



Verified Carbon Standard

MP4 MR 3699

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CONTENTS

1 PROJECT DETAILS	1
1.1 Summary Description of the Implementation Status of the Project	1
1.2 Audit History	1
1.3 Sectoral Scope and Project Type	2
1.4 Project Proponent	2
1.5 Other Entities Involved in the Project	2
1.6 Project Start Date	3
1.7 Project Crediting Period	3
1.8 Project Location	3
1.9 Title and Reference of Methodology	3
1.10 Double Counting and Participation under Other GHG Programs	3
1.10.1 No Double Issuance	4
1.10.2 Registration in Other GHG Programs	4
1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions	4
1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits	4
1.11.2 No Double Claiming with Other Forms of Environmental Credit	4
1.11.3 Supply Chain (Scope 3) Emissions	4
1.12 Sustainable Development Contributions	4
1.13 Commercially Sensitive Information	12
2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT	12
2.1 Stakeholder Engagement and Consultation	12
2.1.1 Stakeholder Identification	12
2.1.2 Stakeholder Consultation and Ongoing Communication	13
2.1.3 Free Prior and Informed Consent	14
2.1.4 Grievance Redress Procedure	14
2.1.5 Public Comments	15
2.2 Risks to Stakeholders and the Environment	16
2.2.1 Management Experience	16
2.2.2 Risk assessment	16
2.3 Respect for Human Rights and Equity	17

2.3.5 Benefit Sharing	19
2.4 Ecosystem Health	19
2.4.1 Rare, Threatened, and Endangered species	20
2.4.2 Introduction of species	20
3 IMPLEMENTATION STATUS	21
3.1 Implementation Status of the Project Activity	21
3.2 Deviations	21
3.2.1 Methodology Deviations	21
3.2.2 Project Description Deviations	22
3.3 Grouped Projects	22
3.4 Baseline Reassessment	22
4 DATA AND PARAMETERS	22
4.1 Data and Parameters Available at Validation	22
4.2 Data and Parameters Monitored	26
4.3 Monitoring Plan	34
4.3.1 Data recording	36
4.3.2 Sampling	37
4.3.3 Avoidance of double counting	41
4.3.4 Use of renewable biomass	41
4.3.5 Decentralized energy systems	41
4.3.6 Self-generated renewable electricity system	41
5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	42
5.1 Baseline Emissions	42
5.2 Project Emissions	47
5.3 Leakage Emissions	48
5.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals	49
6 APPENDIX	50
6.1 Appendix 1: COMMERCIALY SENSITIVE INFORMATION	50

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The grouped project involves dissemination of energy-efficient, improved cookstoves (ICS) to replace existing traditional cookstoves in domestic households of Rwanda. The grouped project has only one project activity instance (PAI-1) till the end of this monitoring period.

The distribution of the project ICSs begun on 04-November-2022 under the PAI-1. This date is also the start date of the grouped project and the start date of crediting period for this project. Till the end of current monitoring period, total 334,941 ICSs have been distributed throughout Rwanda. During the current monitoring period, the project has achieved GHG emission reduction of 568,735 tCO₂e.

Technology/ Measures

The ICSs disseminated under the grouped project are based on a “rocket stove” and designed to improve fuel combustion and heat transfer. The project stoves improve heat transfer to cooking pots through the insulated walls and design of the stove top when compared to traditional cooking methods over open- and three-stone fires. The ICS results in the reduction of fuel consumption and improvement in levels of Indoor air pollution for project users (reducing smoke, black soot, and particulate matter (PM) emissions). The reduction in consumption of cooking fuel also reduces equivalent greenhouse gas (GHG) emissions attributed to the use of non-renewable biomass.

For the current monitoring period, the PAI-1 includes dissemination of Burn Kuniokoa G2 stoves, a tier 3 cooking devices with the following specification:

Name of the ICS	Kuniokoa Generation 2
Manufacturer	Burn
Type	Natural Draft
Material	Stainless Steel
Dimensions	32.1 cm Height, 28.2 cm Diameter
Thermal efficiency	With Pot skirt – 51.3%, Without pot skirt – 43.4%
Power Output	2.9 kW
Lifetime	10 Years
Photo	

1.2 Audit History

Using the table below, include the audit history of the project. This table should include all monitoring periods, including the period of this monitoring report.

Audit Type	Period From	Period To	Program	Validation/verification body name	Number of years
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Validation	2022-11-04	2029-11-03	VCS	Earthood Services Limited	7
Verification	2022-11-04	2022-12-31	VCS	Earthood Services Limited	0.158
Verification	2023-01-01	2024-12-31	VCS	SustainCERT S.A.	2
Verification	2025-01-01	2025-09-30	VCS	SustainCERT S.A.	0.748
Verification	2025-10-01	2026-04-30	VCS	SustainCERT S.A.	0.424

1.3 Sectoral Scope and Project Type

Sectoral Scope	3. Energy demand
Project Activity Type	Type II – Energy efficiency improvement projects

1.4 Project Proponent

Primary	Yes
Organization name	DelAgua Trans Africa Stoves Pte. Ltd.
Contact person	Neil McDougall
Title	Chairman, Director
Address	88 Market Street, #21-01, Singapore, 048948
Telephone	+352 661 939 304
Email	vcsprojects@delagua.org

1.5 Other Entities Involved in the Project

Organization name	DelAgua Health Rwanda (Implementation) Limited
Role in the project	Distribution, operational and monitoring services
Contact person	Rory McDougall
Title	Commercial and Finance Director
Address	#59 Kg 9 Ave, Gasabo, Kigali, Rwanda
Telephone	+250788386128
Email	vcsprojects@delagua.org

1.6 Project Start Date

Start Date	04-Nov-2022
Justification	Date of the first distribution of ICS

1.7 Project Crediting Period

Crediting period

- ☒ Seven years, twice renewable.
☐ Ten years, fixed.
☐ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)

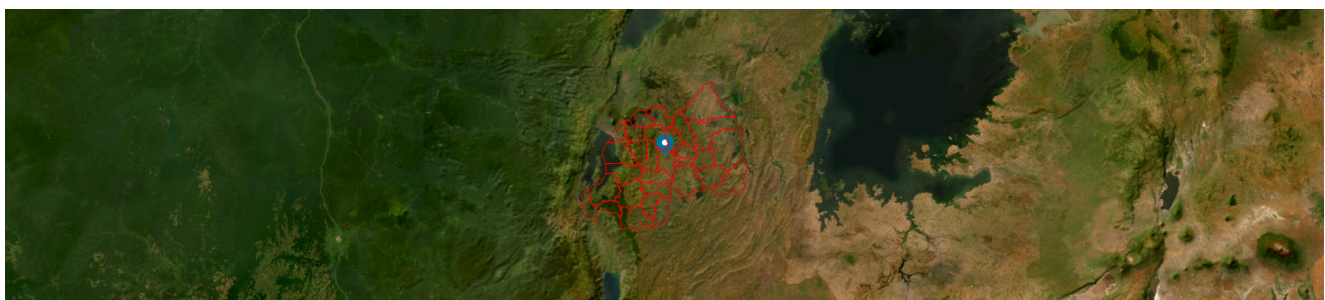
Start and end date of first or fixed crediting period

The monitoring period is from 04-Nov-2022 to 03-Nov-2029 with 8 Vintage periods.

1.8 Project Location

Project Instance	Country Name	State Name	City/ Region	Project Location Format	Project Latitude	Project Longitude	Acres/ Hectares
1	Rwanda	Kigali Province	Kigali	Geodetic Point (Decimal Degrees)			

KML File



1.9 Title and Reference of Methodology

TYPE (METHODOLOGY, TOOL OR MODULE)	REFERENCE ID, IF APPLICABLE	Title	Version number of the Document
Methodology	VM0050	Energy efficiency and fuel-switch measures in cookstoves	1.0

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Was the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the VCS Program Definitions for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the VCS Program Definitions for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.12 Sustainable Development Contributions

The grouped project activity involves dissemination of energy-efficient, improved cookstoves (ICS) to replace existing traditional cookstoves in domestic households in Rwanda. The GP is contributing towards sustainability, which is also verifiable through the SDG indicators selected for the specific activities that are going to be monitored for their fulfilment.

The grouped project has only one project activity instance (PAI-1) till the end of this monitoring period. A summary of sustainable development contributions for the PAI – 1 is provided in the following table:

SDG Targeted	SDG Indicator	Sustainable Development Benefits	Nationally stated Sustainable Development Priority ³
SDG 1	1.4.1 Proportion of population living in households with access to basic services	ofCooking is widely recognized as an essential service, given that food is a fundamental necessity for humans and other living beings. Therefore, improved access to cooking facilities is likewise deemed a basic need and essential. The project by distributing ICS provides access to basic services.	Yes
Evidence: ICS distribution Database monitoring survey results			

SDG 3	3.9.1 Mortality rate attributed to household biomass fuels in the beneficiary households are reduced. and ambient air pollution	The indoor pollutants emissions attributed to inefficient burning of solid biomass fuels in the beneficiary households are reduced. The project ICS aids improved combustion of solid biomass fuel thereby reducing smoke and Particulate matter (PM) emissions.	Yes
SDG 4	4.7.1 Extent to which global education and sustainable development are mainstreamed in national education policies; (b) curricula; (c) teacher education; and (d) student assessment	Evidence: ICS distribution Database monitoring survey results (i) The project activity educates and trains the team involved in the distribution of ICS and educates the end user HHHs about sustainable cooking practices. With this, it can be said that the local population is learning sustainable practices and a healthy lifestyle without spending anything. (a) Evidence: 1) Distribution Database 2) CHW training Data	Yes
SDG 5	5.4.1 Proportion of time spent on unpaid domestic work, by sex, age and location	The project ICS saves time in cooking activities (by faster cooking) as well as save time in fuel procurement (reduced collection time) due to reduced fuel consumption. The proportion of HHHs confirming the reduction in amount of time spent on collection of firewood and cooking time during the survey, multiplies with the total number of households to get the total number of impacted HHHs.	Yes
SDG 7	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Evidence: Monitoring Survey for VCS GP includes questions on time spent on collection of fuel. The project activity by distributing ICS provides access to clean cooking with primary reliance on clean fuels and technology.	Yes
SDG 8	8.3.1 Proportion of informal employment, by total employment, by sector and sex	Evidence: ICS distribution Database monitoring survey results As part of the project activities (distribution and education campaign) DelAgua employs local community members. Evidence: The salary slips for the CHWs act as the data source since these are not on DelAgua's payrolls. However, there are different data sources (number of mobile phones assigned to individuals during distribution, number of CHWs trained for a specific distribution event), which are used to total the CHWs working for DelAgua.	Yes
SDG 13	13.0 Total greenhouse gas emissions per year	The project by replacing the inefficient traditional stove with the energy-efficient ICS shall reduce equivalent GHG emissions for meeting similar thermal energy needs as that in the baseline.	Yes
SDG 15	15.4.2 Mountain Green Cover Index	Evidence: Monitoring report and ER Calculation Sheet The implemented project activity leads to a decrease in deforestation in the mountainous forest ecosystem. This eventually leads to an increase in the mountain green cover index compared with the baseline. Evidence: Registered PD, MR and ER Sheet	Yes

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
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1	1.4	1.4.1 Proportion of population living in households with access to basic services	implemented activities to increase	Cooking is widely recognized as an essential service, given that food is a fundamental necessity for humans and other living beings. Therefore, improved access to cooking facilities is likewise deemed a basic need and essential. For PAI-1, the total number of ICS distributed is 334,941 i.e., 334,941 HHS receiving the project ICS now have access to basic cooking services. No new cookstoves were distributed in this MP. All cookstoves distributed up to MP4 remain operational; therefore, households continue to have access to improved cooking services in this MP.	Till the end of this monitoring period, 334,941 households now have access to basic cooking services when compared with the baseline
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2	3.9	3.9.1 Mortality rate attributed to household and ambient air pollution	implemented activities to decrease	Mortality rate attributed to HH and ambient pollution will decrease for those HHs using the DelAgua improved cookstove. The improved design specifications of the project ICS model(s) ensure there is much less pollution in the households as compared to the baseline. The survey results demonstrate that 86.64% of households confirmed reductions in the smoke level. So, a total of 290,870 households now has less risk towards respiratory ailments due to smoke inside their homes due to the implementation of this project	Till the end of this monitoring period, 290,870 households now have less risk towards respiratory ailments due to smoke inside their homes due to the implementation of this project as compared to the baseline.
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3	4.7	4.7.1: Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment	Implemented activities to increase	The project activity educates and trains the team involved in the distribution of ICS and educates the end user HHs about sustainable cooking practices. With this, it can be said that the local population is learning sustainable practices and a healthy lifestyle without spending anything. i) The number of CHWs that were educated (trained for distribution, 6-monthly household visits, surveys, and training on sustainable cooking practices to be disseminated to end user households) by the Grouped Project (for PAI-1) by the end of M.P.-4 are 3,239. ii) The number of end users per household that are educated for stove usage and apply sustainable cooking practices are equal to the exact number of households where project ICS are distributed. PAI-1: No new cookstoves were distributed during this monitoring period. All 334,941 cookstoves distributed up to MP-4 were associated with prior user training. Monitoring survey results indicate that 98.42% (329,652 households) remain operational, reflecting continued use of the distributed	Till the end of this monitoring period, 329,652 households were educated about stove usage but to cater VM0050 v1.0 clarification 2, 90% cap is considered hence 301,447 HH and to apply sustainable cooking practices.
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				stoves. However, in accordance with VM0050 v1.0 requirements, this observed value is reported for transparency purposes only and does not represent a conservative usage assumption. For emission reduction calculations, the usage rate is conservatively capped at 90%, i.e. 301,447 as prescribed by the methodology. Accordingly, it can be concluded that the previously trained households continue to apply sustainable cooking practices, while conservativeness in quantification is ensured through the application of the capped usage rate.	
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4	5.4	5.4.1: Proportion of time spent on unpaid domestic and care work, by sex, age and location	Implemented activities to decrease	Survey results show 96.49% of respondents stating that they have reduced the amount of time tending fire and collecting wood. Hence, 323,189 Households have reduced their time spent in fuel collection and cooking activities. No new cookstoves were distributed in this MP. As all previously distributed cookstoves remain operational in this MP as confirmed by surveys and 96.49% of sampled, households during surveys continue to experience reduced time spent on fuel collection and cooking.	Till the end of this monitoring period, a total of 323,189 households were positively affected.
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5	7.1	7.1.2: Proportion of population with primary reliance on clean fuels and technology	Implemented activities to increase	The number of HHs with access to clean cooking has been increased with the implementation of this grouped project. A total of 334,941 HHs have received the ICS under the PAI-1. During the surveys, 98.42% of HHs confirmed usage of ICS., capped at 90% in line with methodology guidelines. Thus, till the end of MP4, 301,447 distributed ICS are operational (i.e., These HHs have access to clean cooking when compared with the baseline). No new cookstoves were distributed in this MP. All cookstoves distributed up to MP4 remain operational as confirmed by surveys. Therefore, these households continue to have access to improved energy services in this MP.	Till the end of this monitoring period, PP can claim under methodology caps that 301,447 households now have access to clean cooking when compared with the baseline.
6	8.3	8.3.1 Proportion of informal employment in total employment, by sector and sex	Implemented activities to increase	As part of the project activities (distribution and education campaign) DelAgua employs local community members. To manage activities up to this point have created 3,239 informal employments.	Till the end of MP4 a total of 3,239 informal employment has been created with the project activity.

