



**Verified Carbon
Standard**

SOLAXY COOKSTOVES FOR HEALTHIER HOMES AND A GREENER KENYA



Document Prepared by
Solaxy Group Corp.

Project Title	Solaxy Cookstoves for healthier homes and a greener Kenya “Healthier Homes with Solaxy Cookstoves”
Version	01
Date of Issue	20-11-2023
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Solaxy Improved Cookstove Project, henceforth known as "the Project," embarks on a transformative journey to redefine environmental conservation and public health standards within the underserved communities of the republic of Kenya. The initiative is set to unfold on October 01, 2023, with the strategic dissemination of two hundred thousand (200,000) Improved Cook Stoves (ICS) throughout various Kenyan regions over the subsequent two years, a move that ensures the annual distribution of one hundred thousand (100,000) units.

The core of the Project is the significant reduction of greenhouse gas emissions, a goal attainable through the widespread adoption of ICS technology. These advanced cookstoves, notable for their reduced carbon and particulate emissions, align with the Project's commitment to decrease environmental carbon footprints by an estimated 723,220 tons of carbon dioxide equivalent (tCO₂e) annually. This initiative, sustained over an initial decade, will result in a cumulative reduction of 7,232,195 tCO₂e.



In a bid to address the socio-economic disparities, the Project is tailored specifically for communities that have faced historical neglect, ensuring that these underserved populations are placed at the forefront of our efforts. A pivotal aspect of our approach is the provision of the ICS units at no cost to the beneficiaries. This strategy isn't merely a subsidy but a recognition of the economic barriers that these communities often face. By offering the stoves free of charge, the Project removes financial impediments, encouraging widespread adoption, and facilitating an immediate transition to more sustainable cooking practices that might otherwise be financially out of reach for these individuals.

Moreover, the no-cost approach underscores our commitment to these communities, serving as a catalyst for broader social and economic benefits. It helps mitigate common health risks associated with traditional cooking methods, reduces the time and physical burden of sourcing fuel, and contributes to local and global environmental conservation efforts. Furthermore, this method amplifies the Project's impact on forest conservation, air quality, and health outcomes by making improved cooking technologies accessible to those who need them most.

Beyond its environmental aspirations, the Project pledges to stimulate socio-economic growth within these localities. This dual objective will manifest through job creation in the spheres of local ICS distribution, maintenance, and supervision, coupled with an educational campaign emphasizing the health and ecological advantages of adopting such technology.

Before the Project's inception, communities were entrenched in the use of traditional, inefficient cookstoves, contributing to severe indoor air pollution and its associated health hazards. This peril was most acute among women and children, who are customarily more exposed due to their domestic roles.

In collaboration with local non-governmental organizations, the Project will champion a shift toward healthier, more environmentally friendly ICS technology through an expansive educational program. This program will cover the operation and maintenance of the new systems, underpinned by robust community engagement and awareness campaigns.

Table 1. Distribution and installation plan

Year	Batch	Number of stoves distributed
Year 1	Batch 1	100,000
Year 2	Batch 2	100,000
Total	2 batches	200,000 Cookstoves to be Distributed

1.2 Sectoral Scope and Project Type

The project is categorised under type/category as below:

- a) Sectoral scope: 03 – Energy demand
- b) Type: II – Energy efficiency improvement projects

This project is not part of a grouped project or any program.

1.3 Project Eligibility

The proposed project aims to facilitate the replacement of conventional cooking methods with modern and fuel-efficient improved cookstove. The initiative is categorized under efficiency improvements in thermal applications, with the goal of achieving a more sustainable and environmentally friendly approach to cooking, therefore it is eligible under the scope of VCS Program.

1.4 Project Design

- ☐ The project includes a single location or installation only
- ☒ The project includes multiple locations or project activity instances, but is not being developed as a grouped project
- ☐ The project is a grouped project

Eligibility Criteria

S. No.	Eligibility Criterion - Category	Eligibility Criterion -Required Condition	Supporting evidence for inclusion
1.	Project Boundary	The project requires that the boundary for the new project instance should not extend beyond the national border of Kenya.	The database containing customer registrations includes information on the location of households. In this case, the VVB will receive records of distribution from the customer registration database that clearly specify the project boundaries, which are the different regions of Kenya. This information will be provided to the VVB as a point of reference.
2.	Avoidance of Double counting	To prevent the double counting of distributed ICSs, the stoves must be uniquely marked. Moreover, operators of new project instances must provide assurances or declarations confirming that these stoves are not included in any other CDM or Voluntary GHG offset schemes outside of this project.	Each Improved Cookstove (ICS) that is distributed as part of this project will have a unique serial number and project proponent logo. Each Improved Cookstove will be registered in the project database located in Kenya. with geographical coordinates, serial number, name and address of the end-user, among others. The project proponent will also provide a written statement confirming that the ICSs distributed in the new project instance are not associated with any other CDM or voluntary GHG trading scheme.

S. No.	Eligibility Criterion - Category	Eligibility Criterion - Required Condition	Supporting evidence for inclusion
3.	Technology – The specification of technology/measures including the level and type of service, performance specifications including compliance with testing/certifications	All technologies used in the project must exhibit a minimum thermal efficiency level of 25%	A certificate from an independent 3rd party lab demonstrating that the thermal efficiency of the distributed ICS is greater than 25%, as per Water Boiling Test Protocol 4.2.3¹ or a more recent protocol where available shall be shared. Product description and specification: The VVB will receive a lab test efficiency certificate showing that the ICS model distributed in this project has an efficiency greater than 25%
4.	Additionality – The condition that ensure that new project instances meet the requirements pertaining to the demonstration of additionality in VCS Standard.	The project must demonstrate the additionality according to the methods outlined in the applied version of methodology VMR0006	1. Regulatory Surplus – While there is no regulation in Kenya requiring the use of ICS in households, the project proponent has undertaken a voluntary effort to distribute ICS. There are no specific legal or regulatory barriers to implementing the improved ICS. 2. Positive List – The project undertakes the distribution of ICS, at no expense to the end-user. The project relies solely on the revenue generated from carbon credits, without any alternative financial channels supporting its operations.
S.	Eligibility Criterion -	Eligibility Criterion -	Supporting evidence for inclusion

No.	Category	Required Condition	
6.	The project will adhere to specific sampling requirements, where necessary, following the protocols outlined in the "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities.	The programme will be monitored in adherence to the sampling guidelines including all annexes and amendments till EB 86 Annex 04 and Sampling and surveys for CDM project activities and program of activities	The project outline details the sampling techniques utilized, ensuring adherence to the requisite sampling criteria. For every instance of the project, sampling will be conducted in accordance with the Sampling Plan outlined in the Project Description.
7.	VCU ownership	The end users who receive ICSs under this new project instance agree in writing to transfer their rights to claim and own emission reductions to the project proponent of the group project.	A carbon-waiver agreement for end-users, including the provision that the project proponent owns the emission reductions generated by the ICS, will be provided by default. The waiver of carbon credits from end-users shall be submitted to the VVB at the time of verification.

1.5 Project Proponent

Organization name	Solaxy Group Corp.
Contact person	Abbas Mashaollah
Title	Project Developer
Address	99s Almaden Blvd Suite 600 San Jose, CA 95113
Telephone	408-610-4700
Email	abbas@solaxygroup.com

1.6 Other Entities Involved in the Project

Solaxy Group Corp. is the sole entity involved in the project.

1.7 Ownership

The project ownership is with Solaxy Group Corp.

During the registration process, all parties involved in the registration process, including the end user (Households), ICS manufacturers and distributors will be required to sign a Registration Certificate cum Consent Deed. This document will contain a clause that acknowledges and waives all right associated with the no-cost provision of the improved cookstove. The agreements will also outline the terms and conditions of the transfer of carbon assets to Solaxy Group Corp., including the acknowledgement and waiver of any rights or claims associated with the improved cookstove provision and associated carbon certificates. These rights will be transferred to Solaxy Group Corp., and we may, at any time, transfer them to an affiliate without further notice or consent.

