation method used by PP for sampling purposes.				
#CL Is open				
Project participant response				Date: 07/06/2023
The random number generated using distribution database is attached for reference.				
Documentation provided by project participant				
<i>Sample random number generated using RAND() function</i>				
VVB assessment				Date: 16/06/2023
PP has submitted the excel worksheet presenting the Random numbers.				
CL #05 is closed.				

Table4.2 :CARs from this Joint validation and verification

CAR ID	01	Section no.	1.1	Date: 16/05/2023
Description of CAR				
Based on the findings from VVB's meeting with stakeholders and Delagua officials, it has been identified that the initial plan for the pilot phase involves the distribution of only 20,000 cookstoves. In light of this, CME shall provide further clarification on the phased distribution plan for the number of Improved Cookstoves (ICS).				
Project participant response				Date: 20/05/2023

CAR ID	01	Section no.	1.1	Date: 16/05/2023
To understand the cooking practices in Sierra Leone more thoroughly the PP decided to do a smaller scale pilot than originally planned at project inception. This was to build a greater understand of cooking practices to create a more informed education campaign for the larger roll out of stoves. Now that the pilot stage distribution of over 2,160 stoves has been completed the PP has updated its education campaign and is ready to roll out additional stoves in the future. Further stoves will be added to the project after the commencement of the validation and verification process. The same has been incorporated in the revised PD.				
Documentation provided by project participant				
PD Version-1.2				
VVB assessment				Date: 06/06/2023
The VVB through its observations during site visit has assessed that the PP has taken necessary steps to adapt and refine their approach based on the insights gained during the pilot phase. The rest of cookstoves shall be distributed phase wise and records shall be maintained accordingly.				
# CAR 1 is closed.				

CAR ID	02	Section no.	1.3	Date: 16/05/2023
Description of CAR				
It is observed that the reference of the VCS Standard used by CME for the project does not correspond to the latest available version. This may result in non-compliance with the latest guidelines and requirements of the VCS Standard. It is recommended that CME updates the reference to the latest available version of the VCS Standard to ensure compliance with the latest guidelines and requirements.				
Project participant response				Date: 20/05/2023
There was typo error, latest version referenced in revised PD as VCS Standard version-4.4				
Documentation provided by project participant				
PD Version-1.2				
VVB assessment				Date: 06/06/2023
VVB has assessed the updated joint PD & MR. The reference number of the standard is updated to latest one.				
# CAR is closed.				

CAR ID	03	Section no.	1.3	Date: 16/05/2023
Description of CAR				
It is identified that CME has mentioned only six greenhouse gases under the Kyoto Protocol in their project documentation. However, the scope of the VCS (Verified Carbon Standard) program, as mentioned in the VCS Standard, includes other greenhouse gases as well. This discrepancy may result in inconsistency with the VCS program requirements. Therefore, CME shall correct the statement to ensure consistency with the scope of the VCS program, as mentioned in para 2.1.1 of VCS Standard V4.4.				
Project participant response				Date: 20/05/2023
There was typo error the same has been corrected in revised PD as seven greenhouse gases in line with VCS Standard version 4.4.				
Documentation provided by project participant				
<i>PD Version-1.2</i>				
VVB assessment				Date: 06/06/2023
PP acknowledged that there was a typographical error in their project documentation regarding the number of greenhouse gases mentioned under the Kyoto Protocol. CME has rectified this error in the revised Project Document (PD) by correctly stating that there are seven greenhouse gases, in line with the scope of the VCS (Verified Carbon Standard) program as mentioned in para 2.1.1 of VCS Standard V4.4.				
#CAR 3 is closed.				

CAR ID	04	Section no.	1.4	Date: 16/05/2023
Description of CAR				
Based on VVB's assessment, it has been determined that the explanation provided in section 1.4 does not align with the requirement of criterion 13. The Project Proponent (PP) is requested to update the explanation accordingly to ensure compliance with the stipulated criterion.				
Project participant response				Date: 20/05/2023
The relevant correction made in revised PD in line with latest version of VCS Standard.				
Documentation provided by project participant				
<i>PD Version-1.2</i>				
VVB assessment				Date: 06/06/2023
VVB has assessed the updated joint PD & MR and found that the CME has updated the explanation appropriately in line with criteria 13,				
#CAR is closed.				

