



REDUCED EMISSIONS FROM IMPROVED AND EFFICIENT COOKING IN UGANDAN COMMUNITIES

DOCUMENT PREPARED BY
PERSISTENTCLIMATE INDIA PRIVATE
LIMITED

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed grouped Project aims to reduce greenhouse gas emissions by distributing fuel-efficient Improved Cook Stoves (ICS) in various regions of Uganda. As per analyses in the Africa Energy Outlook 2019 show, the lack of access to clean cooking remains widespread in sub-Saharan Africa with access increasing only slightly from 15% in 2015 to 17% in 2018. Since 2015, only 25 million people have gained access to clean cooking in the region, meaning that the number of people without access increased to over 900 million in 2018 as population growth outpaced provision efforts. Sub-Saharan Africa is the only region where the number of those without access to clean cooking practices continues to rise, highlighting the urgent need for action.

As a result, the vast majority of people in sub-Saharan Africa rely on gathering biomass for cooking. Particularly so in rural areas, which dramatically damages health and impairs productivity improvements. Almost 490,000 premature deaths per year are related to household air pollution from the lack of access to clean cooking facilities, with women and children the worst affected. Forest degradation, sometimes leading to deforestation, is another serious consequence of the unsustainable harvesting of fuelwood. Fuelwood from forests and/or other natural areas (e.g., woodlands) containing these resources, requires traditional cooking methods. These traditional cooking devices are referred to as “3 stones”, “triangle iron”, and/or “crude clay-” or “mud-constructions”. Burning fuelwood in such traditional devices is representative for the scenario existing prior to the implementation of the proposed Project.

The proposed Project Implemented by PersistentClimate India Private Limited with local partners in Uganda seeks to increase access of households and communities to improved cookstoves by disseminating Improved Cook Stoves featuring high thermal efficiency and low greenhouse gas emissions. These ICS shall be distributed across the households and communities in Uganda, replacing previously used traditional devices, typically featuring low fuel efficiency and high rates of emissions among not only greenhouse gas emissions but also particulate matter and other emissions detrimental to health and posing risks of fire. The implementation of this Project will result in the reduction of firewood consumption & associated greenhouse gas emissions in a sustainable manner. Project objectives include reduction of greenhouse gases, conservation of forests and woodlands as well as improved health conditions of ICS users due to improved indoor air quality along with drudgery reduction in everyday cooking.

As each distributed ICS represents a project activity instance included in the proposed Project, the individual households using the ICS will sign an agreement waiving their rights to carbon credits, acknowledging the same. The project proponent is intentional to educate the users of

the ICS' regarding its associated economic, social, and environmental benefits. This will help in creating awareness amongst interested stakeholders.

PERSISTENTCLIMATE INDIA PRIVATE LIMITED, (herein after called "Persistent Climate") is the project proponent ("PP") for the proposed Project. Persistent Climate is a company registered in India and will facilitate the distribution of the ICS' to the households in Uganda (beneficiaries).

Persistent Climate in Uganda will put measures in place to ensure that all requirements with respect to the applied VERRA monitoring methodology of the proposed grouped projects are sufficiently met. Requirements including data, required for accurate and conservative quantification of emissions reductions and other sustainable impacts (SDIs), including but not limited to record keeping and performing household surveys at a regular interval, are met.

The estimated annual average GHG emissions reductions through the implementation of the Project is 355,994 tCO₂e with a total of 3,559,942 tCO₂e for the entire crediting period.

1.2 Sectoral Scope and Project Type

Sectoral Scope: 03 – Energy Demand

Project Type: Type II – Energy Efficiency Improvement Project

Grouped Project: Yes

1.3 Project Eligibility

The proposed Project is eligible under the scope of the VCS Program as:

- 1) The proposed Project reduces Kyoto Protocol greenhouse gases, expressed in tCO₂e
- 3) The proposed project activities are supported by a methodology approved under the VCS Program, being a revision to the CDM small-scale methodology AMS-II.G., "Energy efficiency measures in thermal applications of non-renewable biomass": VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves.

The proposed Project is not excluded from the scope of the VCS Program as per Table 1 of VCS-Standard, v4.2.

1.4 Project Design

The proposed Project is designed to allow for the inclusion of additional project activity instances subsequent to project validation. Each ICS represents a single project activity instance provided the ICS is meeting the eligibility criteria for inclusion of additional project activity instances – including but not limited to an efficient and Improved (high thermal efficiency) displacing traditional cooking methodologies/practices to the end users in the host country of Uganda - can be added subsequent to validation. Therefore, the proposed Project is a grouped project.

☒ The project is a grouped project

Eligibility Criteria

The Project is a grouped project. Each new project activity instance will be assessed against the eligibility criteria below:

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Defined geographical boundary	The new project instance boundary shall be confined to national boundaries of Uganda.	Records of household location under the customer registration database. For this instance, records of sales (customer registration database) with clear delineation of project boundary i.e. host country of Uganda is provided to the VVB for their reference.
2	Conditional to avoid double counting	To prevent double counting of ICSs distributed under the project, ICS shall be uniquely marked, and new project instance implementers shall provide assurances/declarations that they are not included in any other CDM or Voluntary GHG offset schemes outside of this project	- Unique marking on each ICS (such as a Logo/Serial number or batch number which identifies it as part of the new project instance together with the project database) - Written attestation from the project proponent/implementer confirming that the ICSs distributed in the new project instance are not part of any other CDM or Voluntary GHG trading scheme.
3	The specifications of technology/measure including the level and type of service, performance specifications including	All technologies implemented in the project must demonstrate a minimum thermal efficiency of 25%.	Thermal efficiency test results and/or an Independent Third-Party lab testing certificate in accordance with sample testing requirements in line

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	compliance with testing/certifications		with applied methodology demonstrating thermal efficiency greater than baseline device efficiencies (over 20%) in accordance with efficiency testing measures stipulated under VERRA applied methodology. Product description and specifications For this instance, lab test efficiency certificate for model distributed under this instance has clearly showing the efficiency above baseline devices efficiency will be submitted to VVB.
5	The conditions that ensure that new project instances meet the requirements pertaining to the demonstration of additionality in VCS Standard.	There is no regulatory requirement to use ICS in Uganda, therefore according to 3.8.9 of the VCS Standard (Version 4.1), this section does not need to be completed further.	There is no mandatory legal requirement for installation of cookstoves in households/institutions of Uganda. The evidence of applicable policies shall be submitted to VVB. No need for further substantiation.
6	Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance	under this project, new project instance operators shall be required to provide an affirmation that funding from annex I parties, if any, does not result in a diversion of official development assistance	Individual new project instance operators shall sign ODA declarations for new project instances implemented by them to attest that no funding from annex 1 parties that leads to diversion of ODA has been used in the project. the statement shall specify whether or not annex 1 funding is used within the project where funding is sought from annex 1 parties the ODA

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			declaration shall be supported by details regarding annex 1 funding that affirms that the funding doesn't divert ODA For this project activity instance, no funding from Annex-1 parties is received and hence, no ODA declaration is required.
7	The Group project-specific requirements stipulated by the project proponent including any conditions related to undertaking local stakeholder consultations and environmental impact analysis	The local stakeholder consultation will be conducted at the initially during the group PD level. each new project instance/project will be implemented in similar social economic situations. The key stakeholders of the program both at group project activity and new project instance level are the same. No further actions needed at the new project instance level to satisfy the eligibility criteria.	The conditions to meet the requirements on undertaking the local stakeholder consultation have been proven in section further sections of this PD. The conditions to meet the requirements on undertaking the environmental impact assessment have been proven in the group PD.
9	Where applicable, the conditions related to sampling requirements for the group project in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities"	Monitoring of all new project instances will adhere to all requirements related to sampling for a group project activity in accordance with the sampling guidelines including all annexes and amendments till EB 86 Annex 04.	Specification of the sampling methods applied and compliance with the sampling requirements are established at the group DD. For each new project instance, sampling will be undertaken as part of the group project activity sampling plan, and in the new project instance-PD describes how the group project activity sampling Plan is to be applied