7	13	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	568,735 tCO ₂ e have been reduced during the current monitoring period.	Till the end of this monitoring period, a total of 3,261,701 tCO ₂ e emissions have been reduced by the project activity till MP4.
8	15.4	15.4.2: Mountain Green Cover Index	Implemented activities to increase	The implemented project activity leads to a decrease in deforestation in the mountainous forest ecosystem. This eventually leads to an increase in the mountain green cover index compared with the baseline. The amount of total firewood saved by the GP is 303,587 tons in MP4.	Until the end of this monitoring period, a total of 2,669,672 tons of firewood have been saved by the project activity till MP4.

1.13 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the monitoring report.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The Stakeholder makeup has not changed since validation. Prior to start of validation, hence this is not deemed applicable.
Legal or customary tenure/access rights	As the project is not a land use project, there are no legal or customary tenure issues or access rights that are impacted by the project.
Stakeholder diversity and changes over time	Refer section 2.1 of registered PD. No expected change has happened to the stakeholders' makeup

Expected changes in well-being	Household air pollution (HAP) is estimated to lead to 3.2 million ⁴ premature deaths globally each year, with the majority of those occurring in sub-Saharan Africa and Asia ⁵ . A country profile by the World Health Organization (WHO) titled “Rwanda — Environmental Health Scorecard” (2023) ⁶ indicates that the annual mean level of fine particulate matter (PM _{2.5}) in Rwanda was approximately 36 µg/m ³ , exceeding the WHO guideline values, and highlights that air pollution is a significant health risk in the country. The same report notes that around 50% of deaths from stroke and ischaemic heart disease are attributable to air pollution. By providing improved cookstoves and education on the benefits of clean cooking, the project will see positive changes in health. In addition, clean cooking has been shown to contribute towards various SDGs, such as gender equality and zero hunger, meaning the project will produce positive changes in well-being beyond health.
Location of stakeholders	Primary stakeholders are located in rural communities across Rwanda. District government officials are located in rural areas across Rwanda, whilst the Ministry of Environment is headquartered in Kigali (capital city.)
Location of resources	As this is not a land use project, this is not applicable.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	The PP has established a comprehensive grievance redressal mechanism to ensure that stakeholders have access to a transparent and easily accessible system for ongoing consultation and resolution of project-related concerns as detailed in section 2.1.4 below. The stakeholders are informed about the grievance register which is maintained at the local office locations of the PP i.e., in Kigali. Local people employed as field staff, and resource persons also serve as medium to escalate grievances received from the project beneficiaries in their respective zones to PP. Further, DelAgua has a toll-free helpline for the relevant stakeholders to connect with them in case they require any assistance. Any relevant concern received during operation of project activity is addressed according to its merit. The grievance register recording minor grievances raised during this monitoring period was shared with the VVB. Additionally, 21,104 household visits were carried out as part of the additional ongoing engagement and communication process with end users. The visits served multiple purposes: • Reinforcing key usage and maintenance practices through educational materials (flipbooks and posters). • Providing households with an opportunity to share feedback or raise any concerns. • Ensuring that households have access to grievance mechanisms, including direct communication with local field staff and information about the toll-free helpline. • Any concerns raised were noted and addressed appropriately. These continuous visits support sustained use of the improved cookstoves and help maintain strong community relationships.
Date(s) of stakeholder consultation	01-Mar-2023

Communication of monitored results	The government stakeholders have been informed through the preparation and submission of a Monitoring Report.
Consultation records	Refer section 2.1.2 of the registered PD for details of consultation conducted prior to validation and records of local meetings conducted before distribution in monitoring period.
Stakeholder input	Refer section 2.1.2 of the registered PD for details of consultation conducted prior to validation.

2.1.3 Free Prior and Informed Consent

Consent	Prior to commencing the project, DelAgua signed a Memorandum of Understanding with Ministry of Environment to distribute improved cookstoves to rural households across Rwanda. Following this, DelAgua has signed Collaboration Agreements with the districts that the project has been delivered in (to date.) These agreements help the population in protecting the environment by scaling down firewood consumption while reducing indoor air pollution leading to improved respiratory health. Prior to distribution all potential ICS recipients are gathered to introduce the project. They are invited to receive a ICS free of charge. All recipients must consent to receive an ICS by attending a distribution day and signing the agreement on the bottom of the DelAgua poster.
Outcome of FPIC	Not applicable, the project activity involves distribution of improved cookstoves to individual households and hence any possibility of forced eviction/physical relocation of people due to the project is not applicable. There are no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, indigenous people (IPs), local communities (LCs), or customary rights holders. It is a completely voluntary activity and households participating are free to choose whether they take part or not. The PP collaborates with the local entrepreneurs for fabrication as well as installation of project ICS thereby empowering them economically rather than relocation / threat.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
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There was one grievance received during the monitoring period related to damaged stove. The PP has established a comprehensive grievance redressal mechanism to ensure that stakeholders have access to a transparent and easily accessible system for ongoing consultation and resolution of project-related concerns. Key aspects of the process are as follows:

A. Grievance Registration:

Stakeholders, including end users, can raise grievances through multiple channels:

- Submitting grievances via the company's website: <https://www.delagua.org/Contactus/>
- Raising issues in person at the field level, which are then escalated by the relevant field personnel to the designated grievance manager.
- Calling the toll-free helpline (8788) dedicated to grievance reporting.

B. Field-Level Escalation Mechanism:

During the onsite visit, stakeholders confirmed that Community Health Workers (CHWs), who serve as field staff and local resource persons, act as intermediaries for reporting grievances. These individuals escalate concerns raised by project beneficiaries within their zones. As confirmed by households during the visit, DelAgua conducts regular household visits—aiming for at least one per year—during which staff engage directly with stakeholders and ensure grievances are documented and addressed.

C. If a grievance is brought to a local staff member, they are instructed to escalate it to their line manager, who logs the grievance at the local office.

D. Grievance Logbook and Periodic Visits:

- A grievance logbook is maintained at the local office in Kigali, Rwanda.
- Field staff conduct regular visits to project households, providing an additional opportunity for stakeholders to communicate concerns directly.

These procedures support effective communication, ensure continuous engagement with stakeholders, and reinforce the project's commitment to transparency, inclusivity, and timely resolution of concerns.

Cases such as theft or end-of-life stoves or damage resulting from improper handling are considered circumstances beyond the control of the project proponent. To ensure conservative and accurate accounting, this affected ICS has been removed from the active distribution database and excluded from emission reduction calculations. Consequently, no emission reductions have been claimed for these non-operational stoves

2.1.5 Public Comments

Summary of comments received	Actions taken
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No comments were received.	Not applicable
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2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

DelAgua has been delivering cookstove projects for over 10-years and has several active projects listed under VERRA. DelAgua does not sub-contract any of the implementation of this project to non-DelAgua entities. Thus, DelAgua management teams have expertise or experience in implementing similar project activities and engaging communities.

The operational management team for this project are Rwandan nationals with deep experience of rural delivery of services and government engagement.

Senior management of DelAgua manage multiple projects across multiple jurisdictions with deep experience in Carbon Methodologies, Research, Data Analysis and management of large scale development projects. DelAgua staff are well-trained, with prior experience in distribution and monitoring. They received training on the questionnaire before conducting the surveys.

2.2.2 Risk assessment

	Risks identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	Natural Threat: The climate crisis and natural disasters can precipitate displacement and migration, resulting in the relocation of households.	The grouped project involves distribution of ICS that are portable and lightweight. Consequently, users of the project's ICS can easily carry them in case relocation becomes necessary.
Risks to stakeholder participation	No risk identified	The stakeholder consultation process has already been completed in accordance with the VCS requirements. All relevant stakeholders were identified prior to the consultation meeting and informed through appropriate means such as posters, public notices, and community channels. Stakeholders were consulted during project development, and their feedback was duly addressed. The project has demonstrated strong community support and is expected to contribute positively to the social, economic, and environmental development of stakeholders directly or indirectly impacted by the grouped project. Stakeholder engagement will continue throughout the project's implementation to ensure transparency, inclusiveness, and responsiveness to community needs.

Working conditions	DelAgua staff at risk from working in remote locations	DelAgua maintains a health, safety & security policy for all staff in Rwanda. In addition, DelAgua maintains a risk register (as part of an overall risk management policy) that tracks all risk types (in addition to safety and security.) This is updated on a quarterly basis.
Safety of women and girls	Women and girls are exploited as a result of participating in the project	DelAgua ensures all staff follow a clear Code of Conduct that they sign up to upon recruitment. This policy is regularly updated and enforced. Toll Free number exists within Rwanda and a clear whistleblowing policy is adhered to for any grievances raised. Training includes modules on safety and security. All surveys must first gain consent of the respondent. This individual must be above 18 or the survey is immediately ended.
Safety of minority and marginalized groups, including children	Children are recruited to deliver the project.	DelAgua maintains a policy on child labour which all staff, suppliers and vendors are required to adhere to. This policy is regularly updated and enforced.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	No risk identified	N/A, the project does not involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous materials.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified	Mitigation or preventative measure(s) taken
Discrimination	Risk of discrimination based on gender, race, religion, sexual orientation or other habits	DelAgua maintains several HR policies for staff as well as a safeguarding policy for beneficiaries. These policies are maintained, monitored and implemented by DelAgua's HR unit. No instances of discrimination were record during this monitoring period.

Sexual harassment	Risk of sexual harassment	DelAgua maintains several HR policies for staff as well as a safeguarding policy for beneficiaries. These policies are maintained, monitored and implemented by DelAgua's HR unit. No instances of sexual harassment were record during this monitoring period.
Gender equity in labor and work	Risk of gender inequalities in recruitment process	DelAgua maintains recruitment policies that specifically commit the organization towards gender equity. Where possible, DelAgua works to try to increase female recruitment into the organization
Forced labor	Risk of illegal act of recruiting, transporting, harboring, or receiving people through force, fraud.	DelAgua maintains policies on forced labour and requires that all staff, suppliers and vendors agree to adhere to these policies.
Child labor	Children are recruited to deliver the project.	DelAgua maintains policies on child labour and requires that all staff, suppliers and vendors agree to adhere to these policies.
Human trafficking	Risk of illegal act of recruiting, transporting, harboring, or receiving people through force, fraud.	DelAgua maintains policies on forced and child labour and requires that all staff, suppliers and vendors agree to adhere to these policies.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project involves the distribution of improved cookstoves to individual households. In the context of this project, there are no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights held by stakeholders, indigenous people (IPs), local communities (LCs), or customary rights holders. The primary stakeholders are given the opportunity to provide their details if they wish to receive a free improved cookstove. It is entirely their choice whether to sign up or to decline. Once they have signed up, stoves are distributed irrespective of tribal, ethnic, religious or political backgrounds of the beneficiaries. Beneficiaries are not forced or coerced to use the stoves during ongoing monitoring work.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation or preventative measure(s) taken
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No risk identified	As the project is focused exclusively on the free provision of improved cookstoves, there is no impact on cultural heritage as part of project activities. Primary stakeholders are invited to give their name during the beneficiary data collection progress if they wish to receive an improved cookstove. They are not compelled to do so, nor are they told to change their traditional practices beyond being encouraged to use their improved cookstove for future cooking events.
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2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The GP and its PAIs involves distribution of improved cookstove to households and communities in Rwanda and it does not require acquisition of property, hence no impact on any property rights. Hence, this is not applicable.

2.3.5 Benefit Sharing

Summary of the benefit sharing plan	Not applicable. The project activity involves distribution of improved cookstoves to individual households and it does not require acquisition of property.
Benefit sharing during the monitoring period	Not applicable.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure(s) taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified.	The ICS reduces GHG emissions through its better design and improved performance as compared to traditional stove, without changing the baseline fuel or introducing additional pollutants. Therefore, the project has no impact on biodiversity and ecosystems
Soil degradation and soil erosion	No risk identified.	The project stoves directly decrease wood fuel demand and reduce the pressure from wood cutting within the project boundary. Thus, project activity will indirectly avoid erosion associated with tree cutting/ felling.