CAR ID	05	Section no.	1.8	Date: 16/05/2023
Description of CAR				
Based on VVB's assessment, it has been identified that the start date of the VCS project activity is indicated as 15/11/2022. In order to support this representation, the Project Proponent (PP) is required to submit documentary evidence of the actual start date, which may be 15/11/2022 or later.				
Project participant response				Date: 20/05/2023
The date of distribution of first ICS under PAI1 is 22 Feb 2023, which is considered as start date of the grouped project activity. The same has been corrected in revised PD.				
Documentation provided by project participant				
<i>PD Version-1.2</i>				
VVB assessment				Date: 06/06/2023
Based on CME's response, it is clarified that the actual start date of the VCS (Verified Carbon Standard) project activity is 22nd February 2023, which corresponds to the distribution date of the first Improved Cookstoves (ICS) under PAI1. CME has acknowledged this correction and updated the revised Project Document (PD) accordingly.				
# CAR 5 is closed.				

CAR ID	06	Section no.	1.11	Date: 16/05/2023
Description of CAR				
How the project will ensure that the households receiving the ICS technology genuinely require it and will effectively utilize it. Additionally, it has been queried whether there is a plan in place to educate the households about the benefits and proper usage of the technology.				
Project participant response				Date: 20/05/2023
The baseline KPT survey has been conducted by the consultant appointed by PP before undertaking the project activity to confirm that wood usage in Sierra Leone is sufficiently high that an improved cookstove is required to reduce the impact of wood burning on the environment, improve the health of those cooking as well as the plethora of other benefits that a cookstove provides. Further the local representative have knowledge on end user cooking habits, the same has been confirmed through such information. The PP has a plan to educate each beneficiary household every 6-months on the proper usage of the stove and the benefit that this will bring to them and their families. Each Youth Volunteer, paid a daily rate for working for the PP, is provided with a 4-day training campaign on the stove usage as well as a smartphone and a flipbook. The phone allows a survey to be carried out during the educational visit every 6-months using the DelAgua app and the flip book has pictorial references on the how and why to use the stove most effectively to get the greatest benefit.				
Documentation provided by project participant				

PD Version-1.2	
VVB assessment	Date: 06/06/2023
DOE assessed that the CME's response showcases a well-structured plan for assessing the genuine need for ICS technology and educating the beneficiary households. The inclusion of local representatives' knowledge and the utilization of technological tools highlight the commitment to ensure the effective utilization of the technology and maximize its benefits. # CAR 6 is closed.	

CAR ID	07	Section no.	1.11	Date: 16/05/2023
Description of CAR				
PP shall submit the technical specification provided by original equipment manufacturer (OEM) for the validation of VVB.				
Project participant response				Date: 20/05/2023
The technical specification for ICS models to be deployed is provided along with response.				
Documentation provided by project participant				
<i>Technical specification of ICS</i>				
VVB assessment				Date: 06/06/2023
Based on PP's response, it is confirmed that the technical specification for the Improved Cookstove (ICS) models to be deployed has been provided. This indicates that the Project Proponent (PP) has fulfilled the requirement to submit the technical specification as requested by VVB for the validation process. However, VVB has assessed that the life of different cookstoves is represented to vary between 7 and 10 years, PP shall explain why the in joint PD and MR the life of the project taken as 10 years instead of more conservative approach of 7 years. #CAR 7 is open.				
Project participant response				Date: 07/06/2023
As per manufacturer specification the operational lifetime is mentioned as 7-10years, further based on user experience on burn stoves, the operational lifetime observed more than 10years where being used as per guidance and with proper maintenance. The PP has deployed operation and maintenance team to take care of the any issues with ICS during its uses and is committed to ensure usage for 10 years with required O&M and repair as may be required during operation. Hence, 10 years operational lifetime considered is appropriate.				
Documentation provided by project participant				

<i>Technical specification of ICS</i>	
VVB assessment	Date: 16/06/2023
In accordance with raised comment PP has given an appropriate clarification that the life of cookstove can be useful more than 7 years with proper maintenance activity, with reference to grievance mechanism established by PP and from on-site interviews it is observe that monitoring team is actively taking follow up for cookstove during monitoring to ensure the working of stoves and to monitor required monitoring, during interview with end user grievance mechanism is confirmed if required any support for stove which deemed to be appropriate. CAR is closed	