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			For this instance, sampling plan is described in subsequent sections.
11	Approval of new project instance by project proponent	The project proponent approves each project instance to be included into its registered group project activity.	Statement of project proponent giving approval for the new project instance to be included into its registered group project activity. Since, for this instance project proponent is the implementer, no further approval is required, however for the cases, where implementer other than PP, an approval on the same shall be given by PP in order to include the instance into this grouped project.
12	VER ownership	End users receiving ICSs under the specific new project instance contractually cede their rights to claim and own emission reductions under the VCS to the project proponent of the group project.	A default distribution agreement for end users including the provision that emission reductions generated by the stove are owned by the project proponent will be provided for each new project instance. Waiver of carbon credits from the end users are submitted to the VVB for this instance.
13	Awareness and agreement of those operating a new project instance on group project subscription	Contractual provisions to ensure that those operating the new project instance are aware and have agreed that their activity is being subscribed to the new project instance.	Evidence for inclusion, in case new project instance operators are different from the project proponent: a declaration from project proponent/implementer, stating that they are aware and have agreed that their activity is being subscribed to the group project will be provided for each new project instance.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			Since, for this instance, project proponent is the only implementer, no further requirements related to awareness and agreement on their instance to be subscribed under this grouped project, however, for the cases, where implementer other than PP, an agreement on the awareness between PP and new instance implementer shall be furnished.

1.5 Project Proponent

Organization name	PERSISTENTCLIMATE INDIA PRIVATE LIMITED
Contact person	PRAKASH KUMAR MISHRA
Title	Mr.
Address	K- 255, Pocket K Sarita Vihar- New Delhi-110076 India
Telephone	+91- 9811905234
Email	prakashpure@gmail.com admin@persistentclimate.com

1.6 Other Entities Involved in the Project

Organization name	EZYLIFE HOLDINGS LTD
Contact person	Lister Byamugisha
Title	Mr.
Address	Kapchorwa, Uganda

Telephone	+256 787818792
Email	lbyam@ugezylife.com

1.7 Ownership

The Project is owned by PersistentClimate India Private Limited in accordance with the VCS Program specifications on project ownership. This entails that the legal right to control and operate the project activities lies with PersistentClimate and that beneficiaries shall be informed that their ICS is included in the proposed Project as a unique project activity instance upon which the same beneficiary shall wave his/her rights to VCUs resulting from the adoption of the project activity instance.

1.8 Project Start Date

02/01/2021, the start date, it is date on which the first ICS was distributed by this date project partner..

1.9 Project Crediting Period

02/01/2021 to 01/01 /2031, ten years fixed crediting period.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The estimated annual GHG emissions reductions of the Project are:

√ 100,001 – 1,000,000 tCO₂e/year

In line with the definitions of Project with respect to scale, the indicated scale is applicable:

Project Scale	
Project	
Large project	X ¹

The estimated GHG emissions reductions throughout the project crediting period are depicted in the table below:

¹ Values higher than 300,000 tCO₂e/year

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
1.	364,267
2.	356,022
3.	354,634
4.	353,232
5.	351,816
6.	364,267
7.	356,022
8.	354,634
9.	353,232
10.	351,816
Total estimated ERs	3,559,942
Total number of crediting years	10
Average annual ERs	355,994

1.11 Description of the Project Activity

The proposed grouped Project is the distribution of improved Cookstoves (ICS) among households and communities in Uganda with the objective to displace traditional, unimproved cookstoves (in case of charcoal) and open fires for cooking. The ICS are mainly manufactured/assembled locally in Uganda. The project technology under the (improved cookstoves) proposed grouped project have an average lifespan of 7-8 years and minimum thermal efficiency of 25%. These ICS' are designed to improve combustion efficiency, when compared to the traditional methods of cooking and devices deployed for cooking, and to reduce the heat loss with highly improved *combustion efficiency by enabling regulation of the oxygen/air supplied to the chamber to ensure better burning (complete combustion means less CO and other side-emissions and thus, more health benefits as well)*. Moreover the design of these ICS' result in reduction of particulate matters and carbon emissions. The ICS' manufactured currently and envisaged for inclusion under the

proposed Project are made up of a fuel chamber for combusting the renewable biomass. The pot-rest is above the fuel chamber.

The ICS' distributed and/or will be distributed/implemented under the proposed Project are not fixed in terms of their designs and models, however, CME/PP will continuously be focused on design improvements to benefit the end users in all aspects including, faster/efficient cooking, safety from shoot/smoke emission, less fuel consumption and thus money savings etc. This will be assessed and implemented by the CME with local manufacturer/assembling partners. As such the Project is not limited to the distribution of a specific ICS model or type throughout the crediting period, however all ICS' must comply with the eligibility criteria as stipulated in section 1.4 of this PD. Regardless of new insights in ICS' design improvement, any ICS model included in the Project will remain valid in terms of generating carbon offsets and other co-benefits as mentioned above throughout the lifetime of the project period until the CME/PP chooses to discontinue crediting of the improved stoves.

Each distributed ICS can be traced throughout the project's crediting period as every ICS under the project are allocated with unique serial number which can be further back traced in a central/master database and maintained by the CME and PP. A record keeping system and unique identification of the ICS will be done by user's information collected through the Beneficiary Agreement and compiled in ICS distribution records. This will include among others username, identification number and address/location of the user, stove unique serial number and date of distribution. The record keeping system will ensure that each ICS can be traced to appropriately monitored throughout the crediting period and also to avoid any double counting.

1.12 Project Location

The geographic boundaries, within which project technologies (ICS) shall be distributed are the political boundaries of the Host Country of Uganda. The physical location of each device/ICS distributed as a project activity instance under the proposed grouped Project will form the actual project activity instance boundary. Program/group project put provision to capture each ICS location distributed under the proposed Project will be kept and maintained by the grouped project proponent.

The Project has not been registered or is currently seeking registration under any other GHG programs. The project has not participated under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The Project Participant hereby declares that any other GHG program has not rejected the project activity; an undertaking for the same has been submitted by the Project Participant.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The Project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The Project has not sought or received another form of GHG-related credit, including renewable energy certificates.

1.17 Sustainable Development Contributions

The following sustainable development benefits are expected to be envisaged from the project activity:

- Distribute 50,000 ICS' in Uganda, benefitting more than 50,000 individuals from clean, efficient/improved and affordable energy (SDG 7.1.2).
- Reduces the total biomass usage in the project area to generate approximately 3.5 million tCO_{2e} of emission reductions. (SDG 13; and SDG 7).
- Significantly reduce Indoor/Household Air Pollution (HAP) in the households due to reduced exposure to PM and/other emissions (SDG 3.9.1)
- Reduction of respiratory disease, due to improved combustion efficiency and consequently less fumes, such as Chronic Obstructive Pulmonary Disease (COPD) among adult family members, particularly women and the elderly. (SDG 3.4.1)
- Reduce the risk of mortality among infants and children under five years of age due to (1) acute lower respiratory illnesses (ALRI), such as pneumonia and bronchitis, the cause of mortality in 12% of children under five, and (2) burns resulting from children falling into open cooking fires. (SDG 3.2.1, 3.2.2) and risk of fire due to open and shoot production in inefficient cooking ways.