Water consumption and stress	No risk identified.	The by-products (ash and smoke) of the project's ICS match the baseline scenario, as there's no fuel change. This prevents any additional impact on natural watercourses, groundwater, or watersheds, including seasonal flow variations, flooding risks, aquatic connectivity issues, or water scarcity
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2.4.1 Rare, Threatened, and Endangered species

Species or habitat	Areas needed for habitat connectivity
Not applicable, the project is not located in, or adjacent to habitats for rare, threatened, or endangered species.	

Use the table below to identify and summarize any risks related to habitats for rare, threatened, and endangered species, and for areas for habitat connectivity. Describe the commensurate mitigation or preventative measure(s) in place to prevent or mitigate the identified risk during the monitoring period. Where no risk is identified, write 'No risk identified' in the first column, and provide justification in the second column.

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	Not applicable, the project is not located in, or adjacent to habitats for rare, threatened, or endangered species.	
Areas for habitat connectivity	Not applicable, the project is not located in, or adjacent to habitats for rare, threatened, or endangered species.	

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Not applicable, the project does not involve introduction of any species.			

Where invasive species exist in the project area, list such species in the table below and describe the commensurate mitigation measure(s) in place to prevent the spread or continued existence of invasive species.

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
Not applicable, the project does not involve introduction of any species.	

Use the table below to identify and summarize any risks related to invasive species. Describe the commensurate mitigation or preventative measure(s) in place to prevent or mitigate the identified risk during the monitoring period. Where no risk is identified, write 'No risk identified' in the first column, and provide justification in the second column.

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species	Not applicable, the project does not involve introduction of any species.	

2.4.3 Ecosystem conversion

	Risks identified	Mitigation or preventative measure(s) taken
Not applicable, the project is not an ARR, ALM, WRC or ACoGS project.		

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The first ICS under the grouped project has started distribution from 04 November 2022. The implementation status of the first project activity (PA1) at the end of the monitoring period is as follows:

ICS Type	2022	2023	Total (Number)
BURN Kuniokoa Generation 2 (with pot-skirt)	132,226	202,715	334,941
Total	132,226	202,715	334,941

No distributions were conducted after 2023. The stoves are deemed under continuous operation since their installation. In total 334,941 ICS have been installed since the beginning of the project. No changes were made to the PP or any other entities involved in the project during the monitoring period. Three ICS were discarded based on grievances received or observations made during the monitoring surveys regarding damaged cookstoves. As a result, the total project population was reduced from 334,944 ICS reported in MP3 to 334,941 ICS. Consequently, no emission reductions were claimed for these three discarded ICS during the monitoring period. No other events occurred during the monitoring period that could impact the GHG emission reductions.

3.2 Deviations

3.2.1 Methodology Deviations

There are no methodology deviations in this or any previous monitoring period.

3.2.2 Project Description Deviations

There are no project description deviations in this monitoring period. During previous Monitoring Period (01-Jan-2023 to 31-Dec-2024) the following Project Description Deviation took place and was validated under that MP.

Quote from MP2 Monitoring Report:

During the current monitoring period [MP2: 01-Jan-2023 to 31-Dec-2024], the project has undergone a methodology change following the "Procedure to Change Methodology through a Project Description Deviation v4.0." The previously applied methodology, VMR0006 ver 1.1, has been replaced by VM0050 ver 1.0 for this monitoring period.

Impact on Methodology Applicability, Additionality, and Baseline Scenario

The project deviation does not impact the additionality of the project. The project continues to adhere to the same additionality approach by utilizing the positive list provided in the methodology, thereby maintaining its eligibility as additional.

All applicability conditions of the newly adopted methodology, VM0050 ver 1.0, have been duly justified in Section 3.2 of the revised Project Description (PD) and further elaborated in Section 3.4 of this report. The PD has also been updated to reflect relevant changes in methodology in Sections 4.0 and 5.0, aligning them with VM0050 ver 1.0 requirements. Correspondingly, this monitoring report has been updated to ensure consistency with the revised PD and the applied methodology.

The baseline scenario has been reassessed in accordance with the new methodology. However, the fundamental baseline scenario remains unchanged, which is the continued use of traditional cookstoves, such as three-stone fire cookstoves, relying on non-renewable wood fuel by the target population in rural and semi-urban areas. These traditional cookstoves fulfill similar thermal energy needs as the project cookstoves in the absence of the project activity.

Outcome of the Deviation

As a result of the reassessment, the baseline Kitchen Performance Test (KPT) results indicate a reduction in baseline fuel consumption from the previously determined 4.41 tons/year to 4.04 tons/year. This reduction represents a conservative approach, ensuring that the baseline emissions are not overestimated. The updated value reflects the revised methodology's approach to baseline determination while maintaining alignment with the project's overall objectives and operational framework.

3.3 Grouped Projects

No new project activity instances have been added in this monitoring period.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes ☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Enter all data and parameter values using the units specified in the applicable methodology, tool, or module. Project Hub does not perform unit conversions, and all calculations assume that the entered values are already provided in the required units.

Data / Parameter:	$NCV_{b,i}$
Data unit:	TJ/tonne
Description:	Net calorific value of baseline fuel for baseline device type i
Source of data:	Option 3: Default value from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.0156
Justification of choice of data or description of measurement methods and procedures applied:	Use of default values from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories Wood: 0.0156 TJ/tonne
Purpose of Data:	Calculation of baseline and project emissions
Comments:	N/A

Data / Parameter:	EF_{b,i,CO_2}
Data unit:	t CO ₂ /TJ
Description:	CO ₂ emission factor for fuel used by baseline device type i in the baseline scenario
Source of data:	Option 3: Default value from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	112
Justification of choice of data or description of measurement methods and procedures applied:	Use of default values from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories Wood: 112 t CO ₂ /TJ
Purpose of Data:	Calculation of baseline and project emissions
Comments:	N/A

Data / Parameter:	$EF_{b,i,nonCO_2}$
Data unit:	t CO ₂ /TJ
Description:	Non-CO ₂ emission factor for fuel used by baseline device type i in the baseline scenario
Source of data:	Option 3: Default value from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories

Value applied:	9.46
Justification of choice of data or description of measurement methods and procedures applied:	Use of default values from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories Wood: 9.46 t CO ₂ e/TJ (AR5 GWP)
Purpose of Data:	Calculation of baseline and project emissions
Comments:	N/A

Data / Parameter:	NCV _{p,j}
Data unit:	TJ/tonne or TJ/m ³
Description:	Net calorific value of project fuel used in project device type j
Source of data:	Option 3: Default value from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	NCV_p_j.xlsx
Justification of choice of data or description of measurement methods and procedures applied:	Use of default values from the most recent version of the IPCC guidelines for National Greenhouse Gas Inventories Wood: 0.0156 TJ/tonne
Purpose of Data:	Calculation of baseline and project emissions
Comments:	N/A

Data / Parameter:	EF _{p,j,CO2}
Data unit:	tCO ₂ /TJ
Description:	CO ₂ emission factor for fuel used by project device type j in the project scenario
Source of data:	Option 3: Default value from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	EF_p_j_CO2.csv
Justification of choice of data or description of measurement methods and procedures applied:	Use of default values from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories Wood: 112 t CO ₂ /TJ
Purpose of Data:	Calculation of baseline and project emissions
Comments:	N/A

Data / Parameter:	EF _{p,j,nonCO2}
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Data unit:	tCO ₂ /TJ
Description:	Non-CO2 emission factor for fuel used by project device type j
Source of data:	Option 3: Default value from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	EF_p_j_nonCO2.csv
Justification of choice of data or description of measurement methods and procedures applied:	Use of default values from the most recent version of the IPCC Guidelines for National Greenhouse Gas Inventories Wood: 9.46 t CO ₂ e/TJ (AR5 GWP)
Purpose of Data:	Calculation of baseline and project emissions
Comments:	N/A

CF

Data / Parameter:	CF
Data unit:	unitless
Description:	Wood-to-charcoal conversion factor
Source of data:	
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of Data:	
Comments:	

Data / Parameter:	Hhi
Data unit:	Equivalent standard male adults
Description:	Average household size of the target population using device type i
Source of data:	Baseline survey /KPT, refer registered PD
Value applied:	Hhi.csv
Justification of choice of data or description of measurement methods and procedures applied:	A measurement campaign (Baseline KPTs/Surveys), conducted following the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities.

Purpose of Data:	Estimation of average energy consumption when applying Option 1:
	Measurement campaign.
	Cross-checking energy and fuel consumption values.
Comments:	N/A

Data / Parameter:	Hhjk
Data unit:	Equivalent standard male adults
Description:	Average household size of the target population using device type j from batch k
Source of data:	Baseline survey /KPT, refer registered PD.
Value applied:	Hhjk.csv
Justification of choice of data or description of measurement methods and procedures applied:	A measurement campaign (Baseline KPTs/Surveys), conducted following the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities.
Purpose of Data:	Estimation of average energy consumption when applying Option 1:
	Measurement campaign.
	Cross-checking energy and fuel consumption values.
Comments:	N/A

4.2 Data and Parameters Monitored

Enter all data and parameter values using the units specified in the applicable methodology, tool, or module. Project Hub does not perform unit conversions, and all calculations assume that the entered values are already provided in the required units.

Data / Parameter:	$BC_{p,j,k,y}$
Data unit:	tonnes or m^3
Description:	Average quantity of fuel used by project device type j from batch k during year y
Source of data:	Monitoring (Project Kitchen Performance Test results from MP2)
Value applied:	BC_p_j_k_y.csv

Description of measurement methods and procedures to be applied:	Option 1: Kitchen Performance Test (KPT) A measurement campaign following the Kitchen Performance Test Protocol protocol was designed, carried out, and analyzed in compliance with the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities. The campaign achieved confidence and precision of at 95/10 for the target parameter of average daily fuel consumption per adult equivalent. The result was scaled appropriately using the average household size to obtain the value of $BC_{p,j,k,y}$. Project KPTs also measured the quantity of fuel used by pre-project devices that are still operational and provide it in the calculation sheet and monitoring reports (this is a reporting-only requirement).
	Frequency of monitoring/recording: Biennial or annual for Option 1
	Monitoring equipment: N/A
	QA/QC procedures to be applied: -
	Purpose of Data: Calculation of baseline and project emissions
Calculation method:	A measurement campaign (Project KPTs), conducted during MP2 following the Kitchen Performance Test Protocol protocol and analyzed in compliance with the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities. The survey revealed that the average wood consumption on the project ICS is 0.282 tonnes/person/year. This result is scaled appropriately using the average household size ($Hh_{j,k}$) as follows: $BC_{p,j,k,y} = BC_{p,j,k,y} \text{ (tonnes/person/year)} \times \text{Equivalent standard male adults } (Hh_{j,k})$ obtained from project KPT $= 0.282 \times 4.31$ $= 1.21 \text{ tonnes/year}$
	Comments: No new distributions were undertaken in the current monitoring period; therefore, no new KPT was required. For ICS distributed during 2022–2023, a project KPT was conducted in the MP2 between 16 December 2024 and 20 December 2024. As the required frequency of project KPT is biennial, no measurement was required during the current monitoring period.

Data / Parameter:	$\eta_{new,avg,y}$
Data unit:	Fraction
Description:	Weighted average efficiency of project devices in year y
Source of data:	Monitoring
Value applied:	eta_new_avg_y (1).csv

Description of measurement methods and procedures to be applied:	The efficiency must be established using one of the following methods, and the corresponding documentation must be presented: 1) Water Boiling Test campaigns achieving 90/10 confidence and precision levels as per the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities; 2) Manufacturer-certified value that is determined via Water Boiling Test; or 3) Certification from the host country's national standards body or certifying agency. The decrease in thermal efficiency of project device j from batch k due to aging must be accounted for during the monitoring period, as presented below. For devices using biomass or fossil fuel, one of the following options must be selected, listed in descending order of preference: a) Standard Water Boiling Test campaigns b) A linear decrease approach, applying a default schedule of linearly decreasing efficiency up to the terminal efficiency (assumed to be 25%) through the lifespan of the project device For all other electric project devices, efficiency loss is calculated by measuring the total heat absorbed by a known mass for a given time and dividing it by the input of electrical energy measured by a power analyzer and comparing to the result of the previous year. The weighted average efficiency is calculated by multiplying the energy consumption $EC_{p,j,k,y}$ of the project device j of batch k by its thermal efficiency $\eta_{new,j,k,y}$ and then summing these values for all project devices. The resulting sum is divided by the total energy consumption of all project devices to determine the weighted average efficiency.
Frequency of monitoring/recording:	Annually
Monitoring equipment:	All equipment used at the time of measurements were newly purchased; therefore, calibration was not required. WBTs were conducted between 04-May-2026 to 07-May-2026.
QA/QC procedures to be applied:	N/A
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	N/A
Comments:	N/A

Data / Parameter:	$BC_{b,i,y}$
Data unit:	tonnes
Description:	Fuel used per baseline device type i during year y
Source of data:	Option 1: A measurement campaign following the Kitchen Performance Test Protocol in control households that do not participate in the project, established prior to validation as statistically equivalent to the pre-project conditions of project households regarding baseline fuel consumption
Value applied:	BC_b_i_y.csv

Description of measurement methods and procedures to be applied:	Option 1: Follow-up baseline surveys must be conducted at most every five years from the date of the last survey in control households that do not participate in the project, established prior to validation as statistically equivalent to the pre-project conditions of project households regarding baseline fuel consumption. Measurement campaign must be updated where follow-up baseline surveys show that the fuels, fuel sources, or technologies used by the control group are no longer statistically equivalent to the pre-project conditions of project households. The measurement campaign must be designed, carried out, and analyzed in compliance with the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities. The result must be scaled appropriately using the average household size to obtain the value of $BC_{b,i,y}$.
Frequency of monitoring/recording:	At most every five years
Monitoring equipment:	N/A
QA/QC procedures to be applied:	The campaign achieved a confidence and precision of 95/10 for the target parameter of average daily fuel consumption per adult equivalent.
Purpose of Data:	Calculation of baseline emissions
Calculation method:	N/A
Comments:	N/A