1.8 Project Start Date

01/OCT/2023 (is the date for commissioning the first ICS within this project activity).

1.9 Project Crediting Period

Project Crediting Period: First

Start Date: 01/10/2023 (First operating day of the project activity ICS)

End Date: 30/09/2033

Total Number of years: 10 years fixed crediting period

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The estimated annual GHG emission reductions/removals of the project are:

- ☐ <20,000 tCO₂e/year
- ☐ 20,000 – 100,000 tCO₂e/year
- ☒ 100,001 – 1,000,000 tCO₂e/year
- ☐ >1,000,000 tCO₂e/year

Project Scale	
Project	
Large project	X

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 2023-2024	536,754
Year 2024-2025	996,610
Year 2025-2026	890,083
Year 2026-2027	824,921
Year 2027-2028	771,996
Year 2028-2029	730,047
Year 2029-2030	683,349
Year 2030-2031	639,545
Year 2031-2032	598,368
Year 2032-2033	560,522
Total estimated ERs	7,232,195
Total number of crediting years	10
Average annual ERs	723,220

1.11 Description of the Project Activity

The objective of this project is to supplant traditional solid-fuel cooking methods with fuel-efficient improved cookstoves (ICS) in underserved rural communities situated within the designated project area. Presently, locals rely on open fires or rudimentary three-stone fires for their cooking needs. These methods are not only inefficient but also pose substantial health risks to individuals and contribute to environmental degradation through the emission of greenhouse gases.

To address this issue, the project will distribute 200,000 Solaxy Stoves over a period of two years. The Solaxy Stove is an ICS that consumes less wood fuel and has a higher thermal efficiency, resulting in a reduction in greenhouse gas emissions compared to the baseline scenario. The ICS will still consume non-renewable biomass for cooking, but the reduction in wood fuel consumption will have a positive impact on the environment.

The Solaxy Stove is equipped with cutting-edge components and a highly insulated combustion chamber that creates an ideal environment for clean and efficient combustion of wood. This design substantially reduces wood fuel consumption compared to a traditional pot support or three-stone fire. The Solaxy Stove not only reduces emissions but also saves time and money for households by reducing the need for frequent fuel gathering.

ICS Technology: The Improved Cookstoves (ICS) implemented through this project are engineered for optimal performance, boasting a thermal efficiency of approximately 51%. These stoves are designed for durability, with an estimated average lifespan of ten years, ensuring they are a sustainable solution for the beneficiaries. Detailed technical descriptions and precise specifications are integral to our commitment to transparency and will be comprehensively provided within the documentation.

Furthermore, the ICS models selected for distribution under this initiative are characterized by their portability, enhancing user convenience. They are adept at combusting a variety of biomass fuels, a feature that underscores their versatility. Acceptable fuel sources encompass, but are not limited to, firewood, pellets derived from wood or agricultural residues, wood chips, and briquettes formulated from wood or various agricultural by-products. This flexibility in fuel sources, coupled with the stoves' efficient design, positions the ICS as both an environmentally responsible and user-friendly solution.



Figure 1: Solaxy Stove

Technical Specification of the ICS is summarized below:

		Solaxy Stove with Pot Skirt					
		STOVE PERFORMANCE	Name of Stove: Solaxy-FW32				
			Type of Stove: Rocket Stove Firewood				
			Lifespan: 10 years				
			Stove Weight: 10KG				
		Dimensions: L:32cm x W:32cm x H:27cm					
Stove Body: Stainless Steel		Metal Liner: 1mm alloy					
Stove Top: Cast Iron (32 in diameter)		Insulation: Ceramic Chamber					
Grate Mouth: Stainless Steel		Pot Skirt: Stainless Steel					
Number of Test: (3) Three Tests							
Fuel Type:	Firewood	Fuel Properties	Water Content:		16%		
			Low Heating Value (LHV):		18,253.45 KJ/KG		
	Test Date:		20 th , 22 nd & 25 th April 2022				
	Standard Referred:		Water Boiling Standard 4.2.3				
	Test Environment Conditions:	Ambient Temp:		24°C			
		Humidity:		55-60%			
		Wind Speed:		No wind			
	Fan Power (W):		N/A				
	Test Equipment:		Weight Scale	LEMS	Gravimetric		
	Model:		Class 111	2029	CX 265		
	Date of Calibration:		Jan 19, 22	Feb 13, 22	Rotameter		
	Thermal Efficiency		51.5%				
Sampling		N/A					
Test Items			Units	Average	STDeV	Sub-Tier	Tier
Thermal Performance	High Power Thermal Efficiency		%	51.5	0.001	4	2
	Low Power Specific Consumption Rate		MJ/min/L	0.035	0.002	2	
Emissions	High Power CO		g/MJd	4.096	0.663	4	1
	Low Power CO		g/min/L	0.093	0.005	4	
	High Power PM _{2.5}		mg/MJd	711.714	52.355	1	
	Low Power PM _{2.5}		mg/min/L	7.267	0.414	1	
Indoor Emissions	CO		g/min	0.399	0.024	4	0
	PM		mg/min	64.610	2.444	0	
Performance Measures			Units	Average	STDeV	CoV	
Fuel to Cook 5L (850/1500)			g	703.346	21.411	3%	
CO to Cook 5L (20)			g	28.888	0.172	1%	
PM to Cook 5L (1500)			mg	3001.53	6.052	0%	
Energy to Cook 5L (15,000/25,000)			kJ	11910.0	362.559	3%	
Time to Boil			min	22.059	0.789	4%	
CO ₂ to Cook 5L			g	669.334	14.754	2%	

Data Collection of ICS users:

The project's objective is to provide fuel-efficient, improved cookstoves to underprivileged households that presently rely on conventional cooking techniques, such as open fires or three-stone fires. Upon installation, the implementing organization will register each stove in a cloud-based digital database within Kenya, complying with the Kenyan Data Protection Act. This database will facilitate accurate tracking of the cookstoves, preventing any discrepancies during subsequent monitoring and sampling

processes. The database will compile detailed information including, but not limited to, the specifics outlined below:

- ☐ Name of the User
- ☐ Total Family Members
- ☐ District
- ☐ District and Village
- ☐ Date of distribution/installation
- ☐ Unique ID of the ICS
- ☐ Geo-Location of the household where ICS is distributed

1.12 Project Location

The project location will be the geographical boundary of Republic of Kenya with coordinates 0°32'23.5" S latitude 37°27.446' E longitude.



Figure 2: Project boundary

1.13 Conditions Prior to Project Initiation

Prior to the initiation of the project, traditional solid-fuel cooking solutions such as open fire or three-stone fires were used by the local people in the project location. These methods consumed non-renewable wood fuel and emitted significant amounts of greenhouse gases (GHGs) and indoor air pollution. The project is implemented to replace these inefficient traditional devices with 200,000 fuel-efficient improved cookstoves (ICS) that have a higher thermal efficiency and substantially reduce wood fuel consumption and GHG emissions. The baseline scenario is the same as the conditions existing prior to the project initiation, and the project has not been implemented to generate GHG emissions but rather to reduce them by introducing cleaner and more efficient cooking solutions.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There are currently no laws or regulation in Kenya that governs the use of improved cookstoves, making this project an important effort to introduce cleaner and more efficient cooking solutions to households. The project is a voluntary effort by the project proponent.

A review is made on Kenya environmental laws and regulations as below:

- A) The Environment Management and Coordination Act, 1999
- B) The Forests Act, 2005
- C) The environmental (Impact Assessment and Audit) Regulations, 2003

There are no negative concerns made on improved cookstove project from the above laws and regulations.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project is not currently registered, nor is it actively pursuing registration under any other program related to greenhouse gas emissions.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG Programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

Does the project reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading?