- Reduces the proportion of time generally women spend on unpaid domestic work related to collection of firewood, and cooking meals on inefficient traditional cookstoves which is generally slower in cooking meals and thus more time for cooking. (SDG 5.4.1)
- Fuel/money savings to the households and communities due to less fuel/biomass consumption.

1.18 Additional Information Relevant to the Project

Leakage Management

Not applicable as the project adopts a net gross adjustment factor of 95% to account for leakage.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

Not Applicable

2 SAFEGUARDS

2.1 No Net Harm

No potential negative environmental or socio-economic impacts have been identified for the project. The project involves the distribution and installation of Greenway certified improved cook stoves to households in Uganda which currently use mostly traditional open fire for cooking. The activities under the proposed project promote improved cook stoves that result in reduced fuel consumption and emissions due to cooking and heating water in homes. The ICS used in this project have characteristics that improve the efficiency of combustion and thermal transfer to the pot compared with three-stone fires or traditional pot support. Furthermore, traditional cooking methods involve open fires that result in the emissions of local pollutants such as carbon monoxide and particulate matter in often poorly ventilated rooms, which lead to respiratory problems. In addition, open fires are frequent causes of burns and other injuries. Switching from fireplaces to ICS reduces the incidence of such injuries and health problems. Therefore, the

Greenway Jumbo Stove installed under this project presents positive environmental impacts wherever they are applied, and no negative environmental impacts have been identified.

2.2 Local Stakeholder Consultation

The Local Stakeholder meeting was conducted both physically on the 06th of June 2022. The invitations were sent out on email and the newspaper advertisements were published on 09-May-2022. This ensured that the project adhered to the criteria of giving reasonable time notice to stakeholders invited. Stakeholders were chosen in such a manner that they represent the various fields e.g. the experts of climate change, cookstoves, consultants, NGOs including the potential users. The minutes of the meeting were recorded by the project participant. The meeting invitation through the newspaper is presented here. The further details of local stakeholder meetings i.e. Minutes, photographs inter alia are presented in Appendix 1.



2.3 Environmental Impact

No negative environmental impacts have been identified from the project and an environmental impact assessment (EIA) is not required for the project.

There are no major impacts on the environment due to the installation of the ICS. The local ecology is not likely to get impacted by this type of grouped project activities. The group activity included under this group project helps in reducing the consumption of the non-renewable biomass, thus, reducing the pressure on forest, reduction in indoor air pollution and other co-benefits e.g. good health impacts by improved cooking practices, reduced emissions of GHGs including particulate matters and preventing any fire thus, having positive environmental impacts.

2.4 Public Comments

Public comments shall be taken care of after the publishing of VCS PD for global stakeholder's comment on VERRA registry.

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

Following approved baseline & monitoring methodology is applied.

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

Tools: "TOOL30: Calculation of the fraction of non-renewable biomass"; Version-03, EB 108,
Annex 11

3.2 Applicability of Methodology

The table below demonstrates and justifies how the Project meets each of the applicability conditions of the methodology, and tools applied by the project.

VCS Methodology applicability condition	Project justification
Project activities shall be implemented in domestic premises, or in community-based kitchens.	The project activity instances are ICS designed to be used for cooking in domestic premises, or in community-based kitchens.
The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove replacing fossil fuel baseline stove, it shall exclusively use renewable biomass.	The manufacturer's specifications shall indicate the thermal efficiency of each ICS. Only ICS' with a high-power thermal efficiency of at least 25%, and exclusively fuelled by renewable biomass. The first ICS-models to be distributed under the project activity are Greenway Jumbo stoves/greenway stoves, with one pot capacity.
Both 'Projects' and 'Large Projects' can use this methodology.	The Project is of 'Project' scale
Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics ⁵ .	In 1985, more than 90% of total non-commercial energy demand in Uganda was met through fuelwood and charcoal ² . There has not been significant change in the non-commercial energy scenario since 1980 and the majority of household energy demand was met through charcoal and fuelwood even in year most recent years (2019) in Uganda.

² https://eprints.utas.edu.au/20247/1/whole_KahangireBatuuraine1985_thesis.pdf

	According to Uganda-Wood Fuel Overview by Waves published in June 2019³, total demand of wood fuel in Uganda was 53.1 million MT and wood fuels accounts 88% of all energy need in Uganda. The bulk of wood fuels (87% in fuelwood equivalent) are consumed by households, while industry and the commercial sector account for the balance (UBOS, 2018) It can therefore be concluded that non-renewable biomass has been used in Uganda since long back before 31st December 1989.
<i>For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded.</i>	The quantity of fuel consumed after distribution and implementation of an ICS, provided that the traditional method is displaced, shall be monitored for each monitoring period. As per the applicability criterion, energy used for potential processing of biomass residues shall be disregarded as a project emissions source.
<i>The Project Description shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).</i>	Each ICS shall be allocated a unique serial number. These Sr numbers are captured in a central master database together with the end users/beneficiaries details characteristics such as the address of the end user, date of distribution of ICS and their contact details as much as possible, results from surveys, etc. This record keeping system will ensure that each ICS can be traced and double counting can be avoided.

³<https://www.wavespartnership.org/sites/waves/files/kc/WAVES-Woodfuel%20Overview%20Technical%20Report%20Design%20Layout%20Final%20-October.pdf>

<i>The Project Description shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.</i>	Stove manufacturers, wholesale providers and any other entity involved with the manufacturing, sale and/or distribution of the ICS shall enter into a contractual agreement with the PP that the ICS' under the Project are not included in any other GHG reduction certification scheme. The PP shall continuously monitor other developments of ICS distribution schemes in the region and shall perform regular cross-checks to ensure itself that any new projects/programmes are not including the ICS' under the proposed Project.
Tool 30: Calculation of the fraction of non-renewable biomass, may be used by: (a) DNAs to submit region- or country-specific default f_{NRB} values, following the procedures for development, revision, clarification and update of standardized baselines (SB procedures); or (b) project participants to calculate project- or PoA-specific f_{NRB} values.	Option (b) applied to calculate the project specific f_{NRB} value as described under section 4.1 of the PD.

3.3 Project Boundary

The project boundary is the physical, geographical site of the improved and efficient cookstoves that utilize biomass in the host country of Republic of Uganda.

The project boundary is shown in the map for the grouped project:

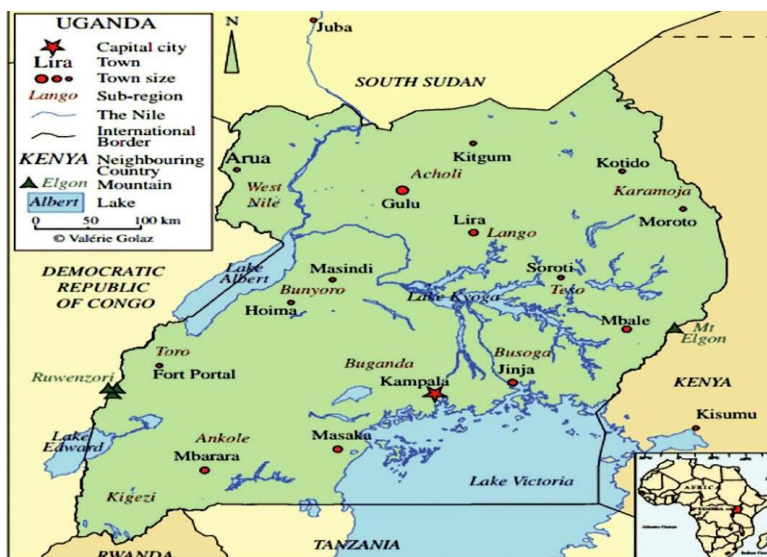


Table 1: GHG Sources Included In or Excluded From the Project Boundary.