Data / Parameter:	$N_{j,k,y}$
Data unit:	
Description:	Number of commissioned project devices of type j from batch k in year y
Source of data:	Monitoring
Value applied:	N_j_k_y (3).csv
Description of measurement methods and procedures to be applied:	The following data must be recorded during project activity implementation: 1) Number of new devices distributed under the project activity, identified by the type of device and date of commissioning; and 2) Identification information of the recipient of the device distributed under the project activity (e.g., name, address, phone number). Data management and reporting of this information must adhere to both data privacy requirements and good practice.
Frequency of monitoring/recording:	Every time that new project devices are distributed
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	N/A

Comments:	The number of project devices will be recorded in a database, sales record, or similar to ensure transparency. Here, the batch k is not segregated in a PAI. Every distribution under a PAI may be considered as a separate batch.
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Data / Parameter:	$n_{j,k,y}$
Data unit:	Fraction
Description:	Proportion of commissioned project devices of type j from batch k that remain operating in year y
Source of data:	Monitoring
Value applied:	n_j_k_y(1).csv
Description of measurement methods and procedures to be applied:	Option 2 (surveys): Based on an adoption rate determined by a survey according to the most recent version of the CDM Standard for Sampling and Surveys for Project Activities and Programmes of Activities.
Frequency of monitoring/recording:	annually
Monitoring equipment:	N/A
QA/QC procedures to be applied:	The date on which a sample project device stopped being used should be taken as follows: Option 2 (surveys): Where the project device is not working or not being used at the time of conducting the survey, it should be conservatively assumed that the project device has not been active since the date on which the last adoption survey was conducted. The monitoring surveys were conducted from 02-March-2026 to 12-March-2026 in this MP.
Purpose of Data:	Calculation of baseline and project emissions

Calculation method:	1) Although the operational check was 98.42% as per the survey, in line with the clarification on VM0050, a cap of 0.9 was applied. 1) The PP has capped the usage rate at 90% in line with the VM0050 v1.0 Corrections and Clarifications Number 2, based on the following: 1. Selection of technologies and fuels that fully meet the cooking needs of the target population demonstrated by citing robust research or conducting an investigation of cooking practices and attitudes - o As detailed in Section 3.4 of the PD, the target population—rural households in Rwanda—primarily use wood fuel and traditional wood stove technology for cooking. This is supported by both the project's baseline survey and national statistics (the Fifth Rwanda Population and Housing Census, 2022). - o The PP has distributed the Kuniokoa stove, an improved wood-burning stove, specifically to replace the traditional 3-stone fires or traditional wood stoves used by these households. This ensures that the distributed technology and fuel type fully meet the cooking needs of the target population. 2. Implementation of support activities to assist households in effectively operating and maintaining their cookstoves. and maintaining their cookstoves. These may include providing materials (print, in-person, or video) on how to operate the cookstove to prepare common local foods, how to troubleshoot common operational issues, and how to make minor repairs (including obtaining necessary replacement parts). All such communications and materials must be provided in local language(s) commonly used in the project area. - o At the time of distribution, each household receives a poster agreement with pictorial representations showing how to properly use and maintain the stove, including clear do's and don'ts. These instructions are provided in the local language, ensuring accessibility and understanding. Demonstrations are also conducted during distribution events. - o Additionally, during follow-up visits, local field teams provide users with training using a 16-page Tubehe Neza Flipbook, which covers proper usage, maintenance, and troubleshooting. 3. Provision of a commonly used, toll-free communications channel through which the target population can contact the project proponent to access support (e.g., maintenance and repair services) As detailed in Sections 2.1.4 of the PD and MR, the PP has established a toll-free helpline number, enabling end users to easily reach out with feedback, requests for maintenance, or any grievances. Considering all these points, the project fully complies with all three conditions set out under Clarification Number 2 of VM0050 v1.0 Corrections and Clarifications, thereby justifying the capping of the usage rate at 90%.
Comments:	The batch k is not segregated in a PAI. Every distribution under a PAI may be considered as a separate batch.

Data / Parameter:	$f_{NRB,y}$
Data unit:	Fraction
Description:	Fraction of woody biomass that is established to be non-renewable used by baseline device in year y; this variable is not considered for fossil fuels
Source of data:	Third party report in line with TOOL30 version 4.0 and applying an uncertainty discount of 26%
Value applied:	f_NRB_y.csv
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Ex-ante for each crediting period
Monitoring equipment:	N/A

QA/QC procedures to be applied:	N/A
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	The value of 0.8872 was registered in the PD under TOOL30 Version 4 for the host country, Rwanda. This registered value in the PD is then adjusted by an uncertainty discount of 26% as follows: $= 0.8872 \times (1-26\%) = 0.6565$
Comments:	This data has been fixed for entire crediting period.

Data / Parameter:	proration
Data unit:	
Description:	
Source of data:	ICS Distribution Summary Tab of the ER sheet
Value applied:	proration.csv
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of Data:	N/A
Calculation method:	N/A
Comments:	N/A

Data / Parameter:	LE _{BC,y}
Data unit:	
Description:	
Source of data:	
Value applied:	LE_BC_y.csv
Description of measurement methods and procedures to be applied:	

Frequency of monitoring/recording:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Purpose of Data:	
Calculation method:	
Comments:	

Data / Parameter:	$LE_{BR,div,y}$
Data unit:	
Description:	
Source of data:	
Value applied:	LE_BR_div_y.csv
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Purpose of Data:	
Calculation method:	
Comments:	

Data / Parameter:	$\eta_{old,avg}$
Data unit:	Fraction
Description:	Weighted average efficiency of baseline device i that is replaced by project device type j
Source of data:	
Value applied:	0.15

Description of measurement methods and procedures to be applied:	This data is fixed ex-ante as per the applied methodology VM0050. A default value of 0.15 shall be used if the baseline device is a three stone fire using firewood or a cookstove without improved combustion air supply or flue gas ventilation. The project distributes non-renewable wood fuel-based ICS, replacing only baseline devices that meet these criteria.
Frequency of monitoring/recording:	
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of Data:	Calculation of baseline emission
Calculation method:	N/A
Comments:	N/A

4.3 Monitoring Plan

Description of Monitoring Plan

- This Grouped Project in Rwanda follows VCS standard requirements applicable, along with the methodological requirements on monitoring a grouped non-AFOLU large project activity. The Monitoring Plan is elaborated in multiple sub-sections for the sake of clarity.
This monitoring plan is based on the applied methodology VM0050 ver 1.0. The monitoring plan consists of checking a representative sample of all ICS units distributed to ensure that they are still operating or are replaced by an equivalent in-service unit.
- 1. Methods for measuring, recording, storing, aggregating, collating and reporting on monitored data and parameters
A project database was populated during the distribution of each initial cookstove issued. The database is accessible to the project proponent, appropriate partners, and the verification VVB. The database includes, at minimum, the following:
 - Date of Distribution
 - Geographic area of distribution;
 - Model/type of project technology distributed
 - Name, telephone number (where available), and address of recipient; and
 - Unique alpha/numeric ID for each device that is distributed
 The database is used to select a random, representative sample for monitoring and verification purposes.
The data was collected using surveys carried out by project proponent own teams.
Monitoring surveys includes examination of the cookstove installations and verification that they are in an operational condition.
Data collected from the surveys was compiled into an Excel spreadsheet. Data obtained from the samples were used to estimate proportions and mean values for the parameters described in below sub-sections. The values then factored into the emissions reduction calculations.
The data recorded in the monitoring surveys is collected and stored electronically, and then uploaded to the central database management system, where it is maintained online on a

subscription-based server host.

The data will be also stored offline, within the hard disk drives. The data collection procedures do not involve any paper records, to reduce the environmental footprint of the programme.

The project related data will be stored for two years after the implementation period is over for the project activity.

2. Organizational Structure, Role, and Responsibilities of Personnel Involved in the Project Activity

The DelAgua team involved in the GHG operations management is the local staff based in Rwanda along with the senior management.

The key responsibilities are shared by the team as follows:

Chairman – Supervises the overall programme at strategy and financial side.

COO – Acts as central point of strategy, programme management, finance, and technical domains

Director Business Intelligence

– Manages the programme at implementation level, and acts as an internal technical reviewer for the programme documents and procedures.

Carbon Operations Manager – Manages the operations for GHG emission mitigation programme, from planning to implementation stage. Additionally, manages the Sustainability aspects of the programme.

Country Director – Supports programme in the operations and management at the host country level and acting as point of communication between DelAgua and government of Rwanda

. The collective responsibilities of DelAgua as the Project Participant is following:

- Acts as the project managing entity
- Development of PD
- Registration/Issuances of the project with VERRA
- Inclusion of new PAIs upon satisfaction of the eligibility criteria stipulated in the PD
- Authorized entity for any official communication with the VERRA and VVB
- Manage and archive the database for all appliances
- QA/QC of database during distribution & data collection
- Maintain local repair/replacement facilities
- Education and public awareness raising during initial distribution as well as periodic education campaigns.
- Data collection during distribution & delivery of data to database
- QA/QC of data collection
- Conduct ongoing monitoring, as required to ascertain monitored parameters.

3. The procedures for Internal Auditing and QA/QC

Quality assurance and quality control (QA/QC) measures were adhered.

Distributors are trained in the proper installation, use, and maintenance of the devices, and are provided with training sufficient to introduce recipient households to the proper operation and maintenance of the devices, as well as contact information for DelAgua. Supervisors receive similar training, as well as supervisory training in monitoring of distributor's activities. The data collected in the database is verified and controlled in the following way:

- Surveys are conducted by staff trained by DelAgua.
- Supervisors are separately trained by DelAgua to spot-check surveyor results.
- All ex-ante and monitored data parameters are collected on smart phone-based surveys and are uniform across all surveyors for any given survey activity.
- Unknown to the surveyors, the database analysis includes verification of "valid" surveys including by a.) verifying household consent is received and b.) that the survey duration, as recorded by Internet time, is no shorter or longer than a reasonable value.

- Data validation is conducted on the database to ensure that values are numerically consistent, i.e. multiple-choice values add up to 100% of respondents.

4. Procedures for handling non-conformances with Validated Monitoring Plan

The personnel engaged in monitoring and reporting underwent training to ensure a comprehensive understanding and proper execution of the monitoring and reporting procedures outlined in the monitoring plan.

DelAgua is responsible for training any contractors used during distribution, education and monitoring activities. DelAgua ensures training of all on-site staff with respect to adherence to the Monitoring Plan of the project activity. Records of the training will be kept. Training records are saved for such training programs, where step-by-step training is provided to the surveyors for a quality data collection process, where they are expected to not impact the materiality, degree of conservativeness, and perform the surveys in an unbiased manner. The surveyors are trained on a periodic basis, and refresher trainings are also provided to improve the quality of surveys from time to time. Since the surveys are electronic in format, recording of responses and the record keeping procedure for these surveys are conveyed to the team through rigorous trainings.

The project proponent ensured that field personnel have reviewed, understood and have agreed to follow the monitoring plan procedures, including provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response. Monitoring plan explains how to properly survey households to prevent bias from interviewer. In the case a household refuses to participate, another household is chosen at random. To reduce interviewer bias, good questionnaire design and well-tested questionnaires is used.

The project proponent must maintain a record of the date of commissioning of project devices of each type j and batch k. Relevant parameters must be monitored and recorded during the crediting period as indicated in Section 9.2. The project proponent must apply the requirements specified in the General Guidelines for SSC CDM methodologies.

This requirement is fulfilled. The Grouped Project in Rwanda follows the VCS standard requirements and the monitoring provisions under VM0050 (ver. 1.0) applicable to grouped non-AFOLU large project activities. A comprehensive Monitoring Plan has been developed, detailing procedures for recording, storing, and managing data for all distributed ICS units, including date of distribution/commissioning, model type, and unique identification numbers.

All relevant parameters are monitored and recorded through electronic databases maintained by DelAgua, in line with the QA/QC procedures and internal auditing systems described in the monitoring plan.

4.3.1 Data recording

The project proponent must compile data on each device that is derived from the total sales record, with project technologies differentiated by different project scenarios. These data must be differentiated into sections based on the results of the applicable monitoring studies for each project scenario, so that emission reductions can be calculated appropriately, section by section. The information captured for each project device included in the project activity must include, at a minimum: 1) Date of sale; 2) Geographic area of sale; 3) Model/type of project technology sold/distributed; 4) Name, telephone number (where available), and address of recipient; and 5) Unique alpha/numeric ID for each device that is sold/distributed.

This requirement is fulfilled. The project maintains a detailed project database capturing all required information for each distributed cookstove, including date and geographic area of distribution, model/type, recipient details, and unique ID. The data are organized by project scenario and used for monitoring analysis and emission reduction calculations in accordance with VM0050 (ver. 1.0).

4.3.2 Sampling

Where measurement campaigns are conducted, the sampling approach described in the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities must be followed. When developing a sampling plan, project proponents must calculate the sample size required to achieve the required level of reliability. The sample size should be determined manually or using appropriate statistical software. The calculation is dependent on all of the following as well as the target level of confidence and the precision of 90/10: a) The type of parameter of interest (i.e., mean value or proportion); b) The target value (i.e., the expected value of the parameter), which should be determined using the project proponent's knowledge and experience; and c) Expected variance (or standard deviation) for that measure in the sample, based on results from similar studies including other similar mitigation projects or previous monitoring periods, pilot studies, or from the project proponent's own knowledge. The project proponent is encouraged to ensure that all surveys and tests performed for the quantification of GHG emission reductions within this methodology are performed by an independent party qualified for these procedures. This ensures the integrity, accuracy, and transparency of reduction claims and supports the credibility of the project's environmental benefits.