☐ Yes☒ No

1.16.2 Other Forms of Environmental Credit

Has the project sought or received another form of GHG-related credit, including renewable energy certificates?

☐ Yes☒ No

Supply Chain (Scope 3) Emissions

Have the owner(s) or retailer(s) of the impacted goods and services¹ posted a public statement saying, “VCUs may be issued for the greenhouse gas emission reductions and removals associated with [organization name(s)] [name of good or service]” since the project’s start date?

☐ Yes☒ No

Explain your response.

Has the project proponent posted a public statement saying, “VCUs may be issued for the greenhouse gas emission reductions and removals associated with [name of good or service][describe the region or location, including organization name(s), where practicable].”

☐ Yes☒ No

Explain your response.

Have the producer(s) or retailer(s) of the impacted good or service been notified of the project and the potential risk of Scope 3 emissions double claiming via email?

☐ Yes☒ No

Explain your response.

In all other cases, demonstrate that a public statement(s) by the owner(s) or retailer(s) of the impacted good(s) or service(s) or project proponent (as applicable) has been made throughout the project crediting period. Where applicable, also demonstrate that the impacted good or service's producer(s) or retailer(s) have been notified of the project and the potential risk of Scope 3 emissions double claiming via email. Evidence of the public statement(s) and email(s) must be provided in this report or attached as an appendix.

¹ Impacted goods and services are all goods and services directly impacted by the technologies and measures specified as project activities in the project description. Please see the VCS Program document *VCS Program Definitions* for additional information.

1.17 Sustainable Development Contributions

This initiative focuses on combating energy poverty by introducing efficient cookstoves that minimize harmful emissions and reduce fuelwood use. This strategy leads to several positive environmental and social ripple effects, directly contributing to sustainable development.

The proposed project activity is expected to contribute towards sustainable Development Goals (SDGs) across various dimensions:

- **Poverty and Hunger (SDGs 1 & 2):** Families save on energy costs, preventing the need to trade food for fuel, and enhancing their financial stability and food security.
- **Health and Well-being (SDG 3):** Reduced smoke emissions lower health risks associated with traditional stoves, particularly benefiting women and children's respiratory health.
- **Education and Gender Equality (SDGs 4 & 5):** Less time spent on fuelwood collection enables more children, especially girls, to pursue education. It also alleviates women's unpaid labor, promoting gender equality.
- **Clean Energy and Climate Action (SDGs 7 & 13):** Our initiative addresses energy poverty and contributes to cleaner, more efficient energy usage, reducing households' carbon footprints and combatting climate change.
- **Economic Growth and Sustainable Communities (SDGs 8 & 11):** The project supports economic expansion by creating clean energy jobs and fostering healthier, more sustainable communities through pollution reduction.
- **Life on Land (SDG 15):** Decreasing dependence on fuelwood helps prevent deforestation, preserving biodiversity and ecological balance.

1.18 Additional Information Relevant to the Project

Leakage Management

The project meticulously incorporates mechanisms to mitigate any prospective leakage of benefits related to the reduction of emissions. Utilizing a calculated net-to-gross adjustment factor of 95% facilitates the assurance of precision in quantifying the project's reductions in emissions. This methodological rigor substantiates the authenticity and exactness of the project's environmental contributions.

Commercially Sensitive Information

The project narrative comprehensively details every facet necessary for a full understanding of the project's aims, approaches, and anticipated results. By incorporating this data into the public report, we uphold a commitment to transparency and responsibility throughout every phase of the project's execution. This practice empowers stakeholders, potential investors, and the public to make knowledgeable assessments regarding the project's prospective influence

and advantages. We have ensured that the public iteration of the report encompasses all relevant aspects related to the project.

Further Information

Legislative:

The project proponent will secure all necessary permissions and authorizations essential for setting up and running the project activities.

Temporal:

The project proponent has refrained from seeking any alternative forms of renewable energy incentives or carbon credits elsewhere for this specific project.

2 SAFEGUARDS

2.1 No Net Harm

The project proponent has established that the forthcoming project endeavours will not impose any adverse effects on either the environment or societal economic conditions. Instead, the project's objectives are aligned with fostering both environmental sustainability and socioeconomic prosperity. Furthermore, the initiative is anticipated to create job opportunities locally, significantly enhancing the region's socioeconomic landscape. In essence, the project is designed to exert a beneficial influence on the natural environment and the local communities within the project's vicinity.

2.2 Local Stakeholder Consultation

The local stakeholder consultation took place on Jun 5th, 2023, from 9 a.m. to 3 p.m. This gathering brought together participants from various sectors, including Local Government, Public institutions, Chiefs, Church Leader, School Boards members, and local leaders.

The most practical and widely accepted method of extending invitations to our esteemed stakeholders was through letters, phone calls, text messages, bulletin board notices, and email communications. This approach is in line with the established norms and practices followed by numerous institutions within the country.

Our invitations were thoughtfully prepared in both Swahili and English, recognizing these as common Language spoken by all members of the Kenyan community.

During the local stakeholder consultations, comprehensive discussions took place regarding the potential risks, costs, and benefits associated with the project. Our project representatives stressed the importance of maintaining open channels of communication between stakeholders and project representatives, enabling continuous feedback and grievance

reporting. The meeting was complemented by live demonstrations and an interactive question and answer session. Additionally, stakeholders were kindly requested to complete feedback forms at the conclusion of the meeting.

We are pleased to announce that the local stakeholder consultations were a resounding success, marked by active participation and spirited discussions on the project's potential risks, costs, and benefits. Stakeholders expressed their enthusiasm for the project and its positive impacts on their health, workload, and the environment.

For those interested in a visual representation of one of the stakeholder meetings, a video recording can be accessed at <https://www.youtube.com/watch?v=8YGnd7qchN8>

Following these productive consultations, stakeholders were encouraged to provide further feedback on the project during the meetings and also via email, traditional letters, or through our online stakeholder feedback portal at <https://solaxygroup.com/stakeholderconsultations/>

Below, we share some of the invaluable feedback and questions raised by our dedicated stakeholders:

2.3 Environmental Impact

The project has undergone an exhaustive analysis to assess its environmental repercussions, concluding that there will be no substantial adverse ecological consequences. As such, conducting an environmental impact assessment is deemed unnecessary. The implementation of Improved Cooking Stoves (ICS) poses no threat to the surrounding ecology, with the project anticipated to contribute positively to environmental preservation. By diminishing the dependence on firewood, the initiative will ease the strain on nearby forests, fostering a more sustainable ecological balance. Moreover, employing ICS will reduce indoor air contamination, thereby enhancing the health and well-being of the community residents.