Source		Gas	Included?	Justification/Explanation
Baseline	Emission from use of non-renewable biomass/Fossil fuel	CO2	Yes	Major source
		CH4	Yes	Major source
		N2O	Yes	Major source
		Other	No	No other source identified
	Production & Transport of Fuel	CO2	Yes	Can be a major source
		CH4	Yes	Can be a major source
		N2O	Yes	Can be a major source
		Other	No	No other source identified
PL	Emission from use of non-renewable biomass	CO2	Yes	Major source
		CH4	Yes	Major source
		N2O	Yes	Major source
		Other	No	No other source identified
	Production & Transport of	CO2	Yes	Can be a major source
		CH4	Yes	Can be a major source

	Fuel	N2O	Yes	Can be a major source
		Other	Yo	No other source identified

3.4 Baseline Scenario

The existing traditional stoves used in the baseline are simple structures made from clay or having stone or metal tripods with poor combustion air supply or flue gas ventilation system i.e. without a grate or a chimney. These stoves use non-renewable biomass.

3.5 Additionality

Activity Method

Step 1: Regulatory Surplus

There is no mandatory legal requirement for installation of cookstoves in households/institutions of Uganda. The evidence to substantiate the same shall be furnished to VVB.

Step 2: Positive List

Criteria:

The applicability conditions of this methodology represent the positive list. The project must demonstrate that it meets all of the applicability conditions of the methodology as well as the below condition. In so doing, the project is deemed as complying with the positive list.

1. Where the project activity installs or distributes stoves at zero cost to the end-user and has no other source of revenue other than the sale of GHG credits, the project activity shall be deemed additional.

Justification: The project is being distributed at zero cost to the end-user therefore the criteria is met.

2. Project activities that are implemented as part of government schemes or are supported by multilateral funds cannot be considered additional even if the stoves are distributed free of cost or at a highly subsidized rate and hence are not eligible to use this methodology.

Justification: The project activity is voluntary activity and is not part of any government scheme therefore the criteria met.

Step 3. Project Method:

N/A as additionality is demonstrated by using activity method, project is not getting any finance other than the carbon revenue.

3.6 Methodology Deviations

The project activity has not taken any deviation in applied approved methodology VMR0006, version 1.1.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

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

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

Where:

- i = Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire
- j = Indices for the situation where there is more than one batch of improved cookstove of type i
- ER_y = Emission reductions during year y in t CO₂e
- ER_{y,i,j} = Emission reductions by improved cookstove of type i and batch j during year y in t CO₂e

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

Where:

- B_{y,savings,i,j} = Quantity of woody biomass that is saved in tonnes per improved cookstove of type i and batch j during year y
- f_{NRB,y} = Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})
- NCV_{wood fuel} = Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)⁴
- EF_{wf,CO₂} = CO₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO₂/TJ)⁵

⁴ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction

⁵ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

$EF_{wf,non\ CO_2}$	=	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO ₂ /TJ) ⁶
$N_{y,i,j}$	=	Number of improved cookstoves of type i and batch j operating during year y
0.95	=	Discount factor to account for leakage

To calculate $B_{y,savings}$, we use Option 1 of the applied methodology⁷

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

Where:

B_{old}	Quantity of wood fuel used in the absence of the project activity in tonnes
η_{old}	A default value of 0.10 may be optionally used if the replaced system is 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 a chimney.
$\eta_{new,i,j}$	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol.

As some of the project households continue to use baseline cookstoves along with improved cookstoves, B_{old} has been adjusted ex-post based on the percentage of project households found to continue such practice according to the Equation 6 of applied methodology as follows:

$$B_{old,adjusted} = B_{old} \times (1 - \mu_y)$$

Where:

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

⁶ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

⁷ Equation 3 of methodology VMR 0006

For ex-ante estimates:

Calculation of f_{nr} . Has been undertaken by using the CDM tool 30, the detailed calculation shall be furnished to VVB.

f_{nr} value comes as 96.9%

Sample Calculation for the 1st year of operation

$$B_{y,savings,i,j} \quad (\text{For the first year}) = 4.970 \times (1 - 0.10/0.38) \\ = 3.669 \text{ Tones/Year}$$

$$ER_{y,i,j} \quad (\text{For the first year}) \\ = 3.669 \times 50,000 \times 0.972 \times 0.0156 \times (112 + 26.23) \times 0.95 \\ = 364,267 \text{ (Rounded down value)}$$

4.2 Project Emissions

The methodology does not account for baseline emissions separately, but instead quantifies net emission reductions achieved by the project. Please refer to Section 4.4.

4.3 Leakage

Leakage is already accounted in calculation of emission reduction by adjusting with default value of 0.95.

4.4 Net GHG Emission Reductions and Removals

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage	Estimated net GHG emission reductions or removals (tCO ₂ e)
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			emissions (tCO ₂ e) ⁸	
2021-22	364,267	0	0	364,267
2022-23	356,022	0	0	356,022
2023-24	354,634	0	0	354,634
2024-25	353,232	0	0	353,232
2025-26	351,816	0	0	351,816
2026-27	364,267	0	0	364,267
2027-28	356,022	0	0	356,022
2028-29	354,634	0	0	354,634
2029-30	353,232	0	0	353,232
2030-31	351,816	0	0	351,816
Total	3,559,942	0	0	3,559,942

⁸ 5% leakage is already deducted and considered in the baseline calculation as per the methodology.

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	Bold,HH
Data unit	Tonnes/household/year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices.
Source of data	Sourced from the recently included CDM CPA in Uganda
Value applied	4.97 tonnes wood-eq/HH-yr ⁹
Justification of choice of data or description of measurement methods and procedures applied	https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/6QAPKDTMHZFY53W0ES27C41I98UVLX/view
Purpose of Data	Calculation of emission reductions
Comments	The value is fixed ex-ante Where charcoal is used by baseline devices, a default wood to charcoal conversion factor of 6 Kg of firewood per kg of charcoal may be used in line with paragraph 35 of AMS II.G, version 11. The value for the charcoal stoves shall be calculated in line with the methodology before including the instances in the group project.

⁹ This value is for firewood stoves and applicable for the first instance, for any future instance the value shall be sued by complying the requirement of methodology.

Data / Parameter	NCV _{woodfuel}
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted or reduced
Source of data	Default as per applied approved methodology VMR0006, v1.1
Value applied	0.0156
Justification of choice of data or description of measurement methods and procedures applied	Default value as per applied approved methodology
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	EF _{wf,CO2}
Data unit	tCO ₂ /TJ
Description	CO ₂ emission factor for the use of wood fuel in baseline scenario
Source of data	Default as per applied approved methodology VMR0006, v1.1
Value applied	112
Justification of choice of data or description of measurement methods and procedures applied	Default as per applied approved methodology VMR0006, v1.1
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	EF _{wf,non CO2}
Data unit	tCO ₂ /TJ

Description	The non-CO ₂ emission factor for the use of wood fuel in baseline scenario
Source of data	Default as per applied approved methodology VMR0006, v1.1
Value applied	26.23
Justification of choice of data or description of measurement methods and procedures applied	Default as per applied approved methodology VMR0006, v1.1
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of non-renewable biomass saved by the project activity
Source of data	CDM Tool
Value applied:	0.975
Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante by using the CDM tool
Purpose of the data	Calculation of baseline and project emissions
Comments	The report of f_{NRB} will be made available to VVB during the validation.

Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline cookstove
Source of data	Methodological default value
Value applied	0.1 (For firewood stoves)

	0.2 (Default value for charcoal stoves and applicable will be for this instance using charcoal stoves) For charcoal stoves if any instance is not using the default baseline efficiency 0.2, the value shall be derived in line with the provisions of CDM methodology AMSIIG.
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.1 shall be used if baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	η_P
Data unit	Fraction
Description	Efficiency of project stove at the start of project activity
Source of data	Manufacturer specification
Value applied	0.382 ¹⁰ (For this instance and firewood stoves).
Justification of choice of data or description of measurement methods and procedures applied	The parameter has been sourced from the efficiency tested in laboratory. Testing results shall be submitted to VVB for validation.
Purpose of Data	Calculation of $\eta_{y,i,j}$
Comments	For charcoal/other firewood models of improved stoves in future instances shall use the manufacturer's efficiency or efficiency tested in lab as per the WBT protocol.

5.2 Data and Parameters Monitored

¹⁰ For charcoal/other models of firewood stoves in future instances shall use the manufacturer's efficiency or efficiency tested in lab as per the WBT protocol.

Data / Parameter	$N_{y,l,j}$
Data unit	Number
Description	Number of project devices of type l and batch j operating during year y
Source of data	Monitoring
Description of measurement methods and procedures to be applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 95/10 confidence precision according to the latest version of Standard for sampling and surveys for CDM project activities and programme of activities.
Frequency of monitoring/recording	At least once every two years
Value applied	For ex-ante emission reduction calculation, it is assumed that the project will distribute up to 50,000 ICS
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	The project implementor shall maintain a distribution record to calculate this parameter.
Purpose of data	Calculation of baseline emissions
Calculation method	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value
Comments	For the calculation of ex-ante ERs, 100% value is considered however in ex-post case the drop down will be considered into account.

Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity
Source of data	Manufacturer specification or <i>Certification by a national standards body or an appropriate certifying agent recognized by that body</i>
Description of measurement methods and procedures to be applied	To adopt Option V given in the methodology: “Efficiency of the improved cookstoves to be estimated using equation 5 of applied approved methodology where loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored”
Frequency of monitoring/recording	Annual
Value applied	0.38 ¹¹ at start of operation Year 1= 0.359 Year 2=0.355 Year 3=0.352 Year 4=0.348 Year 5=0.345
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of data	Calculation of baseline emissions
Calculation method	As per equation 5 of VMR0006, version 1.1 i.e. $\eta_{new,i,j} = \eta_P \times (DF_n)^{Y-1} \times 0.94$

¹¹ For charcoal/other models of firewood stoves in future instances shall use the manufacturer’s efficiency or efficiency tested in lab as per the WBT protocol.

Comments	For charcoal/other firewood models of improved stoves in future instances shall use the manufacturer's efficiency or efficiency tested in lab as per the WBT protocol.
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Data / Parameter	Life span
Data unit	Years
Description	The operating lifetime of the project device. The life span should be reported if the methodology equation 5 is adopted to determine the project stove efficiency
Source of data	Manufacturer specification
Description of measurement methods and procedures to be applied	The data source as per manufacturer specification
Frequency of monitoring/recording	Once at the time of installation of batch of type of stove
Value applied	7-9 ¹²
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of data	Calculation of baseline emission
Calculation method	Not applicable
Comments	For charcoal/other models of firewood stoves in future instances shall use the manufacturer's life time for respective models.

¹² This is applicable for this instance only. For charcoal/other models of firewood stoves in future instances shall use the manufacturer's life time for respective models.

Data / Parameter	Date of commissioning of batch j
Data unit	Date
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch.
Source of data	Project database
Description of measurement methods and procedures to be applied	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
Value applied	01/04/2022 (expected)
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of data	Calculation of emission reduction
Calculation method	Not applicable
Comments	--

Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Monitoring survey
Description of measurement methods and procedures to be applied	This parameter should be monitored using one of the following methods: If the baseline cookstoves are decommissioned and no longer

	used, as determined by the monitoring survey its value is 0 and Bold, adjusted is equal to Bold. If both the improved cookstove and baseline cookstoves are used together then surveys shall be conducted to record the average continued operation of baseline cookstoves in a sample of households. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline cookstoves, by formulating questions and/or collecting evidences to determine the frequency of usage of both the improved cookstoves and baseline cookstoves.
Frequency of monitoring/recording	At least once in 2 years
Value applied	1
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	A 95 /10 confidence / margin of error shall be achieved for the sampling parameter irrespective of annual / biennial monitoring frequency as per para 22 of Standard: Sampling and surveys for CDM project activities and programmes of activities, Version 09.0. In the case the desired precision is not met, lower bound values shall be used against repeating the survey to determine the operational fraction of stoves.
Purpose of data	Calculation of baseline emissions
Calculation method	Not applicable
Comments	--

5.3 Monitoring Plan

The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters. Where relevant, include the procedures for calibrating monitoring equipment.

The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities.

The policies for oversight and accountability of monitoring activities.

The procedures for internal auditing and QA/QC.

The procedures for handling non-conformances with the validated monitoring plan.

Any sampling approaches used, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures.

Sample Plan:

The monitoring plan is designed to monitor the parameters listed in Section above, which are required for calculation of the actual GHG emission reduction achieved by the project activity using ex post sampling survey. The share of operating stoves and the continued use of pre-project devices will be determined based on sampling procedures as outlined below. The PP will be responsible for conducting the sampling surveys and maintaining a database with all operating stoves.

No monitoring for leakage through competitive uses of biomass is required, as the parameter wood usage is multiplied by 95% to account for leakage.

As per the Guideline for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 04, the sampling plan is the following:

(a) Sampling Design

Due to the large number of ICS envisioned to be distributed as part of the project activity, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, a representative sampling survey will be undertaken as part of a project instance-wide Sampling Plan (by grouping and sampling across project activities) that is designed in line with the requirements of the “Sampling and surveys for CDM project activities and programme of activities”, version 04.

(i) Objective and Reliability Requirements:

The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the crediting period. As per CDM Methodology AMS-II.G, 90/10 confidence/precision shall be applied for annual sampling requirement and 95/10 for biennial sampling inspection. As per Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities, 90/10 confidence/precision to be adopted for small-scale project and 95/10 for large-scale project. Given that the size of the project is under the category of large projects, hence 95/10 confidence/precision shall be adopted for all parameters unless the average annual emission reductions *of the project below the threshold*

Monitored Parameter:

Parameter	Description	Parameter type/Frequency
$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y	Proportion/Biennially
$\mu_{y,i,j}$	Adjustment to account for any continued use of pre-pre-project devices during the year y	Proportion/Biennially

$B_{y=1,new,i,j,survey}$	Quantity of woody biomass used by project devices in tonnes per device of type i and batch j	Mean value

(ii) Target Populations:

- The target population for the proportion of ICS still in operation ($N_{y,i,j}$ and $\mu_{y,i,j}$) of this project are all households in the project database which are using fuel wood in ICS distributed under the project for cooking.
- The target population for pre project appliances ($\mu_{y,i,j}$) is the set of old stoves still in use under the project database.