Due to the large number of ICS distributed as part of the project activity, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling have been undertaken as part of Sampling Plan in line with the requirements of the methodology applied and the Standard:

Sampling and surveys for CDM project activities and programmes of activities, version 9.0.

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.

STEP 1: Sampling Objectives

The sampling objective for each parameter was to determine, via sampling survey, a statistically significant parameter value for the emission reduction calculations. These parameters are as listed as below:

No. Parameter	Description	Parameter type	Monitoring frequency	Required/Monitored in this MP
1 $n_{j,k,y}$	Proportion of commissioned project devices of type j from batch k that remain operating in year y	Proportion	Annually	Monitored MS were conducted between 02-March-2026 to 12-March-2026.
2 $\eta_{new,avg,y}$	Weighted average efficiency of project devices in year y	Mean	Annually	Monitored WBTs were conducted between 04-May-2026 to 07-May-2026
3 $BC_{b,i,y}$	Fuel used per baseline device type i during year y	Mean	Every five years	NA
4 $BC_{p,j,k,y}$	Average quantity of fuel used by project device type j from batch k during year y	Mean	Biennial or annual	NA

STEP 2: Target Population

Total 334,941 households were part of the PAI-1 till the end of current monitoring period, were considered for sampling.

STEP 3: Sampling Frame

The sampling frame refers to all the aggregated data of end-users of the ICS as recorded in the Project ICS Database. The monitoring survey data was collected through physical survey which is the primary mechanism in place for the data collection of the newly distributed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) which is used in the current monitoring period.

The following information was recorded during the monitoring survey, at a minimum:

- Product based Unique Identification number.
- Contact information, geographical location or other relevant information of the end user
- Sampling frame was representative of the entire population.
- No elements from outside the population of interest is present for the current monitoring period.

Wherever information miss-match is observed, it is corrected in the database and conservative assumptions is applied.

STEP 4: Sample Method

Sampling was conducted using stratified random sampling technique over the sampling frame, and detailed calculations are provided below as per CDM guidelines "Sampling and surveys for CDM project activities and programmes of activities" v 9.0. The sampling was done on 18th March 2026.

The PP applied vintage-based stratification, as the continued usage of a stove is influenced by its operational age, determined by the year of commissioning.

The following strata were defined:

Stratum	Description	Population
2022 vintage	Devices commissioned in 2022	132,226
2023 vintage	Devices commissioned in 2023	202,715

Within each vintage, devices are of the same stove model and have similar operational age during the monitoring year. Therefore, no intra-stratum variation exists that could influence stove usage behaviour, ensuring homogeneity within each stratum.

To undertake random sample selection in a manner that accommodates the logistical challenge posed by the potential inclusion of ~ 100 (numbers corresponds to sample size) distinct villages and sectors, a simple random sampling method is deemed impractical. Therefore, a stratified random selection approach is employed. Initially, villages are randomly selected with the number required achieved by dividing the sample size by 5, where 5 corresponds to the anticipated number of monitoring surveys achievable in a day by a DelAgua staff member. This choice is based on the operational feasibility of one staff member being able to conduct surveys in one village per day.

This is randomly selected through the excel formula as follows:

=INDEX (SORTBY (data,RANDARRAY(ROWS(data))),SEQUENCE(#villagesrequired))

Where first dataset is the list of villages. This gives a list of random villages.

After the identification of random villages, all stoves distributed within the villages are compiled into a singular document. Each stove is assigned a unique identifier, following which, using the = randbetween function, five stoves (households) are randomly selected from each of the chosen villages. This process gives the final sample set.

To determine the parameters, sampling involves the following approaches.

nj,k,y: Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use (Yes/No)

nnew,avg,y: WBT tests were conducted in the sampled households.

STEP 5: Desired Precision / Expected Variance and Sample Size

To estimate the number of premises to be surveyed with a 10% margin of error at desired confidence level of 95%, the optimal sample size n is given by:

$$n \geq \frac{z^2 * N * V}{(N-1) * precision^2 + z^2 * V}$$

Where,

Parameter	Description
n	Sample Size
N	Total number of cookstoves (ICS) distributed
Z	Constant referring to level of confidence (1.96 for 95 %, 1.646 for 90%)
Precision	Required precision (e.g., 10% = 0.1)

Where for Proportion Parameter:

$$V = \frac{SD^2}{\bar{p}^2}$$

$$SD^2 = \frac{\sum_{i=1}^k g_i * p_i * (1 - p_i)}{N}$$

$$\bar{p} = \frac{\sum_{i=1}^k g_i * p_i}{N}$$

Parameter	Description
SD	Standard deviation
g_i	Weight of strata i in the population
p_i	Expected proportion of strata i in the population
k	Total number of strata in the population

And for mean-based parameters:

$$V = \frac{SD^2}{mean^2}$$

$$SD^2 = \frac{\sum g_i \times SD_i^2}{N}$$

$$mean = \frac{\sum g_i \times m_i}{N}$$

Parameter	Description
Mean	Weighted overall mean
m_i	Mean of strata i

As per the CDM guideline for Sampling and survey⁹, if the sample size calculation returns a value of less than 30 samples, a minimum sample size of 30 shall be chosen. The sample size calculation and monitoring results of the monitoring parameters for PAI-1 has been shown below:

Sampling Constants	Values
Monitoring period start	1/10/2025
Monitoring period end	30/4/2026
Level of Sampling	Grouped Project Level
Monitoring Frequency	Annual
Confidence (%) (90 or 95)	95%
Margin of Error (%)	10%
Z value	1.960

Parameter ($\eta_{new,avg,y}$)

As per the sample size calculation, 8 samples were calculated to be surveyed, However, 13 samples were considered to compensate for any outliers or non-responses associated with samples and to get accurate results. The snapshots below demonstrate that required precision is met i.e., the parameter is within the 95/10 confidence/precision. For detailed calculation of the standard error and relative precision of the parameter $\eta_{new,avg,y}$ refer tab "Sample Size Cal & Results" of the ER sheet.

Monitoring parameter(s)		Project Stove (Kuniokoa) Efficiency $\eta_{new,avg,y}$					
Sampling frame(s)		Given stove model and vintage population					
Sampling approach		Stratified random sampling					
Sampling frame	Sampling Population	Expected Value (without pot-skirt)	Expected SD (without pot-skirt)	Expected Value (with pot-skirt)	Expected SD (with pot-skirt)	Calculated Minimum Sample Size without pot-skirt (n)	Calculated Minimum Sample Size with pot-skirt (n)
2022	132226	0.41	0.041	0.49	0.049	3	3
2023	202715	0.42	0.042	0.50	0.05	5	5
Estimated efficiency (mean)						0.42	0.50
Estimated Standard Deviation of efficiency (SD)						0.04	0.05
$V_{max} = (SD/mean)^2$						0.01	0.01
Minimum Sample Size required (efficiency)						4	4
tDistribution sample size adjustment						Iteration 1	11
						Iteration 2	5
						Iteration 3	8
						Iteration 4	6
						Iteration 5	7
						Iteration 6	6
						Iteration 7	7
Monitoring results							
Sampling Population	Sampling frame size	Monitored Sample Size (without pot-skirt)	Monitored Efficiency (Fraction) (without pot-skirt)	Monitored Standard Deviation (without pot-skirt)	Monitored Sample Size (with pot-skirt)	Monitored Efficiency (Fraction) (with pot-skirt)	Monitored Standard Deviation (with pot-skirt)
2022	132226	5	39.11%	0.00869	5	48.18%	0.00348
2023	202715	8	39.41%	0.00269	8	48.46%	0.00333
Reliability Check							
Samples Monitored				13	Samples Monitored		
Efficiency Monitored				39.29%	Efficiency Monitored		
Standard error of mean				0.0015	Standard error of mean		
Relative precision (Margin of error) (%)				0.909%	Relative precision (Margin of error) (%)		
Result				Ok, reliability level	Result		
Lower Bound confidence value				Not applicable	Lower Bound confidence value		

Parameter ($\eta_{j,k,y}$)

Monitoring parameter(s)		Stove Operating Fraction for determination of $\eta_{j,k,y}$	
Sampling frame(s)		Given stove model and vintage population	
Sampling approach		Stratified random sampling	
Sampling Population	Sampling frame size	Expected operational proportion	Calculated Minimum Sample Size (n)
2022	132228	0.85	27
2023	202716	0.85	42
Sample size determination			
Estimated $\eta_{j,k,y}$ (p)			0.85
Estimated Standard Deviation of $\eta_{j,k,y}$ (SD)			0.36
Variance (SD/p) ²			0.18
Sample Size required			68
Monitoring results			
Sampling Population	Sampling frame size (N)	Monitored Sample Size (n)	Monitored ($\eta_{j,k,y}$)
2022	132228	50	0.96
2023	202716	64	1.00
Reliability Check			
Samples Monitored			114
$\eta_{j,k,y}$ Measured			98.42%
Standard Error of $\eta_{j,k,y}$			1.094%
Relative precision (Margin of error)			2.18%
Result			Ok, reliability level met
Lower Bound confidence value			Not applicable

As per the sample size calculation, 68 samples were calculated to be surveyed, However, 114 samples were considered to compensate for any outliers or non-responses associated with samples and to get accurate results. The snapshots above demonstrate that required precision is met i.e., the parameter is within the 95/10 confidence/precision. For detailed calculation of the standard error and relative precision of the parameter $\eta_{j,k,y}$ refer tab "Sample Size Cal & Results" of the ER sheet.

STEP 6: Quality Assurance/Quality Control

The project proponent applied a confidence/precision of 95/10 for each monitored parameter allowing for non-response and the possible removal of outliers from the sample, as part of a Quality Control/Quality Assurance system. The choice of measure applied to both parameters i.e. number of operational cookstoves, and adjustment factors. The project proponent monitored a

particular parameter till the required level of confidence/precision has been reached, as long as the calculated minimum number of samples has been achieved.

4.3.3 Avoidance of double counting

Project proponents must demonstrate that the project prevents double counting of GHG emission reductions by any actor²⁵ who may wish to claim reductions from project devices. Ownership of the reductions resulting from the project activity must be clearly communicated by contract or clear written assertions in the transaction paperwork to all involved parties. Users must be notified that they are not permitted to claim reductions from the project.

This requirement is fully addressed. The project has implemented robust measures to prevent double counting of GHG emission reductions. A formal agreement with Burn Manufacturing explicitly states that Burn has no rights or claims over any carbon or impact credits generated by DelAgua. Each Improved Cookstove (ICS) distributed under the project bears a unique serial number, barcode, and DelAgua logo, ensuring full traceability.

At the time of ICS distribution, a poster agreement in the local language was displayed and clearly explained to each end user. As part of this process, users signed an acknowledgment confirming that all rights and ownership of the emission reductions from the ICS rest exclusively with DelAgua. Furthermore, the Project Proponent has submitted a signed declaration to the VVB in accordance with VCS Standard v4.7, Section 3.23, confirming that the project stoves are not registered or claimed under any other carbon mechanism and that emission reductions are solely owned by DelAgua.

4.3.4 Use of renewable biomass

For project activities introducing renewable biomass in the form of charcoal, it must be demonstrated (on an ongoing basis) that methane produced during the charcoaling process is captured and destroyed or combusted for energy purposes. The project proponent must document this both in the project description and monitoring reports. Project activities must ensure that renewable biomass sources are documented in the project description and monitoring reports, including origin, quantities, and conditions prior to use under the project activity. Where the biomass is sourced from a third party, proof of purchase must be provided (e.g., contractual agreements or purchase receipts).

The grouped project involves the distribution of non-renewable biomass-based improved cookstoves exclusively to the target users. Given, the project does not involve renewable biomass as a fuel source, hence, this is not applicable.

4.3.5 Decentralized energy systems

Where backup generators in decentralized energy systems supply more than 1% of the annual electricity, the same percentage of emission reductions from project devices powered by these systems must be excluded during the monitoring period.

This requirement is not applicable, as the project activity is a biomass cookstove-based project and does not involve any decentralized energy systems or backup generators.

4.3.6 Self-generated renewable electricity system

The total energy generation of the self-generated renewable electricity system must be estimated and compared to the electricity use of the project device. Where self-generated renewable electricity is supplemented by non-renewable electricity (e.g., a back-up generator), such non-renewable electricity must not account for more than 20% of the electricity consumed by the project devices. Where a verification audit finds that the threshold has been exceeded, the project device must be excluded from emission reduction calculations.

This requirement is not applicable, as the project activity is a biomass cookstove-based project and does not utilize any self-generated renewable electricity systems or electricity-powered project devices.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

CCP Labels

VM0050, v1.0 has been approved by the Integrity Council for the Voluntary Carbon Market (ICVCM) as meeting the requirements of the Core Carbon Principles (CCPs) Assessment Framework. Please note that to receive CCP labels for the credits they generate, projects using VM0050 must meet certain conditions. A guidance document outlining Verra's process for CCP labeling, the ICVCM CCP Label Guidance (PDF), is available on the VCS Rules and Requirements page.

Where the ICVCM has determined that additional CCP label criteria have to be met for a project using a CCP-approved methodology to receive CCP labels, these criteria are checked at the verification review by a validation/verification body (VVB) and Verra. All projects using VM0050 that intend to request CCP labels at issuance must have a completed VM0050 CCP Eligibility Verification Report Checklist Template (.docx) attached as an appendix to the project's verification report. Where VCUs have been issued from projects using multiple methodologies, only VCUs from projects solely using CCP-approved methodologies are eligible for CCP labels.

Per the ICVCM decision (external), projects using VM0050, v1.0 also have to comply with the following additional criteria to be eligible for CCP labels:

The fNRB value must meet the following criteria:

The fNRB value must be from the latest version of CDM Tool 33 for emission reductions achieved on or before December 31, 2025, or
the fNRB value must be drawn from the MoFuSS model.