CAR ID	08	Section no.	1.17.2	Date: 16/05/2023
Description of CAR				
In section 1.17.2 of the Joint Project Description (PD) and Monitoring Report (MR), it is specified that the Sustainable Development Goal (SDG) indicators for the Group shall be provided during the validation or verification process. Additionally, table 1 in section 1.17.2 states that the table shall be updated during the validation and verification of the grouped project activity (GP). The Project Participant (PP) is recommended to ensure the completion of this section, considering that the document serves as a joint PD and MR.				
Project participant response				Date: 20/05/2023
Assessment on Sustainable Development Goal (SDG) indicators for the Group project is incorporated in revised PD.				
Documentation provided by project participant				
<i>PD Version-1.2</i>				
VVB assessment				Date: 06/06/2023
DOE has assessed that the Sustainable Development Goal (SDG) indicators for the grouped project activity (GP) have been updated in the revised in section 1.17.2 of Joint Project Description (PD) and Monitoring Report (MR) and found to be in line with the requirement. # CAR 8 is closed.				

CAR ID	09	Section no.	2.2	Date: 16/05/2023
Description of CAR				
• PP shall share the information and meeting documents of the LSC. • PP shall provide declaration against no legal contests/disputes and grievance received during the current monitoring period.				
Project participant response				Date: 20/05/2023

CAR ID	09	Section no.	2.2	Date: 16/05/2023
The details on local stakeholder consultation meeting is shared along with revise PD. There were no grievances received during current monitoring period i.e. from 22/02/2023 to 30/04/2023. Further a declaration regarding no legal contest/dispute related to group project is also provided.				
Documentation provided by project participant				
<i>Local Stakeholder Invitation publication in newspaper</i>				
<i>Email to identified attendees.</i>				
<i>LSC Attendance sheet</i>				
<i>Declaration letter</i>				
VVB assessment				Date: 06/06/2023
VVB has assessed that CME's response demonstrates compliance with the requirements for sharing details on local stakeholder consultation, as well as providing information on grievances and legal contests. The absence of grievances and legal disputes indicates positive stakeholder engagement and a favourable operating environment for the project. CME has submitted Local Stakeholder Invitation publication in newspaper, Email to identified attendees, LSC Attendance sheet, and Declaration letter are still pending to be shared with VVB.				
# CAR 09 is open.				
Project participant response				Date: 07/06/2023
The declaration letter and attendance sheet attached along with the response.				
Documentation provided by project participant				
<i>Declaration letter</i>				
VVB assessment				Date: 16/06/2023
PP has submitted the LCS documents along with the declaration stating no legal disputes/contests related to the project.				
CAR # 09 is closed.				

CAR ID	10	Section no.	4.4	Date: 16/05/2023
Description of CAR				
PP shall submit the fNRB calculation and shall demonstrate how the fNRB calculation is in compliance with tool 30.				
Project participant response				Date: 20/05/2023
The fNRB calculation is summarised in Appendix of PD, the fNRB calculation is done by third party having competency in field in line TOOL 30 version 4.0 and details with fNRB report is also provided along with revised PD.				

Documentation provided by project participant	
<i>fNRB calculation sheet</i> <i>fNRB report by third party</i> <i>PD Version-1.2</i>	
VVB assessment	Date: 16/06/2023
PP has submitted the report titled <i>Calculation of Fraction of non-renewable biomass (fNRB) for Sierra Leone</i>. VVB has assessed that quantification is based on CDM tool 30 (EB 115 Annex 22, version 4.0 2022). The fNRB value for Sierra Leone quantified as 0.68 seems appropriate. CAR #10 is closed.	