(iii) Sampling Frame

To ensure the homogeneity of the project instances included for a single sampling plan, two sampling frames shall be defined. Overall, all project instances will have same group of end users which is from households from rural/semi-urban areas. The projects are to be implemented in rural/semi-urban areas; thus, it is expected that the geographical locations do not have influence on the parameter of interest. Therefore, all above mentioned parameters can be assumed to be highly homogeneous for each ICS model regardless of how the end user group and distribution/installation location is defined.

1) Sampling frame for proportion of ICS in operation ($N_{y,i,j}$)

The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: the Registration Process for newly distributed/installed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) that will be used throughout the lifetime of the ICS. The detailed information collected from Registration Process is used to populate the stoves Database and the Monitoring Survey follows “Sampling and Surveys for CDM Project Activities and Programme of Activities”, version 04.

As explained below (on section “Sampling Method”), to take the different characteristics of different project instances Implemented and ICS models into consideration, Project instances shall be grouped together to create a Primary Sampling Unit, which is homogenous. As per EB 86 Annex 04, Appendix-2, paragraph 1, for the use of a single sampling plan covering a group of projects, provided the homogeneity of population can be demonstrated, or differences are

taken into account in the sample size calculation, a 95/5 confidence/precision is applied for biennial sampling..

The first step is to identify the Primary Sampling Units. Primary sampling units are project instances, which have:

1. The same ICS models

That is project with the same ICS model can therefore be grouped together and form a Primary Sampling Unit. In case project has two different ICS models being implemented – this will form two Primary Sampling Units. This is justified by the fact that project might vary in terms of performance and it is important for the PP to collect and monitor accurate data for each stove model.

- 2) Adjustment to account for any continued use of pre-project devices during the year($\mu_{y,i,j}$)

In line with applied approved methodology AMS-II.G, as installing data logger is not practical and if any use of pre project devise can be monitored in a common survey with other monitoring parameters; therefore, a random sub-sample within the common survey can be taken to determine continued use of old cookstoves and its proportional usage by including suitable questionnaire.

There will be two situations 1) project ICS are completely discarded 2) the old stoves used along with project ICS.

Hence in first case it will be simple multiplication of fraction of total number of project ICS displaced by old cookstoves by total number of cookstoves in project, to achieve precise results based on survey result sample size calculation can be repeated.

However, for second case, surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when the baseline device is the three-stone fire. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices. For example, if there were 3 pre-project devices per household and it was determined during the survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.66 is applied for the relevant monitoring period. Another example would be the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.75. Where a more precise data is available i.e. the thermal capacity of the project

and pre-project devices and respective utilization hours, a weighted average adjustment factor may be used.

3) Quantity of woody biomass used by project devices in tonnes per device of type i and batch j ($B_{y=1,new,i,j,survey}$)

As mentioned above the either separate sampling can be done for this parameter or can be clubbed with sampling of above parameters, wherein interview question to be included to determine the average fuel wood used by the project device.

(iv) Sampling Method

The sampling method for monitored parameters $N_{y,i,j}$, and $\mu_{y,i,j}$ is Simple Random Sampling and samples will be randomly selected from the primary sampling units as illustrated above. To ensure a random selection of ICS, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its unique ID number. Each ICS can thus be allocated a Sample Selection Number in each monitoring period, starting at 1 and increasing up to the total number of ICS in the Database for that pre-defined sampling frame. Applying the random number generators, the ICS can then be randomly chosen from the defined population up to the required sample size as calculated by the PP.

To determine the parameters, sampling will involve the following approaches (outcome in brackets):

$N_{y,i,j}$: 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)

$\mu_{y,i,j}$: Pre project device only is in use then fraction to be used to calculate total number, however if pre project device is used along with project ICS, proportion of usage of each will be determined by cooking habits evaluated by survey questionnaire during the monitoring period.

$B_{y=1,new,i,j,survey}$: Quantity of woody biomass used by project devices in tonnes per device (first year of installation)

Using the formulas in the section “Sample Size” below, the PP will randomly sample the required number of ICS from the primary sampling units. It is important to note that for $\mu_{y,i,j}$ where partial usage of both old stoves and project ICS are observed, for each household under sample cooking habits must be taken into consideration.

(v) Sample Size

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 confidence/precision. for annual and 95/5 confidence/precision for biennial sampling.

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using, a 95 per cent confidence level, and a 5 per cent margin of error, random samples will be selected from each Primary Sampling Unit. There are three parameters that will be estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($N_{y,i,j}$), Quantity of woody biomass used by project devices in tonnes per device ($B_{y=1,new,i,j,survey}$) and the continued use of old stoves, ($\mu_{y,i,j}$). In line with sampling guidelines, all can be sampled in a single survey with a random sample of households using the above described confidence/precision levels depending on annual or biennial monitoring frequency. The $N_{y,i,j}$ and $\mu_{y,i,j}$ requires proportion/percentage parameters, however the wood consumption by ICS may have variation and will be a mean value.

In order to calculate the required sample size estimates, values for the proportions, mean values, and standard deviations are required. As per Guidelines for Sampling and surveys for CDM project activities and programmes of activities, version 07.0 Appendix 1 paragraph 5, there are different ways available to obtain the estimates of the parameter of interest:

- (a) Refer to the result of previous studies and use these results;
- (b) In a situation where information from previous studies is not available, a preliminary sample as a pilot could be conducted and use that sample is used to provide the estimates;
- (c) Use best guesses based on the researcher's own experiences.

For the registration purpose of project, option C shall be applied. For the first monitoring period, values from a pilot shall be applied. For the following monitoring periods, the estimates shall be adjusted taken into account the results of the previous monitoring period(s) or the result from recent pilot study, which is conducted after the previous monitoring periods.

To estimate the sample size for parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ the following equation is used:

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

Where:

n = Sample size

N = Population size (Total number of households/ICS)

p = Expected proportion

1.96 = Represents the 95% confidence required

(In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

The following assumptions are made to exemplify the sample size calculation for parameters: $N_{y,i,j}$ and $\mu_{y,i,j}$.

The PP envisage distribution of 500,000 ICSs over next five year. Hence, population size, N, is taken as 500,000 households/ICS (Assuming one ICS for one household).

It is expected at least 90% of ICS will be operational, hence the expected proportion p for $N_{y,i,j}$ is taken as 0.9.

Sample size calculation:

The calculation of the required sample size for each parameter in the first monitoring period is illustrated below for a 95/10 level of confidence and precision (for biennial monitoring periods the sample sizes will be recalculated using 95/5 confidence/precision values). In all cases a conservative approach is taken, however if for any parameter the required 95/10 confidence/precision is not met then the project proponent will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds.

Parameter $N_{y,i,j}$: Based on the above assumptions, the resulting sampling size for a 95/10 confidence/precision is calculated as:

$$n \geq \frac{1.96^2 \times 500,00 \times 0.9 (1-0.9)}{(500,000-1) \times 0.1^2 \times 0.9^2 + 1.96^2 \times 0.9 (1-0.9)}$$

Which comes out to be

$$n \geq 42.68$$

$$n = 43$$

Therefore, in this case a sample size of 43 is to be sampled from each primary sampling unit.

In case the resulting sample size to achieve the desired confidence/precision levels is smaller than 30 ICS, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion in line with para 14 of Standard: Sampling and surveys for CDM project activities and programmes of activities, Version-09.

Parameter $B_{y=1,new,i,j,survey}$:

For the purposes of determining sample size in the first monitoring period, the efficiency of stoves will vary.