Fuel consumption must meet the following criteria:

Fuel consumption must be determined using a Kitchen Performance Test (KPT) or Controlled Cooking Test (CCT), or

fuel consumption must be determined using methodology default values with cross-checks on fuel savings.

Charcoal projects must meet the following criteria:

Projects must use a direct charcoal emission factor (which may include production emissions), or
projects must use a wood-to-charcoal conversion factor of 4:1.

5.1 Baseline Emissions

Describe the procedure for quantification of baseline emissions and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

As per the applied methodology VM0050, ver. 1.0,
baseline emissions are calculated as follows:

$$BE_y = \sum EC_{i,y} \times N_{j,k,y} \times \eta_{j,k,y} \times (EF_{b,i,CO_2} \times f_{NRB,y} + EF_{b,i,nonCO_2}) \quad \text{Equation (1)}$$

Where:

BE_y	Baseline emissions during year y (t CO ₂ e)
$EC_{i,y}$	Average energy consumption of baseline device type i in year y (TJ)
$N_{j,k,y}$	Number of commissioned project devices of type j from batch k in year y
$\eta_{j,k,y}$	Proportion of commissioned project devices of type j from batch k that remain operating in year y (fraction)
EF_{b,i,CO_2}	CO ₂ emission factor for fuel used by baseline device type i in the baseline scenario (t CO ₂ /TJ)
$f_{NRB,y}$	Fraction of woody biomass that is established to be non-renewable used by baseline device in year y (fraction)
$EF_{b,i,nonCO_2}$	Non-CO ₂ emission factor for fuel used by baseline device type i in the baseline scenario (t CO ₂ e/TJ)
i	Baseline device type and its respective fuel type
j	Project device type and its respective fuel type

$$BE_y = \sum_{i,j,k} EC_{i,y} * N_{j,k,y} * \eta_{j,k,y} * (EF_{b,i,CO_2} * f_{NRB,y} + EF_{b,i,nonCO_2})$$

BE_y	= Baseline emissions during year y (tCO ₂ e)
$EC_{i,y}$	= Average energy consumption of baseline device type i in year y (TJ)
$N_{j,k,y}$	= Number of commissioned project devices of type j from batch k in year y
$\eta_{j,k,y}$	= Proportion of commissioned project devices of type j from batch k that remain operating in year y (fraction)
EF_{b,i,CO_2}	= CO ₂ emission factor for fuel used by baseline device type i in the baseline scenario (t CO ₂ /TJ)
$f_{NRB,y}$	= Fraction of woody biomass that is established to be non-renewable used by baseline device in year y; this variable is not considered for fossil fuels(fraction)
$EF_{b,i,nonCO_2}$	= Non-CO ₂ emission factor for fuel used by baseline device type i in the baseline scenario (t CO ₂ e/TJ)
i	= Baseline device type and its respective fuel type
j	= Project device type and its respective fuel type

5.1.1 Average Energy Consumption of Baseline Device ($EC_{i,y}$)

$$EC_{i,y} = BC_{b,i,y} * NCV_{b,i}$$

$BC_{b,i,y}$	= Fuel used per baseline device type i during year y (tonnes)(This parameter corresponds to BC _{ex-ante,b,i} for the first two years and where the follow-up baseline survey campaign shows that there are no significant changes in baseline fuel consumption. Otherwise, it corresponds to BC _{b,i,y} .)
$NCV_{b,i}$	= Net calorific value of baseline fuel for baseline device type i (TJ/tonne)

Where:

$BC_{b,i,y}$	Fuel used per baseline device type i during year y (tonnes)
$NCV_{b,i}$	Net calorific value of baseline fuel for baseline device type i (TJ/tonne)

The quantity of fuel that would be used in the baseline scenario must be determined by one of the following two methods.

- ☒ Option 1: Measurement campaign
- ☐ Option 2: Default values

A measurement campaign (Baseline KPTs), conducted following the Kitchen Performance Test Protocol protocol and analyzed in compliance with the most recent version of the CDM Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities.

The survey revealed that the average wood consumption in the Rwanda is 0.937 tonnes/person/year. This result is scaled appropriately

using the average household size (Hhi) as follows:

$BC_{ex-ante,b,i} = BC_{ex-ante,b,l}$ (tonnes/person/year) x Equivalent standard male adults (Hhi) obtained from baseline KPT

= 0.937×4.31

= 4.04 tonnes/year

This parameter has been fixed ex-ante.

Cross-check of $EC_{i,y}$

The quantity of energy determined by both options above must be compared to energy used in the project scenario ($EC_{p,y}$) using back-calculation, as a cross-check. Where the results indicate that baseline consumption is higher than that indicated by back-calculation from the project scenario, then the back-calculation results ($EC_{est,y}$) must be applied in Equation (1) as a conservative cap, except where project devices are electric cooking devices with efficiency of 70% or higher. For this case, the back-calculation result is considered a reference value and project proponents may justify why it is not an appropriate cap by referring to peer-reviewed literature, third party assessments, and/or official data or statistics. Where it is not possible to justify energy use using these sources of information, the reference value must be applied as a conservative cap.

$$EC_{est,y} = EC_{p,y} * \frac{\eta_{new,avg,y}}{\eta_{old,avg}}$$

$EC_{est,y}$ = Back-calculated energy consumption of the potential mix of devices and fuels in the baseline in year y (TJ)

$EC_{p,y}$ = Energy used in project scenario by project devices during year y (TJ)

$\eta_{new,avg,y}$ = Weighted average efficiency of project devices in year y (fraction)

$\eta_{old,avg}$ = Weighted average efficiency of baseline devices that are replaced by project devices (fraction)

Cross-check of $EC_{i,y}$ to address stove stacking:

Baseline consumption from the back calculation is calculated as follows:

Where:

$EC_{est,y}$	Back-calculated energy consumption of the potential mix of devices and fuels in the baseline in year y (TJ)
$EC_{p,y}$	Energy used in project scenario by project devices during year y (TJ)
$\eta_{new,avg,y}$	Weighted average efficiency of project devices in year y (fraction)
$\eta_{old,avg}$	Weighted average efficiency of baseline devices that are replaced by project devices (fraction)

Note: Where the results indicate that baseline consumption ($EC_{i,y}$) is higher than that indicated by back-calculation from the project scenario ($EC_{est,y}$) then the back-calculation results ($EC_{est,y}$) will be applied in Equation (1) as a conservative cap.

$EC_{p,y}$ must be determined as follows, using the parameters determined as per Section 8.2 of VM0050.

$$EC_{p,y} = \sum_{j,k} BC_{p,j,k,y} * NCV_{p,j}$$

$BC_{p,j,k,y}$ = Average quantity of fuel used by project device type j from batch k during year y (tonnes or m³)

$NCV_{p,j}$ = Net calorific value of project fuel used in project device type j (TJ/tonne or TJ/m³)

Where:

$BC_{p,j,k,y}$	Average quantity of fuel used by project device type j from batch k during year y (tonnes or m ³)
$NCV_{p,i}$	Net calorific value of project fuel used in project device type i (TJ/tonne or TJ/m ³)

Given that the grouped project involves the distribution of non-renewable biomass-based improved cookstoves exclusively to the target users, Equation (5) of the methodology applies to electric stoves and is therefore not applicable.

Electric Project Devices With Additional Characteristics Affecting Energy Consumption

For electric pressure cooker project devices with additional characteristics that affect energy consumption (i.e., pressure), thermal efficiency does not reflect the cookstove's thermal performance. In such cases, Equation (5) must be applied to determine specific energy consumption. This requires the determination of specific energy consumption for both baseline and project scenarios using a Controlled Cooking Test (CCT). CCT is applied since the electric pressure cooker is not expected to replace all baseline cooking activities, but only those that can be performed by an electric pressure cooker.

The CCT must be conducted using dishes and cooking practices typical of the project region. The CCT must be performed for the same cooking tasks with both the project electric pressure cooker and baseline device(s). Cooking tasks that cannot be performed with the project electric pressure cooker must be excluded from the baseline CCT.

$$EC_{i,y} = EC_{p,j,k,y} * 0.0036 * (SC_{p,j}/SC_{b,i})$$

$EC_{p,j,k,y}$	= Annual consumption of electricity by electric project device type j from batch k in year y (MWh)
$SC_{p,j}$	= Specific energy consumption of electric pressure cooker project device type j in the project scenario (TJ/test/person)
$SC_{b,i}$	= Specific energy consumption of baseline device type i in the baseline scenario (TJ/test/person)

Given that the grouped project involves the distribution of non-renewable biomass-based improved cookstoves exclusively to the target users, Equation (5) of the methodology applies to electric stoves and is therefore not applicable.

Where the project device replaces more than one type of baseline device, the specific consumption ($SC_{b,i}$) must be determined as the weighted average of the specific energy consumption of the replaced baseline cooking devices, weighted by the proportion of cooking tasks performed by the target population with each type of baseline cooking device.

$EC_{i,y}$ must be cross-checked as described above. $EC_{p,j,k,y}$ must be determined as per Section 8.2.2 of VM0050.

5.1.2 Baseline Emissions Calculation

Select type of project devices

- ☐ Electric devices with efficiency of 70% or higher
- ☐ Electric devices with efficiency of less than 70%
- ☒ Non-electric devices

Verra published Corrections & Clarifications for VM0050 on February 03, 2025, this document explains setting usage rate caps for projects employing surveys. Please select if usage rate cap is applicable for this project?

- ☒ Applicable
- ☐ Not Applicable

Select the usage rate for your project

- ☐ 75%
- ☒ 90%

Provide photographic evidence of monitoring usage rate:

File Name	Description	Upload File
3699.png		3699.png

Select the conditions for equation 1 to calculate baseline emission

Please select the applicable parameter based on project conditions

- ☒ $EC_{i,y}$
- ☒ $EC_{est,y}$

Justification

Justify why the back calculated result ($EC_{est,y}$) is not an appropriate cap by referring to peer-reviewed literature, third party assessments, and/or official data or statistics

Given that EC_{esty} is a back-calculated value and is the lower of the two (EC_{iy} and EC_{sty}), it has been conservatively considered in the calculation.

5.2 Project Emissions

Describe the procedure for quantification of project emissions and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

Project emissions are calculated as follows:

$$PE_y = PE_{energy,y} + PE_{others,y}$$

PE_y = Project emissions during year y (t CO₂e)

$PE_{energy,y}$ = Project emissions from energy consumption of project devices in year y (t CO₂e)

$PE_{others,y}$ = Project emissions from other sources in year y (t CO₂e)

As per the applied methodology VM0050, ver. 1.0, project emissions are calculated as follows:

$$PE_y = PE_{energy,y} + PE_{others,y} \text{ Equation (6)}$$

Where:

PE_y	Project emissions during year y (t CO ₂ e)
$PE_{energy,y}$	Project emissions from energy consumption of project devices in year y (t CO ₂ e)
$PE_{others,y}$	Project emissions from other sources in year y (t CO ₂ e)

Please select all applicable sources of project emissions;

- ☒ Project emissions from energy consumption of project devices
- ☐ Project emissions from other sources

Project emissions from energy consumption of project devices

- ☒ $PE_{energy,y}$ from Biomass, Fossil Fuels, or Bioethanol
- ☐ $PE_{energy,y}$ from Electricity

A. $PE_{energy,y}$ from Biomass, Fossil Fuels, or Bioethanol

Project emissions from energy consumption of project devices using biomass, fossil fuels, or bioethanol in year y are calculated as follows:

$$PE_{energy,y} = \sum_j \sum_k BC_{p,j,k,y} \times N_{j,k,y} \times NCV_{p,j} \times n_{j,k,y} \times (EF_{p,j,CO_2} \times f_{NRB,y} + EF_{p,j,nonCO_2})$$

EF_{p,j,CO_2} = CO₂ emission factor for fuel used by project device type j in the project scenario (t CO₂/TJ)

$EF_{p,j,nonCO_2}$ = Non-CO₂ emission factor for fuel used by project device type j (t CO₂e/TJ)

$PE_{energy,y}$ = Equation (7)

Where:

EF_{p,j,CO_2}	CO ₂ emission factor for fuel used by project device type j in the project scenario (t CO ₂ /TJ) = 112 tCO ₂ e/TJ (Meth Default Value)
$EF_{p,j,nonCO_2}$	Non-CO ₂ emission factor for fuel used by project device type j in the project scenario (t CO ₂ e/TJ) = 9.46 tCO ₂ e/TJ (Meth Default Value)

The CO₂ emission factors for renewable biomass and other renewable energy sources are zero. Non-CO₂ emissions of these fuels must be accounted for where they are not deemed de minimis.

Given that the grouped project involves the distribution of non-renewable biomass-based improved cookstoves exclusively to the target users, Equation (8) and Equation (10) of the methodology applies to electric stoves and are therefore not applicable. Further, the ICS distributed under the project is designed for wood fuel, and beneficiaries procure the wood fuel either from nearby fields or the market. Therefore, Equation (9) is not applicable.

5.3 Leakage Emissions

Leakage emissions (LEy) must be accounted as follows:

Leakage Emissions Associated with Reduced or Avoided Use of Non-Renewable Biomass

A. Use of non-renewable biomass by other users and other types of GHG reversals (Other non-permanence risks, such as fires)

The value of Leakage has been considered as default of 0.95 in accordance with methodology.

B. Reuse outside the project boundaries of baseline devices that were replaced by project devices

An adjustment factor of 0.95 is applied to the GHG emission reductions in Equation (11) (i.e., 0.95 x (BE_y - PE_y)).

The value of Leakage has been considered as default of 0.95 in accordance with methodology

5.3.1 Leakage emissions associated with fossil fuel use:

Increased emissions from fossil fuel use by non-project participants

An adjustment factor of 0.95 is applied to the GHG emission reductions in Equation (11) (i.e., 0.95 x (BE_y - PE_y)).