CAR ID	11	Section no.	5.1	Date: 16/05/2023
Description of CAR				
PP shall submit the technical specification of all type of cookstoves proposed for the project activity mentioning the efficiency, and technical life of the cookstoves. PP shall also submit the CREEC lab report.				
Project participant response				Date: 20/05/2023
The specification of all ICS models to be used in grouped project is submitted along with response.				
Documentation provided by project participant				
<i>Technical Specification of ICS</i>				
VVB assessment				Date: 06/06/2023
VVB has reviewed that PP has submitted the technical specification of all type of cookstoves proposed for the project activity mentioning the efficiency, and technical life of the cookstoves. However, PP shall also submit the CREEC lab report as mentioned in footnote number 23 and 24 of the Joint PD and MR.				
Project participant response				Date: 07/06/2023
The CREEC lab report attached along with this response.				
Documentation provided by project participant				
<i>CREEC Lab report</i>				

VVB assessment	Date: 16/06/2023
PP has submitted the CREEC lab test certificate for cookstoves with and without pot skirt and on assessment the tested efficiency in the reports found to be consistent with the efficiency mentioned in Joint PD/MR. CAR #11 is closed.	

CAR ID	12	Section no.	5.3	Date: 16/05/2023
Description of CAR				
CME shall submit the training records of the staff involved in ICS distribution, baseline survey/KPT and monitoring survey of the project instances.				
Project participant response				Date: 20/05/2023
The training records for team involved in distribution of ICS, baseline survey/KPT and monitoring survey is attached along with response.				
Documentation provided by project participant				
<i>Training records</i>				
VVB assessment				Date: 06/06/2023
The documents are not the part of the submission package. #CAR 12 is open				
Project participant response				Date: 07/06/2023
The training records for team involved in distribution of ICS, baseline survey/KPT and monitoring survey is attached along with response.				
Documentation provided by project participant				
<i>Training records</i>				
VVB assessment				Date: 16/06/2023
The training records has been submitted by the PP. CAR # 12 is closed.				

CAR ID	13	Section no.	6.1	Date: 16/05/2023
Description of CAR				

CAR ID	13	Section no.	6.1	Date: 16/05/2023
Based on the site visit conducted by VVB, it was observed that some households were still using baseline metallic cookstoves in addition to the improved cookstoves. The Project Participant (PP) is requested to provide clarification on how such occurrences are accounted for when considering the fraction η_{old} .				
Project participant response				Date: 20/05/2023
Please note that the iron stoves are having the same baseline efficiency as indicated in the VMR0006, default value of 0.1 shall be used if baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.				
The PP through its local representative creates awareness on benefits of using improved cookstoves, however in some cases due to additional need few end users may use the baseline stoves often in an instance of stove stacking. As per applied approved methodology, if observed usage of baseline stove further data is collected from those beneficiaries for determining the percentage of use of baseline stoves and same is adjusted in B_{old} using equation of 6 of approved methodology. The actual emission reduction calculation is done adjusting the baseline stove usage in conservative manner.				
Documentation provided by project participant				
ER Sheet				
PD version 1.2				
VVB assessment				Date: 06/06/2023
VVB has found that the equation referred by the PP is not relevant to the parameter. Moreover, PP shall disclose the baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves.				
# CAR 13 is open				
Project participant response				Date: 07/06/2023
There was typo error the B_{old} will be adjusted for any baseline cookstove usage using equation 6 of VMR0006 Version1.1				
Documentation provided by project participant				
PD version-2				
VVB assessment				Date: 16/06/2023
VVB has assessed and found that the PP has addressed the query appropriately by providing the exact equation which is being used in the project case.				
CAR # 13 is closed.				

Table 3. FARs for the VVB undertaking subsequent verifications

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FAR	1	Section no.	Preliminary Review	Date: 02/02/2024
Description of FAR				
During the PRR review of the joint validation & verification it was observed during the monitoring KPT surveys that along with project ICS, 12 % end users are using charcoal stoves and 1% another type of stoves as continued usage of baseline stoves. These results were deemed potentially contradictory from the baseline KPT survey results with the value of η_{old} as 0.1. As a conservative measure, PP has taken weighted average of the baseline stoves observed during the monitoring KPT surveys to calculate η_{old}. In order to ensure conservativeness of the values used, PP has used a value of 0.1130 for the parameter η_{old} based on the results of the monitoring survey during the first monitoring period. Whilst PP has ensured the conservativeness of the value during the reported first monitoring period, PP shall also compare the results of the monitoring survey during the subsequent monitoring period with the ex-ante value and value from the first monitoring period for the parameter η_{old} and use the most conservative value available. This measure has been applied to ensure the conservativeness of the value used for the monitored parameter η_{old}. Verifying VVB during the next subsequent verification shall ensure that the value for η_{old} continues to be reflective of a conservative approach.				