To estimate the sample size for parameter $B_{y=1,new,i,j,survey}$ the following equation is used:

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

Where,

$V = (SD/\text{mean})^2$

n = Sample size

N = Population size (Total number of households/ICS)

Mean= Expected mean of ICS thermal efficiency

SD = Expected standard deviation

1.96 = Represents the 95% confidence required

(In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

Based on the above assumptions, the sample size calculation for a 95/10 confidence/precision would be

$$n \geq \frac{1.96^2 \times 500,000 \times (0.05/0.5)^2}{(500,000-1) \times 0.1^2 + 1.96^2 \times (0.05/0.5)}$$

Using above values, the sample size comes out to be 3.84 or 4.

The PP may choose to use the same samples to monitor more than one parameter, where parameters have same units. Sampling more than one parameter within the same sample (household) helps reduce travel needs for monitoring and the associated costs. At the same time this approach ensures the random selection of samples for every parameter.

Oversampling is strongly encouraged, not only to compensate for any attrition, outliers or non-response associated with the sample, but also to prevent a situation at the analysis stage where the required reliability is not achieved and additional sampling efforts would be required. The sample size shown above will be adjusted upwards to account for non-responses, PP shall determine the appropriate non-responses rate based on previous experience.

Appendix 1: Details of Local Stakeholder Consultation

Photographs:





MINUTES TAKEN FROM THE LOCAL STAKEHOLDERS CONSULTATION ON VOLUNTARY CARBON EMISSIONS REDUCTION SCHEDULED ON THE 6TH OF JUNE 2022 AT KOLPING HOTEL KAMPALA

Theme: Reduced Emission from Improved and Efficient Cooking in Ugandan Communities

AGENDA

1. MINUTE 1: Opening remarks from Fred Barasa and breakfast
 - Recognizes partners present and representative from Permanent Secretary's office ministry of Energy.
2. MINUTE 2: Communication from Lister Byamugisha MD Ezylife Holdings Ltd.
 - Welcomes guests to the breakfast meeting on reduction of emissions from improved and efficient cook stoves in Ugandan communities.
 - Provides a brief introduction into the project description and its background.
 - Highlights on the negative effects caused by the continued use of the 3 stones fire and traditional jiko such as the increased emission of carbon into the environment, damage to people's health leading to death from continued inhaling of the dangerous GHG and increased deforestation to provide the wood fuel used in cooking.
 - Introduces and showcases the Masupa stoves.
 - Reduction of biomass, conservation of natural resources due to reduced usage of fuel due to the energy saving features of the introduced cook stove.
 - Persistent climate India will take the lead role in managing the project while Ezylife will implement the distribution of the stoves to households in Uganda.
 - Collection of customer information and household data will be done and the information shared with patrons accordingly.
 - Shares the profile of Mr. Prakash Mishra who possesses over 17years in the industry.
3. Minute 3: Communication from Mr. Prakash Mishra, founder and MD Persistent Climate India Pvt. Ltd
 - Welcomes guests and stakeholders for the breakfast meeting and apologies for not having been able to make it in person.
 - Offers brief insight into his 2 decades work experience in Africa and presence in Uganda.
 - The experience of Covid-19 from which most businesses and activities came to a standstill except for food and cooking partly explains the hike in fuel prices such as petroleum, kerosene and LPG, gave rise to the need to come up with more efficient ways to offer a technology to the needy communities of Uganda that use efficient cookstoves.
 - 2021 January the project was fostered and goals set for piloting of over 8000 cookstoves but was hampered by Covid19 lockdown
 - The project is meant to help communities reduce expenditure on inefficient cook stoves that cause harm to their health.
 - Direct benefits of the cookstoves were also discussed such as the introduction of highly effective cook stoves and efficient technology by local people and for the local people, produced in the country and directly giving to the beneficiaries highly subsidized cookstoves.

- High tariffs and money related benefits.
 - Indirect benefits: consumption of less fuel such as firewood or charcoal, less pollution, less time spent on cooking and improved quality of life.
 - Direct benefit on money saving and less expenses on trouble cooking avoided.
 - The project targets an implementation of 50,000 stove. Presents opportunity to partners and invites them to offer learning points to the project at hand.
4. MINUTE 5: Communication from Madam Margaret Kabayambi E.D MASUPA and founder.
- Introduces some colleagues from MASUPA.
 - Provides brief background into MASUPA that was established in 2012, is a woman led partnership with production in line with cookstoves and briquettes and a section for training youth in stoves and production of briquettes.
 - The quality of their stoves and efficiency was tested by UNBS as well which led them to receive recommendation and referrals from both GIZ and ministry of Energy.
 - Introduces the head of finance MASUPA to offer more insights into the project details and some statistics.
5. MINUTE 5: Communication from Sylvia Nakandi MASUPA Head of Finance
- Introduction to MASUPA AND its 10 Years of existence.
 - Impact through skilling over 1500 people across the different sections of MASUPA mostly women and youth.
 - Economic impact through creation of employment opportunities for over 30 people with 5 people on full time and contract basis for the other 25 individuals.
 - In this project they hope to employ more people across the different stages of the project and across the entire production chain with a target production capacity of 2500 stoves a week.
 - MASUPA being among one of the first stove producers in Uganda to be certified by UNBS, priority is placed on the doing things the right way.
 - Ezylife is partnering with MASUPA as a distributor.
 - MASUPA generated a revenue of 29M UGX last year and expectation for growth to 288M UGX when the project is implemented
 - Expect to mitigate carbon emissions on a larger scale and improve on health standards of the people.
 - Calls on more suppliers to revise their prices so that they can get into the project together top have greater impact on the community.
 - Employment creation objectives from all the implementation impacts.
 - Increased household savings from an efficient cookstove from saving at least 50% of the charcoal.
 - Recycling of waste materials into briquettes and scrap into efficient energy saving cookstoves to provide the market with high quality efficient cook stoves.
 - Project focus is on mitigation of carbon emissions to reduce the negative impact of negative effects of climate change such as the deforestation, mudslides and soil erosion.
 - Prosed Impact of the project includes saving on finance, fuel and improving safe cooking.

6. MINUTE 6: DISCUSSIONS, Q&A session.
- Question on sustainability of the project: Nampijja Zainah
 - Suggestion on training to be included in the different areas to avoid supply shocks that may prompt people to go back to the inefficient cooking practices. MASUPA should expand training facilities to other parts of the country to promote sustainability of the product.
 - Raises question on calculation method used to determine the 3M tonnes of carbon emissions reduction that will be done by the project.
 - Addresses the gap for training in the value chain in line with handling the raw materials used in order to be able to make efficient cook stoves and how to utilize them even with daily usage of the product.
 - Proposes the idea of bringing MUK students on board to bridge the perception gap and stories on cook stoves. Collecting data and understanding the people and reasons behind why they dropped off for those who did and calculating the units say of the level of cut forest and quantifying carbon emissions.
7. Communication from Mr. Prakash Mishra
- VCS unit of measuring carbon emissions.
 - Target of 50,000 stoves to reduce emission of GHG with consideration of 6 major GHG is the focus as concern is raised by the drastically rising and changing climate levels such as the 50°C.
 - Experienced in validating and quantifying cookstove projects. That is why he believes attaching a value to the cookstove will make people appreciate it rather than if it is provided for free.
 - With standards compliance in place, positive validation will be provided to the project. It will undergo rigorous reviews and adjustments will be made as recommended until the carbon credits are received.
 - The stove is subsidized so people can afford it on the market.
 - Exact amount of carbon emission reduced and how to calculate it. They calculate the input fuel used on baseline devices. The saving capacity from the 3 stone fire or the traditional jiko in comparison to the efficient cook stove. The measure is on the fuel saved in comparison to the baseline stove. Feedback from the customers will also be used to record the fuel saved (at least 50% has been saved as recorded from MASUPA clients) to show carbon emissions saved.
 - Target market is the really needy people outside central Uganda's communities. People using the 3 stone fire to cook or the traditional jiko but can be converted to the efficient cook stove
 - Suggested that as part of project training and design, when a survey is to be conducted on monitoring and implementation, then students at the university can be included so they can get training every year.
 - Target focus will be the students in agricultural so they can be impacted on through capacity building.
 - Stove design should be intact because stove efficiency can do down by just one design mistake.