N/A

5.3.2 Leakage Emissions Associated with Use of Renewable Biomass

A. Shift of pre-project activities due to the establishment of dedicated plantations for renewable biomass supply

These leakage emissions must be calculated using CDM TOOL16.

N/A

B. Diversion of biomass residues from other uses to the project activity

These leakage emissions must be calculated using CDM TOOL16.

N/A

5.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

Describe the procedure for quantification of net GHG emission reductions and removals. Include all relevant equations.

Provide the ex-ante calculation (estimate) of baseline emissions/removals, project emissions/removals, leakage emissions and net GHG emission reductions and removals in the table below. Specify the breakdown of GHG emissions reductions and removals by calendar year.

For data and parameters monitored, use estimates. Document how each equation is applied, in a manner that enables the reader to reproduce the calculation. Provide example calculations for all key equations, to allow the reader to reproduce the calculation of estimated net GHG emission reductions or removals.

$$ER_y = (BE_y - PE_y) \times 0.95 - LE_{RB,y}$$

ER_y = Emission reductions during year y (t CO₂e)

$LE_{RB,y}$ = Leakage emissions associated with use of renewable biomass during year y (t CO₂e)

ER_y	Emission reductions during year y (t CO ₂ e)
$LE_{RB,y}$	Leakage emissions associated with use of renewable biomass during year y (t CO ₂ e)

Given that the grouped project involves the distribution of non-renewable biomass-based improved cookstoves exclusively to the target users, leakage emissions associated with the use of renewable biomass are not applicable, as the project does not involve renewable biomass as a fuel source.

Table: Baseline, project, leakage, and net GHG emission reductions (tCO₂e) by Vintage Period:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
1-October-2025 – 31-December-2025	379,159	119,360	12,990	246,810	0	246,810
01-January-2026 – 30-April-2026	494,556	155,687	16,943	321,925	0	321,925
Total	873,715	275,047	29,933	568,735	0	568,735

Table: Baseline, project, leakage, and net GHG emission reductions (tCO₂e) by Vintage Period.

For all projects, state the estimated ex-ante GHG emission reductions and removals and the achieved emission reductions and removals for this monitoring period. Report the percentage difference and justify the difference. The quantities of GHG emission reductions and removals are the total quantities before any deductions for buffer credits.

Vintage Period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
01-Oct-2025 - 31-Dec-2025	336,506	246,810	-26.66	The primary reason for lower VCUs in the current monitoring period attributed to lower ICS distribution than envisaged ex-ante and distribution of ICS in phases during current monitoring period. Hence, average operational age of ICS is significantly lower than number of days in current monitoring period, which is appropriate.
01-Jan-2026 - 30-Apr-2026	469,671	321,925	-31.46	The primary reason for lower VCUs in the current monitoring period attributed to lower ICS distribution than envisaged ex-ante and distribution of ICS in phases during current monitoring period. Hence, average operational age of ICS is significantly lower than number of days in current monitoring period, which is appropriate.
Total	806,177	568,735	-29.45	

Quantify the net GHG emission reductions and removals, summarizing the key results using the table below. Specify breakdown of GHG emission reductions and removals by calendar year. VCUs will be issued separately by calendar year in the Verra Registry.

Submit all the calculation spreadsheets and supporting documentations:

Name	Description	Upload Document
VCS 3699 MP4 ER Calculator v 4.0 06102026		VCS 3699 MP4 ER Calculator v 4.0 06102026.xlsx

6 APPENDIX

6.1 Appendix 1: COMMERCIALY SENSITIVE INFORMATION

Appendix 1 : Commercially Sensitive Information

Section	Information	Justification
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No information presented in the monitoring report is deemed commercially sensitive	Not Applicable	Not Applicable
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APPENDIX 1: THERMAL EFFICIENCY PERFORMANCE THRESHOLDS

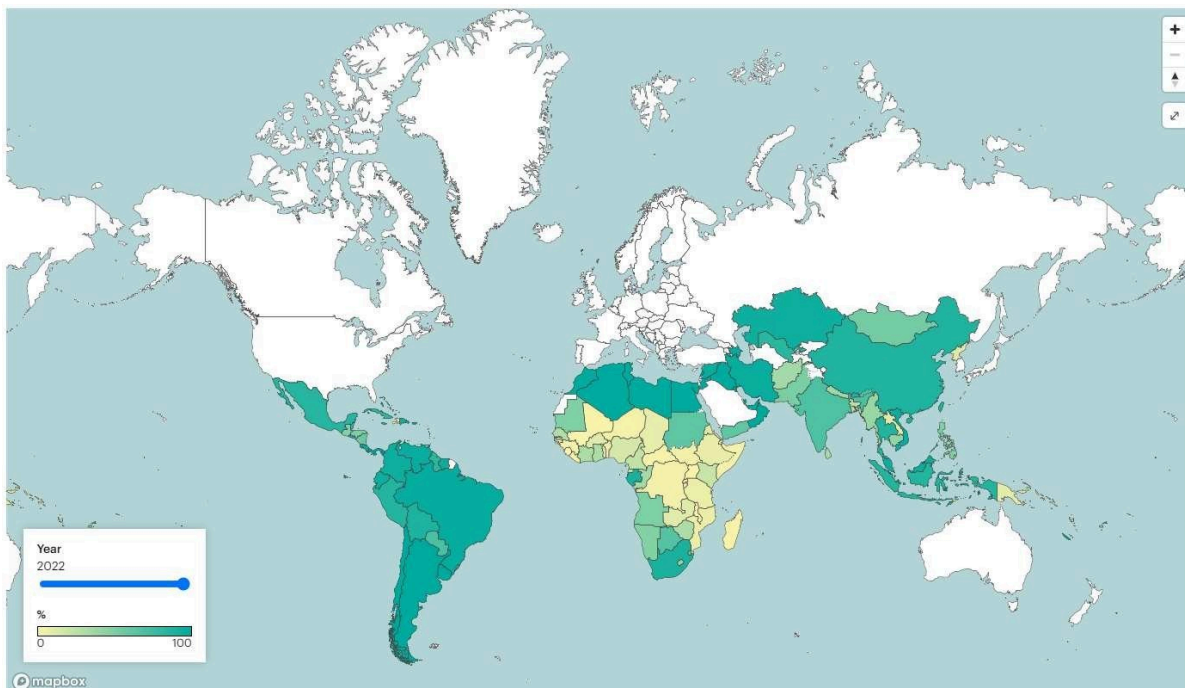
The following default values for thermal efficiency performance thresholds are taken from ISO/TR 19867-3: Clean cookstoves and clean cooking solutions — Harmonized laboratory test protocols — Part 3: Voluntary performance targets for cookstoves based on laboratory testing. Publicly available sections of ISO/TR 19867-3 are available at: <https://www.iso.org/standard/73935.html> A technical report providing a preview of some of the other content is available at: <https://cdn.standards.iteh.ai/samples/73935/feb537d3c06f400dbe46e1b44ecbb67b/ISO-TR-19867-3-2018.pdf>

	Tier	Thermal efficiency (%)	Durability score
Better performance	5	≥50	<10
Good performance	4	≥40	<15
Moderate performance	3	≥30	<20
Poor performance	2	≥20	<25
Very poor performance	1	≥10	<35
No performance	0	<10	>35

APPENDIX 2: ACTIVITY PENETRATION

To establish a penetration rate of less than 20% for the project device technology, the UN SDG 7 progress report(Available at: https://sustainabledevelopment.un.org/content/documents/2019_Tracking_SDG7_Report.pdf) has been used as a reference. Based on Appendix 1, the cookstoves applicable under this methodology belong to Tier 2 and above, meaning either intermediate or advanced cooking solutions. Hence, for some countries, while penetration of improved cooking solutions may be higher than 20%, the penetration of intermediate and advanced improved cooking solutions may be very low. Project proponents may use other sources to establish penetration rates of less than 20% for respective technologies. The International Energy Agency (IEA) uses the World Health Organisation (WHO) Household Energy Database for people without access to clean cooking for historic numbers and the World Energy Model and official energy balances to present the map shown in Figure 1.

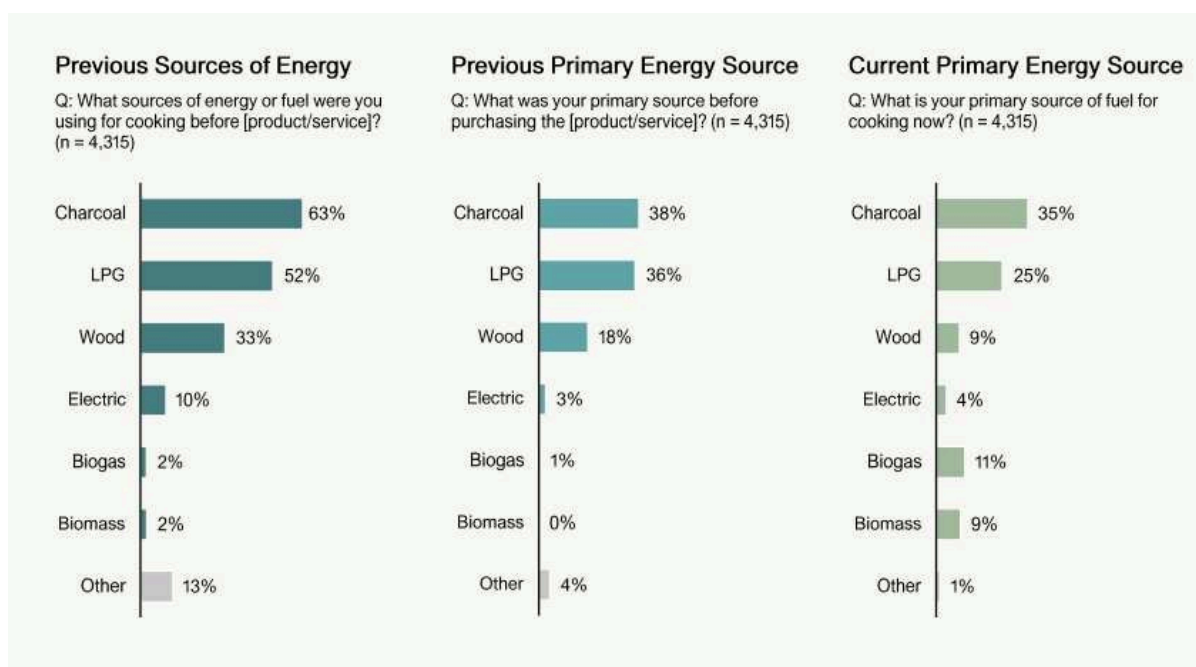
Figure 1: Share of population with access to clean cooking(Source: <https://www.iea.org/reports/sdg7-data-and-projections/access-to-clean-cooking>.)



The Clean Cooking Alliance (CCA) in its Lean Data Insights Aggregate Report presents the sources of fuels used for cooking before and after purchasing products from CCA portfolio companies (Figure 2). Cleaner and safer energy sources such as biomass, biogas, and electricity have a lower penetration rate compared to common fuels such as charcoal.

Figure 2 presents the results based on a sample of surveyed households. According to the report, the distribution of these households was as follows: rural households 32% (village or countryside), periurban households 29% (town), and urban households 39% (city). This distribution reflects the diversity of contexts in which the surveys have been carried out, thus allowing for a broader and more representative view of the situation in different areas.

Figure 2: Sources of cooking fuels before and after purchasing products from CCA portfolio companies (Source: https://cleancooking.org/wp-content/uploads/2023/07/Clean-Cooking-Alliance_Lean-Data-Insights-Aggregate-Report.pdf)



APPENDIX 3: BINDING SURVEY QUESTIONNAIRE

The following is a binding questionnaire with the minimum requirements for the baseline survey. The project proponent may choose a different format but must include these questions, at minimum.

Survey Format A: Baseline Fuel Consumption Pattern

General information

Title of project activity	
Name of surveyor	
Date of survey	
Survey method	

Household profile (Selection of households should be based on a sampling plan.)

Name (household representative)	
Household size (total number of people)	
Females over 14 years	
Males 15–59 years	
Males over 59 years	
Children 0–14 years	
Type of area (urban/rural)	
Address or coordinates	
Phone number	

Stove used prior to project implementation

A three-stone fire or a conventional system with no improved combustion air supply nor flue gas ventilation system (i.e., without a grate or chimney)	
Basic charcoal stove	
Improved woodfuel cookstove	
Improved charcoal cookstove	
LPG cookstove	

Electric cookstove	
Other (describe)	

Household fuel consumption pattern prior to project implementation

How many meals did you prepare yesterday?	
Is this a typical value?	
If the answer is "No," how many meals are prepared in a typical day?	
Is there any difference with the amount of meals prepared during a typical weekend day?	
Describe any other ways in which you used your stove last week (e.g., water boiling for drinking, water boiling for hygiene, space heating).	

Fuel used for cooking(Where surveys are biennial, they may be designed to capture results for each year separately (e.g., the survey may ask for utilization hours for year 1 and year 2 separately). The end-user may not be able to provide information on the quantity of cooking fuel in the units given here. In many places, the volume of firewood (e.g., the volume capacity and level of filling of the transporting/storage room) is measured, rather than its weight. Local measurement practices vary. The project proponent should include such local measurement units in the questionnaire. The measurement unit may also be given in terms of money spent on purchasing fuel. The project proponent must provide guidelines for how to convert the reported values to required units (mass or volume). For example, where a household uses a bag of charcoal every 10 days, the monthly average may be calculated if the weight (or volume and bulk density) of the full bag is determined.)

	Yes/No	Quantity of usage	Unit
Charcoal			kg/ month or year
Wood			kg/ month or year
LPG			kg or cylinders / month or year
Kerosene			liters/ month or year

Coal			kg/ month or year
Electricity			kWh/ month or year
Other fuels (explain)			

Fuel sources

	Collected/ Purchased	Source or location of fuel
Charcoal		
Wood		
LPG		
Kerosene		
Coal		
Electricity		
Other fuels (explain)		

Survey Format B: Adoption Rate Survey

General information

Title of project activity	
Name of surveyor	
Date of survey	
Survey method	
Period of usage (for adoption rate)	

Household profile (Selection of households should be based on a sampling plan.)