2.4 Public Comments

This section currently does not apply, as the project has not been registered with VERRA. Nonetheless, the project proponents welcomes public feedback on this initiative. Interested parties can submit their comments by visiting the following link:

<https://www.solaxygroup.com/stakeholderconsultations/>

2.5 AFOLU-Specific Safeguards

This section is not applicable as the project is a non-AFOLU project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title: Energy efficiency measures in thermal applications of non-renewable biomass

Type: Type II –Energy Efficiency Improved Projects

VMR0006 Methodology for energy efficiency and fuel switch measures in thermal applications--
Version 1.2

Dated: 6 July 2023

Sectoral Scope: 03

Tool: Tool-30– “Calculation of the fraction of non-renewable biomass” v4.0₆

Standard: “Sampling and surveys for CDM project activities and programmes of activities” v9.0₇

Tool: AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass --
v13.0₈

3.2 Applicability of Methodology

The project activity meets each of the applicability conditions:

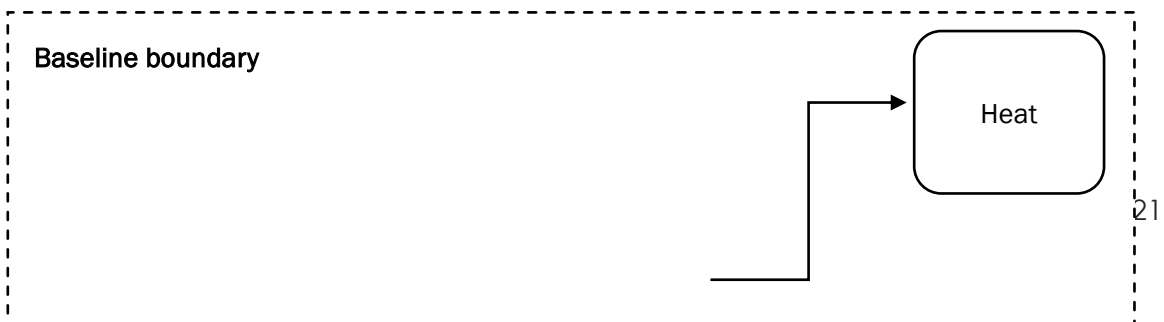
No.	Applicability criterion	How the project complies
1	Project activities shall be implemented in domestic premises, or in community-based kitchens.	The project activity will replace traditional wood-based stove (mainly tree stone) in individual households only
2	The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacture’s specifications and shall exclusively use woody biomass and can be single pot or multi-pot;	The Solaxy improved cookstove planned to be distributed under this project are single pot wood cookstove that has a specified high-power thermal efficiency of 51.5% as per the manufacture’s specifications.
3	It has been established that non-renewable biomass has been utilized within the project region since December 31 st , 1989, as determined through the implementation of survey methodologies and by consulting relevant published literature, official reports, and statistical data	As indicated by the Global Forest Resources Assessment 2010 Report of Kenya authored by the Food and Agriculture Organization of the United Nations, the forest area of Kenya was recorded as $3,708 \times 10^3$, $3,582 \times 10^3$, $3,522 \times 10^3$, and $3,467 \times 10^3$ hectares in the years 1990, 2000, 2005, and 2010, respectively, exhibiting a decline of 6.5% from 1990 to 2010. Given Kenya's status as a

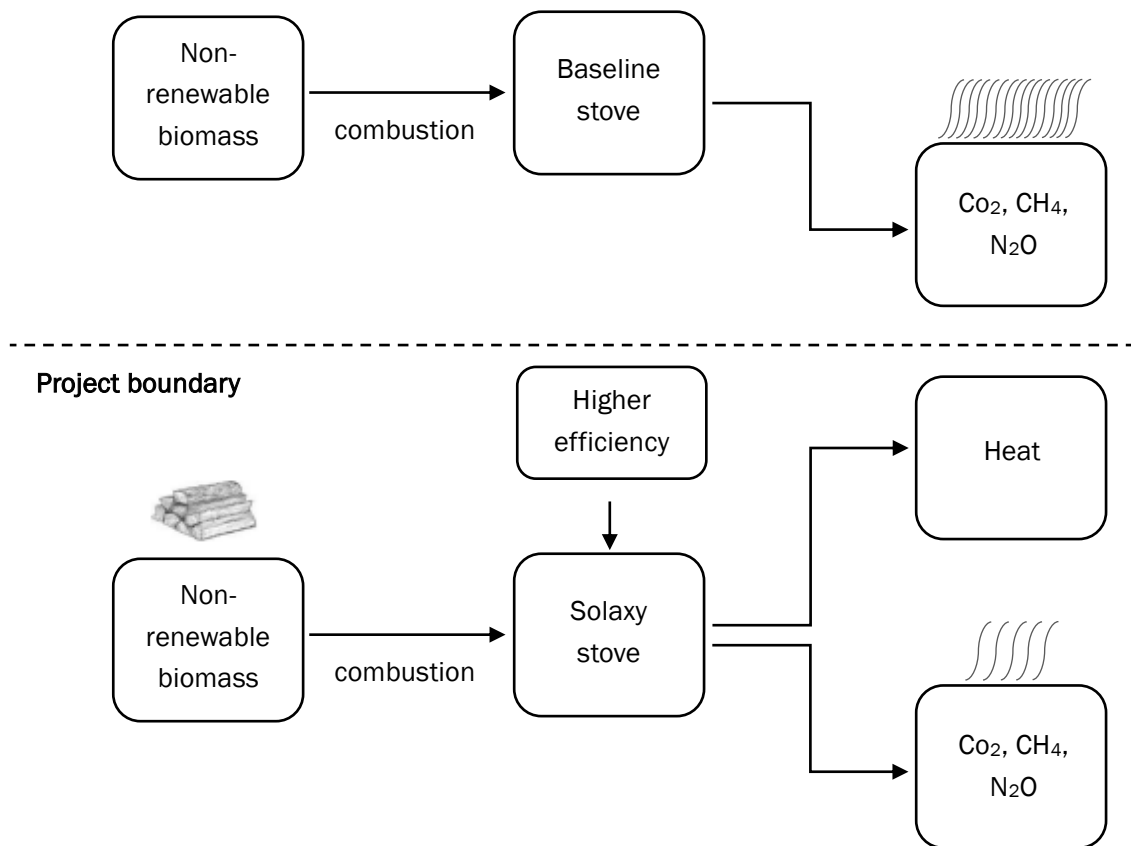
		developing country in the African continent, it is highly plausible that the utilization of non-renewable biomass had taken place since 1990 throughout the country.
4	In the case of biomass residues that are processed to be utilized as fuel, such as briquettes or wood chips, it is mandatory to demonstrate the following: (a) the fuel in question is generated exclusively through the use of renewable biomass (with more than one type of biomass being permissible); (b) the fuel consumption shall be closely monitored throughout the crediting period; and (c) energy consumption associated with the processing of renewable biomass, such as shredding and compacting in the case of briquetting, may be deemed equivalent to the upstream emissions linked with the processing of the displaced fossil fuel, and hence, may be discounted.	The implementation of an Improved Cook Stove (ICS) is being introduced as an energy efficiency measure, intended to replace the use of baseline stoves and subsequently reduce the consumption of non-renewable biomass utilized for combustion. As part of the project activity, fuel usage shall be meticulously monitored to ensure its optimal use. As such, the current stipulation is deemed inapplicable.
5	The CDM PDD or CDM PoA DD/CPA DD shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations.	The project proponent shall ensure that each cookstove distributed within the project area is assigned a unique identification number consisting of a combination of customer name, geographical location, and a serial number to identify the ICS end-users of this project activity. Furthermore, the project shall undergo cross-checks against other CDM project activities operating in the country, utilizing the UNFCCC, the Gold Standard, and other pertinent voluntary carbon schemes to ensure that the ICS is not included in any other CDM project activity or voluntary project activity. Additionally, the distribution approach for cookstoves shall be extensively described in the monitoring report.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Use of non-renewable biomass/Fossil fuel	CO ₂	Yes	Major Source
		CH ₄	Yes	Major Source
		N ₂ O	Yes	Major Source
Project	use of non-renewable biomass	CO ₂	Yes	Major Source
		CH ₄	Yes	Major Source
		N ₂ O	Yes	Major Source
	Cultivation of renewable biomass in a dedicated plantation ²	CO ₂	No	Minor Source
		CH ₄	No	Minor Source
		N ₂ O	No	Minor Source
	Thermal and/or mechanical processing of renewable biomass (e.g., shredding, briquetting) ⁴	CO ₂	No	Minor Source
		CH ₄	No	Minor Source
		N ₂ O	No	Minor Source
	Transport of renewable biomass ⁴	CO ₂	No	Minor Source
		CH ₄	No	Minor Source
		N ₂ O	No	Minor Source

A representation of the baseline boundary and project boundary are given as below.





3.4 Baseline Scenario

The current baseline scenario involves the continued use of non-renewable wood fuel (i.e., firewood) by the demographic group targeted by the project to meet their thermal energy needs in the absence of any project intervention. The prevailing cookstoves currently used are either three-stone fires or conventional systems lacking an improved combustion air supply mechanism, such as traditional stoves.

3.5 Additionality

The approach used to establish additionality in this context is anchored in the "activity method," a systematic procedure involving two critical phases: Regulatory Surplus and Positive List.

Activity Method Overview:

1. Regulatory Surplus:

The project operates outside the scope of mandatory legal frameworks within the republic of Kenya, including laws, statutes, or regulations, particularly those pertaining to non-Annex I

nations under the UNFCCC. It thrives on voluntary participation from local households, spearheaded by Solaxy Group, reinforcing that it's not a byproduct of any existing regulatory obligation.

2. Positive List:

The project aligns with the conditions stipulated in the Positive List, primarily distributing International Carbon Standard (ICS) credits directly to households. It stands independent of government initiatives or backing from multilateral financial mechanisms, fortifying its authenticity and additional nature.

Given the project's adherence to the guidelines detailed in the Activity Method, it qualifies as an 'additional' initiative, signifying that it's an extra measure beyond what is legally required or currently ongoing.

Elaboration on Methodology VMR0006 v1.2:

Step 1: Regulatory Surplus

The project's host country, Kenya, lacks enforced government policies mandating the provision of fuel-efficient cookstoves for domestic use. There's no legal obligation compelling the initiative, making household involvement purely voluntary. The Project Proponent acknowledges this undertaking as an autonomous, coordinated campaign.

Step 2: Positive List

The stringent applicability criteria of this methodology constitute the Positive List. This project satisfies all prerequisites outlined in Section 3.2, with specific conditions met, including:

1. Provision or distribution of stoves to end-users at no charge, relying solely on revenue from GHG credit sales.
2. Independence from governmental or multilateral fund endorsements, confirming the project's additional status and freedom from alternative financial or programmatic support.

Step 3: Project Method

This step is redundant since the ICS are granted complimentary to beneficiaries, circumventing the need for further validation methods.

3.6 Methodology Deviations

The project does not involve any methodological deviations.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The applied methodology does not account for baseline emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 4.4

4.2 Project Emissions

The applied methodology does not account for project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 4.4

4.3 Leakage

Leakage shall be considered as default 0.95 in accordance with the applied methodology.

4.4 Net GHG Emission Reductions and Removals

The project will replace traditional wood-based stoves with ICS, therefore net GHG emissions reductions are calculated by applying Equations 1 and 2

Equation (1)

$$ER_Y = \sum_i \sum_j B_{y,savings,i,j} \times N_{o,i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times (EF_{wf,co2} + EF_{wf,non\ co2}) \times Adj_{LE} \times (1 - u_d)$$

Where:

ER_y	=	Emission reduction in year y (tCO ₂ e)
$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved per project device i and batch j in year y (tonnes)
$N_{o,i,j}$	=	Number of project devices of type i and batch j commissioned (200,000) ⁶
$n_{y,i,j}$	=	Proportion of commissioned project devices of type i and batch j ($n_{y,i,j}$)

that remain operating in year y (See table blow)

μ_y	=	Adjustment to account for any continued use of pre-project devices during the year y (Measured every 2 years with usage survey -- Expected: 0 as baseline stoves are decommissioned)
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (0.92)
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted or reduced 0.0156 TJ/tonne ² (IPCC default for wood fuel)
EF_{wf,CO_2}	=	CO ₂ emission factor for non-renewable woody biomass 112 tCO ₂ /TJ (IPCC default for wood fuel)
$EF_{wf,non\ CO_2}$	=	Non-CO ₂ emission factor for non-renewable woody biomass 9.46 tCO ₂ /TJ (IPCC default for wood fuel)
Adj_{LE}	=	Adjustment factor to account for leakage related to the non-renewable woody biomass saved by the project activity (0.95)
u_d	=	Uncertainty deduction for f_{NRB} (26%)

¹ Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/DNA/fNRB/index.html>

² value from the latest version of AMS-II.G must be used.

³ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Chapter 2 Stationary Combustion

⁴ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Chapter 2 Stationary Combustion

The estimation of the amount of woody biomass saved as a result of the adoption of an improved cookstove can be determined using the following equation:

$$B_{y,savings,i,j} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,y,i,j}}{\eta_{old}} - 1 \right) \quad \text{Equation (2)}$$

Where:

- η_{old} = Efficiency of baseline cookstove. Default value: 15%
- $\eta_{new,y,i,j}$ = Efficiency of the improved cookstove type I and batch J determined through water boiling test (WBT) during year “y”
Alternatively, efficiency may be determined using Equation 4.
- $B_{y=1,new,i,j,survey}$ = Annual quantity of woody biomass used by improved cookstove in tonnes per device of type i and batch j, determined in the first year of the implementation of the project through a sample survey. The value is assumed to be 4.47 kg/device/day or equal to 1.80 tonnes/device/year.

$$\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94 \quad \text{Equation (3)}$$

Where:

- η_p = Efficiency of project stove (fraction) at the start of project activity. The Value is 51.5% as per the specification provided by manufacture.
- $(DF_n)^{y-1}$ = Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on manufacturer’s declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.
- 0.94 = Adjustment factor to account for uncertainty related to project cookstove efficiency test.

For the purpose of ex-ante calculations, the following assumption is adopted.

- 1) The project will install up to 200,000 ICS.

- 2) ICS installation to be implemented in 2 years with each year comprises of 100,000 ICS.
- 3) The life span of ICS is 10 years; For conservative estimate of ER, the annual stove loss rate is estimated at 5%
- 4) $B_{y=1,new,i,j,survey}$ Is assumed as 1.80 tonnes / device / year

Number of ICS in operation during a specific year "y." $n_{y,i,j}$

Accounting for replacements, we've factored in a 5% depreciation rate for the stoves detailed below:

$$N_{y,i,j} = N \times (1 - r)^{(t-1)}$$

Where

N = Initial quantity of stove

r = Depreciation rate (5%)

t = Time in Years

Example of calculation:

If $t = 2$,

$$N_{y,i,j} = 100,000 \times (1 - 0.05)^{(2-1)}$$

$$= 100,000 \times 0.9025$$

$$= 90,250$$

The number of operational ICS during a given year, represented as "y," can be stated as follows.

Table 2: Number of operating cookstoves

Year	Batch 1	Batch2	$n_{y, i, j}$
1	100,000		100,000
2	95,000	100,000	195,000
3	90,250	95,000	185,250
4	85,738	90,250	175,988
5	81,451	85,738	167,189
6	77,378	81,451	158,829
7	73,509	77,378	150,887
8	69,834	73,509	143,343
9	66,342	69,834	136,176
10	63,025	66,342	129,367

Efficiency of ICS during a specific year, indicated as "y."

Accounting for stove efficiency loss, we've factored in a 1% depreciation rate for the stoves detailed below:

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

Where

$$\eta_p = 51.5\%$$

$$(DF_n)^{y-1} = 0.99$$

Example of Calculation :

If $y = 2$

$$\eta_{new, y, i, j} = 51.5\% \times (0.99)^{2-1} \times 0.94$$

$$= 47.93\%$$

Set of values for $n_{new, i, j}$ over the lifetime of the stove.