Name (household representative)	
Household size (total number of people)	
Females over 14 years	

Males 15–59 years	
Males over 59 years	
Children 0–14 years	
Type of area (urban/rural)	
Address or coordinates	
Phone number	

Household fuel consumption pattern following project implementation

Cooking device	
Model name/number	
Unique ID	
Date of installation	
Do you use the project cookstove?(Physically check the stove)(This is to determine whether the cookstove is currently in use and includes visual checks. Physical checks to verify usage may include checking stove conditions (e.g., warm to touch, ashes in grate, soot on stove).	
If yes, have you used the stove regularly since you installed it? (This is to determine whether the cookstove has been continuously used.)	
If yes, is your stove in good condition?(The project proponent may rephrase the question keeping in mind the objective (i.e., whether or not the project cookstove is in usable condition). Where the project cookstove is not in usable condition, the project proponent must exclude such stoves from the project database for the whole crediting year and subsequent years. The project proponent may include such stoves again on replacing them with new cookstoves of similar efficiency.)	
If no, why did you stop using the stove?	

How many meals did you prepare using the project cookstove last week or last month?	
Do you also use your traditional (baseline) cookstove?	
If yes, how many meals did you prepare using the traditional (baseline) cookstove last week or last month?(This is to determine whether the baseline stove is being used, in order to accurately account for project emissions. Where celebrations and/or festivals at the time of the survey may alter the number of meals prepared,provide an average value considering normal conditions.)	
Do you use any other stove?(This is to cross-check whether the project cookstove is used for all cooking requirements. It may also detect situations where a household is taking part in more than one project activity, thereby avoiding double counting)	
If yes, list the types and number of other non-project stoves.	
How many times a week do you use the non-project stoves?	
How much do you spend on fuel for cooking per type of cooking device in a week/month?	

APPENDIX 4: MONITORING/ MEASUREMENT TECHNIQUE GUIDANCE

Stove Use Monitors

Stove use monitors (SUMs) are devices that quantify stove usage through direct measurements of physical or chemical parameters (e.g., temperature, heat flow, light, power, motion, gas concentration) on stoves, kitchen technologies, and cookware, among others. These monitors are often employed in regions where cooking primarily uses solid fuels such as wood, charcoal, or dung. The data collected by these monitors can provide valuable insights into cooking behaviors, patterns, and the effectiveness of interventions aimed at promoting cleaner cooking practices.

SUMs used for determining stove usage are sensors containing internal software that identifies stove usage when a temperature threshold is reached. Event identification can be performed using the “firefinder” method, for instance (Wilson, Daniel Lawrence, Kendra N. Williams, and Ajay Pillarisetti on behalf of the HAPIN Investigators.

2020. "A Integrated Sensor Data Logging, Survey, and Analytics Platform for Field Research and Its Application in HAPIN, a Multi-Center Household Energy Intervention Trial" *Sustainability* 12(5):1805. <https://doi.org/10.3390/su12051805>), which allows removal of events that are too short and detects the beginning (threshold, high slope) and the end (threshold, low slope, and slowing decreasing temperature) of stove use events.

Parameters such as threshold values, positive slope, and negative slope must be adjusted based on the stove type, and it is recommended that stove usage start and stop times are periodically verified manually as a cross-check. SUMs require careful positioning to ensure a robust response capturing temperature variation and avoiding heat damage.

When characteristic temperature signals or "signatures" of the main cooking tasks are obtained and their frequency is measured, the adoption niche of each cooking device can be quantified from SUMs-based data in terms of the redistribution of cooking tasks.

The following table describes some recommendations that the project proponent may adopt for field deployment of SUMs to quantify adoption. (Recommendations adapted from Ruiz-Mercado, I. 2012. The Stove Adoption Process: Quantification Using Stove Use Monitors (SUMs) in Households Cooking with Fuelwood, University of California, Berkeley.)

Table 3: Recommendations for stove use monitors (SUMs)

Placement of SUMs and sampling frequency	
Data collection and management	

Kitchen Performance Test (KPT) with digital monitors

Digital monitors can be included in traditional KPTs to optimize fuel consumption monitoring, since fuel consumption is one of the most important metrics of cooking intervention performance. To directly monitor fuel consumption in households, digital monitors record time-stamped fuel mass data using a logging load cell. Digital monitoring systems can operate in tension for fuels like firewood, charcoal, and agricultural residues, or in compression for LPG, ethanol, or kerosene. Where households stack with multiple stoves or fuels, a separate sensor can be installed for each stove or fuel type.

Two versions of the system have been developed, one manufactured by Waltech Systems that relies on SD cards (first generation) and an updated model manufactured by Climate Solutions Consulting that collects data wirelessly using a custom-designed launcher and collection device (second generation). (Ventrella J., Lefebvre O., and MacCarty N. 2020. Techno-economic comparison of the FUEL sensor and Kitchen Performance Test to quantify household fuel consumption with multiple cookstoves and fuels. *Development Engineering*, 5, 100047. <https://doi.org/10.1016/j.deveng.2020.100047>) Wireless data collection allows for faster data collection integrated with multiple sensors (fuel, temperature, emissions) in a home, and enables troubleshooting and preliminary data reporting at the source.

General system components include:

- Off-the-shelf S-type tensile or compressive load cell with eye bolts for attachment
- Internal temperature sensor
- Integrated power supply, analog-to-digital converter (ADC), and control module with internal clock
- Battery power supply

- Plastic housing
- Fuel storage container

Components specific to first generation systems include:

- External thermocouple port
- SD card port for data storage

Components specific to second generation systems include:

- Wireless data launcher
- Initial pre-processed data analytics (calibration equations applied before storing data)
- Wireless infrared temperature logger

For first generation systems, logging rate is normally programmed to 49 seconds and decreased to 7 seconds when a specified weight change is detected, until no additional changes in mass are detected. Data is stored on SD cards as .csv files.

For second generation systems, the measurement rate is normally programmed to 30 seconds, with data written to memory once per minute. The data are stored in the device's internal memory and then downloaded wirelessly to the launcher SD card as a .csv file.

For adequate operation, a household cook must be trained to store his or her fuel supply in the bucket or sling-type fuel holder, remove fuel as needed for cooking, and refill when empty. These actions result in discrete reductions in weight, which are recorded by the load cell and integrated to determine total fuel use over a specified time.

How to approach seasonality with KPT

Project proponents must provide a description of seasonality at the project location(s) (e.g., wet/dry, cold/warm, temporality during the year), as well as observed and expected impacts on cooking practices and cooking energy use.

The project proponent must consider one of the following options to address seasonality.

- Perform the measurement campaign in such a way that it captures seasonal factors that may affect fuel consumption over the year, or
- Perform the measurement campaign in a way that ensures that the results are conservative, given seasonal variability and ensure that baseline and project KPT are performed at the same moment.

APPENDIX 5: SAMPLING GUIDANCE

According to the Guidelines on Sampling and Surveys for CDM Project Activities and Programmes of Activities, (Available at: <https://cdm.unfccc.int/Reference/Guidclarif/index.html>) it is important to distinguish between two categories of data when determining sample size: those related to mean and those related to proportions.

Sample size refers to the number of observations or individuals included in a statistical study or experiment. Determining the appropriate sample size is critical to ensuring that the results of the study are accurate and representative of the population being studied.

- **Mean values:** Corresponding to average values inferred from data that are often referred to as continuous variables
- **Proportion (or percentage) values:** Values that are derived from data that are described as attributes, yes/no data, or binary data

The 'population' in this methodology refers to the total number of project devices commissioned whereas the sample target represents a specific subset of these devices. The following table specifies the parameters described in the methodology to be considered in relation to the CDM sampling guidelines, together with a description of the type of data to which they correspond (mean or proportion).

scenario	Parameter	Description	Mean value	Proportion
General	$N_{j,k,y}$	Number of commissioned project devices of type j from batch k in year y	X	X
	$\eta_{j,k,y}$	Proportion of commissioned project devices of type j from batch k that remain operating in year y (fraction)		
Baseline	$BC_{b,i,y}$	Fuel used per baseline device type i during year y	X	
	$SC_{b,i}$	Specific energy consumption of baseline device type i in the baseline scenario	X	
Project	$BC_{p,j,k,y}$	Average quantity of fuel used by project device type j from batch k during year y	X X X	
	$EC_{p,j,k,y}$	Annual consumption of electricity by electric project device type j from batch k in year y		
	$SC_{p,j}$	Specific energy consumption of project device type j		

Recommended sampling methods selected based on specific project conditions and available sampling and/or prospecting capabilities are listed below.

sampling Method	Characteristics
-----------------	-----------------

Simple random sampling	• Conceptually straightforward and easy to implement • Particularly advantageous when assuming population homogeneity, such as within the same climate zone or socioeconomic circumstances • Costs of data collection can be higher than other sampling approaches when the population is large and geographically dispersed. • Not applied where the population covers a large geographical area.
Stratified random sampling	• Ensures that each subgroup is represented proportionally in the final sample which can lead to more accurate and reliable results compared to simple random sampling. • Applied for heterogeneous populations and most applicable to situations where there are obvious groupings of population elements whose characteristics are more similar. • Stratification factors should be selected to reflect significant differences in the population regarding the parameter of interest. • Requires prior knowledge or information about the population to correctly identify and define the strata. • Tends to be more complex, demanding additional calculations in contrast to simple random sampling.

To perform sample size calculations, the parameters of interest must be estimated. This procedure can be accomplished by:

- 1) **Preliminary data analysis:** Conduct an exploratory study using previously collected data, where available. This can give a first idea of the data distribution and parameter variability.
- 2) **Literature research:** Previous research related to the topic of study can be examined.
- 3) **Pilot or feasibility studies:** Conduct pilot or feasibility studies to gather preliminary data. This can help estimate parameters of interest and adjust sample size calculations accordingly.
- 4) **Expert consultation:** Obtain opinions and knowledge from experts in the relevant field.
- 5) **Own experience:** Using estimates based on the researcher's own experiences.

The following equations must be followed to determine the sampling plan.

A5.1 Simple Random Sampling

Simple random sampling is suited to populations that are homogeneous. This method is often used because it is straightforward and ensures that each member of the population has an equal chance of being included in the sample. The sample-based estimate (mean or proportion) is an unbiased estimate of the population parameter.

$$n \geq \frac{1.645^2 N \times V}{(N - 1) \times 0.1^2 + 1.645^2 \times V}$$

n = Sample size for households

N = Total number of households

1.645 = Represents the 90% confidence required

0.1 = Represents the 10% relative precision

$$V = \left(\frac{SD}{mean} \right)^2$$

SD = Expected standard deviation
mean = Expected mean, based on studies or location

$$n \geq \frac{1.645^2 \times N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.645^2 \times p(1-p)}$$

n = Sample size for households
N = Total number of households
p = Expected proportion of parameter of interest
1.645 = Represents the 90% confidence required
0.1 = Represents the 10% relative precision

$$n \geq \frac{1.96^2 \times N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.96^2 \times p(1-p)}$$

n = Sample size for households
N = Total number of households
p = Expected proportion of operating cookstoves
1.96 = Represents the 95% confidence required
0.1 = Represents the 10% relative precision

A5.2 Stratified Random Sampling

Where the project covers a large geographic area, stratified random sampling may be applied. This consists of dividing the area into different districts based on the likelihood that stoves will continue to operate. The number of districts (D) should cover the total number of households. Estimates of the proportion of cookstoves still in operation in each district, as well as the population size of each district, are required.

Total sample size determination for proportion parameter

$$n \geq \frac{1.645^2 \times N \times V}{(N-1) \times 0.1^2 + 1.645^2 \times V}$$

n = Sample size for households
N = Total number of households
V = Overall variance
1.645 = Represents the 90% confidence required
0.1 = Represents the 10% relative precision

$$V = \frac{SD^2}{\bar{p}^2}$$

V	= Overall variance
SD	= Standard deviation
$\bar{p}$	= Overall proportion

$$SD = \sum_d \frac{gd \times pd \times (1 - pd)}{N}$$

SD	= Standard deviation
gd	= Number of households with cookstoves in district d
$pd(1 - pd)$	= Variance of a proportion
N	= Total number of households

$$\bar{p} = \sum_d \frac{(gd + pd)}{N}$$

$\bar{p}$	= Overall proportion
gd	= Number of households with cookstoves in district d
pd	= Proportion of households with cookstoves in district d
N	= Total number of households

$$n_d = \frac{gd}{N} \times n$$

n_d	= Sample size for district d
gd	= Number of households with cookstoves in district d
N	= Total number of households
n	= Total sample size

$$n \geq \frac{1.645^2 \times N \times V}{(N - 1) \times 0.1^2 + 1.645^2 \times V}$$

n	= Required total sample size
N	= Total number of households
V	= Overall variance
1.645	= Represents the 90% confidence required
0.1	= Represents the 10% relative precision

$$V = \left(\frac{SD_{overall}}{mean} \right)^2$$

$SD_{overall}$ = Weighted overall standard deviation
 $mean$ = Weighted overall mean

$$SD_{overall} = \sqrt{\frac{\sum_{d=1}^D (g_d \times SD_d^2)}{N}}$$

$SD_{overall}$ = Weighted overall standard deviation
 SD_d = Standard deviation for district d
 g_d = Number of households with cookstoves in district d
 N = Total number of households

$$mean = \sum_{d=1}^D \frac{(g_d + m_d)}{N}$$

$mean$ = Weighted overall mean
 g_d = Number of households with cookstoves in district d
 m_d = Mean cookstoves in district d
 N = Total number of households

Appendix - 6