Table 3: Stove Efficiency: Baseline and Lifetime Evolution

Baseline η_p	51.50%
Year	$n_{new,i,j}$
1	51.50%
2	47.93%
3	47.45%
4	46.97%
5	46.50%
6	46.04%
7	45.58%
8	45.12%
9	44.67%
10	44.23%

Quantify of woody biomass saved $B_{y,savings,i,j}$

The estimation of the amount of woody biomass saved as a result of the adoption of an improved cookstove can be determined using the following equation:

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

Example of calculation:

If $y = 2$,

$$B_{y,savings,i,j} = 1.80 \times [(0.4793/0.15) - 1]$$

$$= 3.95 \text{ tonnes}$$

This gives us the following results for $B_{y,savings,i,j}$

Table 4: Biomass Reduction Over Stove Lifetime

Year (y)	$B_y = 1_{,new,i,survey}$	$n_{new,i,j}$	n_{old}	$B_{y,savings,i,j}$
1	1.80	51.50%	0.15	4.38
2	1.80	47.93%	0.15	3.95
3	1.80	47.45%	0.15	3.89
4	1.80	46.97%	0.15	3.84
5	1.80	46.50%	0.15	3.78
6	1.80	46.04%	0.15	3.72
7	1.80	45.58%	0.15	3.67
8	1.80	45.12%	0.15	3.61
9	1.80	44.67%	0.15	3.56
10	1.80	44.23%	0.15	3.51

Determination of emission reductions " ER_Y "

$$ER_Y = \sum_i \sum_j B_{y,savings,i,j} \times N_{o,i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \\ \times (EF_{wf,co2} + EF_{wf,non\ co2}) \times Adj_{LE} \times (1 - u_d)$$

Where

$$NCV_{biomass} = 0.0156 \text{ TJ/tonne}$$

$$f_{NRB,y} = 0.92$$

$$EF_{wf,co2} + EF_{wf,non\ co2} = 112 + 9.46 = 121.46 \text{ tCO}_2/\text{TJ}$$

$$Adj_{LE} = 0.95$$

$$u_d = 0.74$$

Given that the stoves installed in year 2 operate under the same assumption as those used in year 1, the total reduction in emissions that the project is expected to achieve over a 10-year crediting period can be expressed as follows.

Year	Estimated emission reductions		
	Year 1	Year 2	Total
2023 - 2024	536,754	0	536,754
2024 - 2025	459,856	536,754	996,610
2025 - 2026	430,227	459,856	890,083
2026 - 2027	394,694	430,227	824,921
2027 - 2028	377,302	394,694	771,996
2028 - 2029	352,745	377,302	730,047
2029 - 2030	330,604	352,745	683,349
2030 - 2031	308,941	330,604	639,545
2031 - 2032	289,427	308,941	598,368
2032 - 2033	271,095	289,427	560,522
		Total:	7,232,195
		Number of crediting period	10
		Average Annual ERs	723,220

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
01-10-2023 – 09-09-2024	536,754			536,754
01-10-2024 – 09-09-2025	996,610			996,610
01-10-2025 – 09-09-2026	890,083			890,083
01-10-2026 – 09-09-2027	824,921			824,921
01-10-2027 – 09-09-2028	771,996			771,996
01-10-2028 – 09-09-2029	730,047			730,047
01-10-2029 – 09-09-2030	683,349			683,349
01-10-2030 – 09-09-2031	639,545			639,545
01-10-2031 – 09-09-2032	598,368			598,368
01-10-2032 – 09-09-2033	560,522			560,522
Total	7,232,195			7,232,195

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	NCV_{biomass}
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted or reduced
Equations	(1)
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction: Table 1.2 Default net calorific values (NCVs) and lower and upper limits of the 95% confidence intervals.
Value applied	0.0156

Justification of choice of data or description of measurement methods and procedures applied	IPCC default value for wood fuel, based on the gross weight of the wood that is 'air-dried'.
Purpose of Data	Calculation of emission reductions
Comments	The value is fixed ex-ante

Data / Parameter	EF_{wf,CO_2}
Data unit	tCO ₂ /TJ
Description	CO ₂ emission factor for the use of non-renewable woody biomass in baseline scenario
Equations	(1)
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories;
Value applied	112 tCO ₂ /TJ
Justification of choice of data or description of measurement methods and procedures applied	Default as per applied approved methodology VMR0006, v1.2
Purpose of Data	Calculation of emission reductions
Comments	The value of the most recent IPCC guidelines must be applied at validation

Data / Parameter	$EF_{wf,non\ CO_2}$
Data unit	tCO _{2e} /TJ
Description	Non-CO ₂ emission factor for non-renewable woody biomass in baseline scenario
Equations	(1)
Source of data	Latest IPCC Guidelines for National Greenhouse Gas Inventories;
Value applied	9.46 tCO ₂ /TJ
Justification of choice of data or description of measurement methods	Default as per applied approved methodology VMR0006, v1.2

and procedures applied	
Purpose of Data	Calculation of emission reductions
Comments	The value is fixed ex-ante

Data / parameter	Ad_{jLE}
Data unit	Fraction
Description	Adjustment factor to account for leakage related to the non-renewable woody biomass saved by the project activity
Equations	(1)
Source of data	Latest version of AMS-II.G. must be applied
Value applied	0.95
Justification of choice of data or description of measurement methods and procedures applied	Procedure for underlying methodology AMS.II.G.
Purpose of Data	Calculation of emission reductions
Comments	Fixed at validation

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of woody biomass saved by the project activity during year “y” that can be established as non-renewable biomass
Equations	(1)
Source of data	Fraction of non-renewable biomass is calculated as per the fNRB calculation TOOL30: Calculation of the fraction of non-renewable biomass v.4
Value applied	92%
Justification of choice of data or description of measurement methods and procedures applied	Any changes/ revisions to this value would be monitored and if new default values are approved by the CDM, the value of the fraction of fNRB used will be updated

Purpose of Data	Calculation of share of non-renewable biomass
Comments	This parameter shall remain fixed for the monitoring period

Data / Parameter	u_d
Data unit	%
Description	Uncertainty deduction from fnrb
Equations	(1)
Value applied	26%
Justification of choice of data or description of measurement methods and procedures applied	Conservative discount factor based on uncertainty for fnrb The following uncertainty deduction must be applied, depending on the procedure for fnrb used from AMS.II.G. 1) If the default value for fnrb from TOOL33 is applied: $U_d = 0$ 2) If fnrb is calculated as per TOOL30: $U_d = 26\%$ 3) If fnrb from an approved standardized baseline is applied: $U_d = 26\%$
Purpose of Data	Calculation of emission reductions
Comments	-

Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline cookstove
Source of data	Default value: 0.15 (three-stone fire using firewood)
Value applied	0.15
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.15 must be used if baseline device is a three-stone fire using firewood(not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.
Frequency of monitoring/recording:	Further as per the methodology, this value has been fixed for each individual household that receives project ICS, at the time of project implementation.

Purpose of Data	Calculation of emission reductions
Comments	-

Data / Parameter	η_p
Data unit	Fraction
Description	Efficiency of project stove at the start of project activity.
Source of data	Manufacturer's specification including
Value applied	51.5%
Justification of choice of data or description of measurement methods and procedures applied	As per manufacturing specifications include data from independent stove efficiency tests conducted by the Centre for Research in Energy and Energy Conservation (CREEC)
Purpose of Data	Calculation of emission reductions
Comments	

Data / Parameter	Life Span
Data unit	Number of years
Description	The operating lifetime of project device is 10 years
Source of data	Manufacturer's specification
Description of measurement methods and procedures to be applied	The cookstove will be manufactured to match the fixed design specification. This will ensure that ICS delivered to project households is standardized with respect to the dimensions and performance.
Frequency of monitoring/recording	Once at the time of Project stove installation
Value applied	10.0 years
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	In the case of inclusion of other/new models, during project lifetime, corresponding thermal efficiency values shall be used

	for ER calculations. Also, the PP shall either replace the ICS after the end of its life with an equivalent device to continue claim credits or otherwise shall cease claiming credits after the rated lifespan.
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Data / Parameter	$\eta_{new,y,i,j}$																						
Data unit	Fraction																						
Description	Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y																						
Source of data	Calculation Equation (3) $\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94$																						
Value applied	<table> <tr> <th><i>Year (y)</i></th><th>$\eta_{new,y,i,j}$</th></tr> <tr><td>1</td><td>51.50%</td></tr> <tr><td>2</td><td>47.93%</td></tr> <tr><td>3</td><td>47.45%</td></tr> <tr><td>4</td><td>46.97%</td></tr> <tr><td>5</td><td>46.50%</td></tr> <tr><td>6</td><td>46.04%</td></tr> <tr><td>7</td><td>45.58%</td></tr> <tr><td>8</td><td>45.12%</td></tr> <tr><td>9</td><td>44.67%</td></tr> <tr><td>10</td><td>44.23%</td></tr> </table>	<i>Year (y)</i>	$\eta_{new,y,i,j}$	1	51.50%	2	47.93%	3	47.45%	4	46.97%	5	46.50%	6	46.04%	7	45.58%	8	45.12%	9	44.67%	10	44.23%
<i>Year (y)</i>	$\eta_{new,y,i,j}$																						
1	51.50%																						
2	47.93%																						
3	47.45%																						
4	46.97%																						
5	46.50%																						
6	46.04%																						
7	45.58%																						
8	45.12%																						
9	44.67%																						
10	44.23%																						
Justification of choice of data or description of measurement methods and procedures applied	To utilize Equation (5) in the methodology, the efficiency of the improved cookstoves can be estimated by calculating the loss in efficiency per year. This parameter does not need to be monitored separately.																						
Purpose of Data	Calculation of emission reductions																						
Comments																							

5.2 Data and Parameters Monitored

Data / Parameter	$N_{y, i, j}$
Data unit	Number
Description	Number of project devices of type i and batch j operating during year “y”
Equations	(1)
Source of data	Distribution database and monitoring survey
Description of measurement methods and procedures to be applied	Project proponent shall maintain a database of all ICS distributed. The usage rate of installed ICS shall be measured based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of CDM standard for sampling and surveys for project activities and programme of activities.
Frequency of monitoring/recording	At least once every two years
Value applied	200,000 ICS The ex-ante emission reduction calculation is based on the implementation of 200,000 improved cookstoves (ICSs) over a period of 2 years. The project includes the installation and distribution of 100,000 ICSs in each year.
Monitoring equipment	Sampling based Monitoring survey
QA/QC procedures to be applied	In the case
Purpose of data	Calculation of emission reductions
Calculation method	The results from sample-based monitoring will be used to calculate $N_{y, i, j}$ as follows $N_{y, i, j} = (n_{i, j, operational} / n_{i, j, total}) * N_{y, i, j, distributed}$ Where: N = number of stoves n = number of samples

Comments	As per the guidelines of the project, it is mandatory to conduct monitoring during the stove distribution process to identify any existing improved cookstoves (ICSs) present in the households. In the event that a previously installed project ICS is discovered in the same household, the subsequent (second) ICS will not be considered for the purpose of emission reduction (ER) calculations. Alternatively, it is permissible to determine the presence of multiple project ICSs in a household post-distribution, through sampling surveys. In such cases, the total ICS population will be discounted by the fraction of households sampled that were found to be using more than one project ICS, as stipulated by the project regulations.
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Data / Parameter	$B_{y=1,new,i,j,survey}$
Data unit	Tonnes
Description	Quantity of woody biomass used by project devices in tonnes per device of type i
Source of data	Monitoring survey
Description of measurement methods and procedures to be applied	Minimum sample size of each type i and batch j should be in line with the latest CDM project activities version of “Standard of sampling and surveys” for project activities and programme of activities or guidelines provided in version 4.0 Determined in the first year of the introduction of the devices (e.g., during the first year of the crediting period, Y=1) through measurement campaigns at representative household and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied. (a) Baseline cookstoves have been completely decommissioned and only improved cookstoves are exclusively used in the project households; (b) If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of firewood being used by each device. In other words, if more than one device, or another device that consumes firewood, are in use in project households, then the sample survey needs to distinguish the quantity of firewood used by the project

	device and the other device that use firewood
Frequency of monitoring/recording	Determined in the first year of project implementation
Value applied	For ex-ante emission reduction calculation, the value is assumed as 4.47 kg/device/day or equal to 1.80 tonnes/device/year.
Monitoring equipment	Monitoring survey including weight scales to be used for measuring quantity of fuel wood
QA/QC procedures to be applied	Calibration of weight scales to be used for measuring the fuel wood will get done before start using on site
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Equations	(1)
Value applied	0 (stoves will be decommissioned)
Source of data	Monitoring
Justification of choice of data or description of measurement methods and procedures applied	Monitoring this parameter necessitates one of the following methodologies: - Scenario of Decommissioned Baseline Cookstoves: Should the monitoring survey confirm that the baseline cookstoves are decommissioned and rendered non-operational, the value assigned is '0', aligning the 'adjusted' parameter with 'Bold'. This reflects complete cessation of baseline cookstove usage. - Scenario of Dual Usage: In cases where both improved and baseline cookstoves are operational, comprehensive surveys are mandated. These surveys will meticulously document the ongoing

	operation of baseline cookstoves across a representative sample of households. The objective is to architect surveys that delve into regional cooking habits and stove utilizations, necessitating the construction of queries or evidence-gathering mechanisms. These are instrumental in quantifying the usage frequencies of both improved and baseline cookstoves.
Frequency of monitoring/recording	At least once every 2 years
Monitoring Equipment	Usage survey
Purpose of Data	Calculation of emission reductions
Comments	-

5.3 Monitoring Plan

The monitoring plan has been established to ensure the effective monitoring of emission reduction throughout the credit period of the proposed project. The project proponent will oversee the entire monitoring process.

Responsibilities:

The project proponent is responsible for supervising monitoring activities and ensuring emission reduction performance. To achieve this, the project proponent has outlined a comprehensive structure for data collection, archiving, and equipment calibration.

Monitoring Activities:

Monitoring activities will encompass data collection at two key stages: during stove distribution and after usage. During stove distribution, data will be systematically collected on the stove, beneficiaries, and location to ensure the unique identification of each ICS unit and prevent double counting. This information will form the distribution record, and the project proponent will personally oversee stove distribution and monitoring activities during this phase. Project proponent will provide training to its employees and associates to ensure accurate distribution data collection.

The project proponent is responsible for ensuring the correct distribution process and data collection protocol are followed.

Steps	Data Categories	Detailed explanations
1	Beneficiary Identification:	Collecting Data of Underserved Beneficiaries
2	Data Entry:	Inputting Beneficiary Information into CRM Software

3	Stove Distribution:	Distributing Stoves and Linking to Beneficiary IDs
4	Data Collection and Documentation:	Recording Beneficiary Information in CRM • First Name • Last Name • SIN Number • Telephone Number • GPS Location for Stove Placement • Photo ID • Signed Document for Carbon Credit Rights • Location • Village • District • Date of Distribution • Stove Serial Number
5	Database Creation:	Compiling Beneficiary Data into a Database
6	Data Validation:	Ensuring Data Accuracy and Completeness
7	Annual Monitoring:	Ongoing Yearly Monitoring Activities
8	Monitoring Report Preparation:	Creating Reports Based on Monitoring Data
9	Submission to VVB	Submitting Findings and Data to the Verification and Validation Body (VVB)

After the distribution phase, the monitoring process will entail the selection of a representative sample of stoves from the distribution records. These selected stoves will then be visited at their respective locations where they have been distributed. This meticulous approach allows us to closely monitor and assess key parameters that are critical for calculating emission reductions accurately.

To uphold the highest standards of data integrity and storage, our data collection and handling procedures will be characterized by transparency and security. All collected and monitored data will be diligently stored in an electronic format that guarantees both security and accessibility. This information will remain securely stored and retrievable for a minimum of two years following the conclusion of the project crediting period.

In the event of any uncertainties or issues arising in the course of data handling, our monitoring procedures will undergo swift revisions to rectify any concerns, if necessary. These adjustments will undergo scrutiny and approval by a designated verifier, such as a Designated Operational Entity.

Furthermore, it is worth noting that our data management practices adhere to the Kenya Personal Data Protection Act. This legislation safeguards the privacy and security of personal data. Additionally, all data will be stored within the country, further reinforcing our commitment to compliance with local data protection regulations and ensuring data sovereignty.

Monitored Parameters:

The table below provides a summary of the data requirements for field measurements:

Parameter to be Monitored	Sampling Parameters	Parameter type	Frequency
Number of stoves in use (Ny,i,j)	Number of stoves in the database that are still in operation for the monitoring period	Proportion	biannually
Continued use of baseline technologies (μ_y)	Number of stoves in the database that are still in operation for the monitoring period, but the baseline stove is also in use.	Field surveys of required sample size of ICS users in the database	annually
By=1,new,i, survey	Quantity of woody biomass used by project devices in tons per device of type i. and batch j	Field surveys of required sample size of ICS users in the database: Daily consumption	Determined in the first year of project implementation

Sampling Plan:

In order to manage monitoring costs effectively and avoid the extensive expense of monitoring every single Improved Cook Stove (ICS) unit distributed within the project, a representative sampling approach will be employed. This sampling plan will be carefully designed to align with the requirements outlined in the VMRO006 v1.2 and AMS-II.G. methodology.

The method employed to select households for inclusion in the sample is designed to ensure that they provide a representative cross-section of the larger project population, thereby minimizing the potential for sampling errors. To achieve this, a random sample will be drawn from each stratum, with a confidence level of 90 percent and a margin of error of 10 percent.

To determine the required sample size accurately, it is essential to have estimates of proportions, mean values, and standard deviations. According to the guidelines outlined in the Sampling and Surveys for CDM Project Activities and Programmes of Activities, version 04.0, several methods can be utilized to obtain these crucial estimates:

1. **Referencing Previous Studies:** In cases where relevant information is available from previous studies, these results can be used as a reference point for estimating proportions, means, and standard deviations.
2. **Conducting Preliminary Pilot Samples:** In situations where no prior information is accessible from previous studies, a preliminary pilot sample can be conducted. This helps in generating the necessary estimates.

3. **Leveraging Researcher Experience:** In cases where neither prior studies nor pilot samples are available, the researcher's own experiences and expertise can be relied upon to make informed and educated guesses regarding the required estimates.

Proportion Parameter Estimation: To calculate the sample size for proportion parameters accurately, the following equation will be applied:

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

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

Where:

n	=	Sample size
N	=	Population size (Total number of households or ICS)
P	=	Weighted overall expected proportion
SD ²	=	Weighted overall expected variance
1.96	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision

This approach ensures that the sample size is carefully determined, taking into account the specific characteristics and requirements of the project, while adhering to recognized guidelines and best practices for sampling methodologies.

Assessment for Leakage:

According to methodology VMR006, version 1.2 section 8.: Leakage shall be considered as default 0.95 in accordance with Section 5.4 of AMS II.G. therefore default value of leakage as 0.95 will be applied.

Additional Monitoring:

While it's not a mandated requirement within the VCS methodology, we are dedicated to going above and beyond by incorporating additional parameters into our project monitoring throughout its entire lifespan. Specifically, we will conduct biannual assessments of stove efficiency through on-site Water Boiling Tests. This commitment ensures the sustained environmental benefits of the project are continuously verified and upheld.

APPENDIX

5.4 Determination of the fraction on non-renewable biomass

As per the CDM tool “Calculation of the fraction of non-renewable biomass” (V.3.0)14. The overall equation to be applied is:

(Equation 1 of tool)

$$fNRB = \frac{NRB}{NRR + RB}$$

where:

fNRB = Fraction of non-renewable biomass (fraction or %)

NRB = Quantity of non-renewable biomass (t/yr)

RB = Quantity of renewable biomass (t/yr)

The quantity of non-renewable biomass is derived by the equation given by:

(Equation 2 of tool)

$$NRB = H - RB$$

where:

H = Total annual consumption of wood in the absence of the project activity in tons/yr

Determination of the total wood consumption H

(Equation 3 of tool)

$$H = HW \times N + CE + NE - RB$$

where:

HW X N = Total household's fuelwood consumption in tons. The tool par. 15 allows to use an aggregated value for consumption per household (HW) times the number of households (N).

CE = Commercial woody biomass consumption for energy applications (e.g., commercial, industrial or institutional uses of woody biomass in ovens, boilers etc.) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)

NE = Commercial woody biomass consumption for non-energy applications (e.g. construction, furniture) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)

5.5 Non-binding survey questionnaire

5.5.1 Survey format A: Baseline fuel consumption pattern

1. General information¹

Title of project activity/CPA/PoA	
Name of Surveyor	
Date of survey	mm/dd/yyyy
Period of measurements (for consumption rate)	mm/dd/yyyy to mm/dd/yyyy

2. Household Profile²

Name (Household representative)	
Household size (total number of people)	
- Adult	
- Children	
SIN Number #	
Phone number (if available)	
Address	

3. Stove description prior to the project implementation³ (Mark x with type of stove used)

"A three-stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. Without a grate or chimney".	
Any other type of stove	

4. Household Fuel consumption pattern prior to the project implementation⁴

How many meals did you prepare last week or last month?	Meals/week or month
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¹ Selection of households should be based on a sampling plan.

² If the survey is done biennially, it may be designed to capture the results for each year separately (e.g. the survey may ask for the utilization hours for year 1 and for year 2 separately).

³ An "X" shall be filled in in one of the two alternatives. If the stove does not have a chimney or a grate, then "X" should be filled out for "Any other type of stoves". Such a stove would then be considered an improved cookstove.

⁴ In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms units mentioned above. In many places the volume of firewood (e.g. the volume capacity and level of filling of the transporting/storage room) is measured, not its weight. This very much depends on the local practice of measurement. The project participants should include such local measurement unit in the questionnaire. In some cases, the measurement unit could also be in terms of money spent on purchasing the fuel. Therefore, the project participant shall provide further guidelines for how the conversion of these reported values to required units (mass or volume) should be carried out.

5.5.2 Survey format B: Project survey

1. General Information⁵

Title of Project activity/CPA/POA	
Name of Surveyor	
Date of Survey	mm/dd/yyyy
Period of measurement (for consumption rate)	mm/dd/yyyy to mm/dd/yyyy

2. Household fuel consumption pattern post the project implementation

Cooking device	
Model name/number	
Unique ID	
Date of installation	mm/dd/yyyy
Do you use the project stoves? (Physically check the stove) ⁶ .	Yes/NO
- If Yes, have you used the stove regularly since you installed it? ⁷	Yes/No
-If Yes, is your stove in good condition? ⁸	Yes/No
-If No, why did you stop using the stove?	

⁵ Selection of households should be based on a sampling plan.

⁶ The question is to determine if the cookstove is currently in use, i.e. to address the parameter of “usage factor”. Physical checks to verify the usage may be done by checking the conditions of stoves, e.g. warm to touch, ashes in grate, and soot on stove.

⁷ The question is to determine if the cookstove has been continuously used.

⁸ The project proponent may rephrase the question keeping in mind the objective, i.e. whether or not the project cookstove is in usable condition. If the project cookstove is not in usable condition, the PP shall exclude such stoves from project database of the whole crediting year and subsequent years. The PP may include such stoves again on replacing them with new cookstoves of similar efficiency.