- Basic idea of calculation between design and is a device with fuel saving capacity, highly carbon efficient in terms of the baseline case. Input fuel reduction is measured in terms of charcoal usage by the end user say reduction in charcoal used by 50%.
 - Provides formula for measurement of carbon emissions saved by the efficient fuel saving cook stove.
 - Advocates for changing mindsets about the usage of the different modes of cooking fuels i.e., wood fuel and informs the guests that they are in the process of developing a duo cook stove that can use both wood and charcoal fuel efficiently. They
8. MINUTE 10: Communication from Annet Sempala Endev. GIZ
- Shares insight into what GIZ inline with businesses to increase access to clean cooking energy and technologies.
 - GIZ improves distribution mechanisms by increasing stores upcountry, increase sales teams so that their products are brought upcountry.
 - GIZ improves production capacity of business entrepreneurs say from using manual hand mixers to using machine mixers.
 - Ensuring training on what SMEs need to improve the quality of products used and supplied.
 - Business support from SMEs to partners.
9. MINUTE 11: Communication from Muyanja Hatimu
- Energy Officer from Ministry of Energy and Mineral development
 - Offers statistical insights into how much bio mass contributes coming to about 1.6G Watts in the country.
 - Explains the role of government in creating and facilitating the existing government policies, opportunities for the cookstoves sector.
 - Conductive environment and policies to facilitate the work of companies/ businesses in the cookstove line, establish and promote the rationale and exploitation of renewable energy resources in the country.
 - 91.1% contribution of bio mass according to the 2020 statistics showing the high level of importance of bio mass in the country.
 - 89% contribution to the mix of what is being consumed in terms of energy.
 - To ensure reliable, equitable, efficient and environmentally sustainable development, management and utilization of energy resources and services.
 - Presents the key challenges faced in the renewable energy resources sector including financing mechanisms, limited awareness of availability, benefits and opportunities of renewable energy, inefficient utilization of bio mass energy resources.
 - Communicates on the opportunities available in the cookstove sector such as the dissemination of efficient technologies, capacity building, training of artisans in construction of improved cookstoves, tree plantation to provide wood fuel, credit financing under UECCC and awareness creation on sustainable bio mass.
 - Participation of government in the project
 - Provision of supportive documents towards the project development.
 - Supervision and monitoring project activities

- Awareness creation and sensitization
 - Developed standard for the HH cook stoves and for the institution are under development.
- The proposed project of reduced emissions from improved and efficient cooking in Uganda is vital for the country and the ministry pledges its support.
- Appreciates the field partners MASUPA and Ezylife holdings Ltd.

10. Discussion session, Q&A session.

- I. How can we scientifically highlight and point out the challenges faced in distribution of efficient cook stoves? Sylvia Aarakit MUBS

Through addressing issues of trust, contact numbers have been attached on each stove bearing the direct contacts of the directors the stove comes with a 1 year's warranty such that if anything happens within that 1 year (not fault/caused by the customer) the company will repair the stove.

Receipts are also issued for each purchased stove which carries a unique serial number for authenticity.

Stoves can be used for up to 1 year.

Stoves come in different sizes with the target market being the average of 4 to 5.5 in the family size cooking for up to at least 12 people.

- II. What are some of the lessons learnt during the pandemic in line with supply management? Jessica Sendagire
- Failure to make timely collection, to avoid a high default rate the business shifted from a high-cost stove to a low-cost stove.

Delivery and supply channel delays, the business shifted from the imported BURN cook stove to the locally produced MASUPA cook stove.

Shifted from their own agents to village entrepreneurs-based agents to facilitate data collection, trained them on usage and maintenance of the stoves and incentivized them with commissions to promote sales.

The village vendor model where the village-based vendors are picked and used to promote the sales since they are more trusted than the new non local vendors.

- III. Social sustainability, environmentally sustainability: question raised by Vincent Nturawabe MD Water for people.
- If it is not a limitation by resources, why can't we front both briquettes and cook stoves with the same energy? Why is the business model focused only on the eastern part of the country?

Focus on the East is to be able to spring board off it into the other areas and efficiently serve them. However, we have a presence in Western Uganda in Mbarara from which we have reached Ntungamo and Isingiro and other parts of the country as well.

As far as the briquettes are concerned, there have been efforts taken to promote the briquettes for example provision of a free kg of briquettes when someone buys a stove. But as awareness grows the briquettes project can be scaled as well.

Social sustainability and environmental sustainability of the project, the project is targeting small entrepreneurs and households, SMEs that might need more than one cook stove. About maximum stove size the Ugandan household survey the target is to provide the households with a family size of 4 to 5.5 people. Different sizes are also being developed to provide for larger family sizes allowing them to have more access.

Sustainable development goals include carbon emissions reduction which is the key goal of the project through reduction of input fuel used in cooking such charcoal and firewood.

Social sustainability of the project, they have partnered with MASUPA which is a woman led enterprise and as such promoting gender balance and reducing the gender inequality gap.

More than 4 to 5 of the SDGs are covered by the project.

- IV. GHG considered mainly 2 carbon and methane that are mostly visibly emitted through firewood burning, reduction of charcoal usage shows a reduction in the emissions of the GHG emitted into the environment.

The need for data aggregation and sharing has been raised. Focus on the eastern region has been questioned and the participants encouraged to expand the reach to other regions to share the technology.

Urges the ministry of energy to share the variables they would want collected in the data collected by the project.

- V. GAVA JOB Principal Quality Control Officer NWSC
Appreciates the MASUPA for the effort and strides taken in line with energy usage. Policies in place are not robust enough. What are the viable sustainable substitutes government is putting in place for the for the Bio mass as its increased consumption poses a threat to the environment?
What kind of policies is government coming up with or the renewable resources government can come use to provide as an alternative to Bio mass? Can fecal sludge be used as an alternative source of fuel?

Proposed substitutes for the Bio Mass

- Bio gas at household level.
- Bio gas at institutional level such as in schools where fecal matter can go through the _____ process so that some gas can be produced.
- Proposed development of a biogas system.
- Liquified petroleum gas promotion to be used.
- E cooking is a subsidy when cooking is done using electricity. However, this is at a large-scale cooking.
- Briquettes at large scale (loose bio mass)
- Ethanol cooking using ethanol stove.

- VI. How are we planning to solve the waste problem after the stove has been used in its 8 years? What is the project waste management policy after the stove lifetime has been reached? Bosco Amerit Researcher MUBS

- VII. How can we utilize volcanic rock?

Volcanic stores do not provide fuel for cooking. However, they increase surface area for cooking and the moment you provide the fire and it starts running you are able to increase the surface area from which you are cooking.

Funding will be needed to venture into volcanic rocks as a fuel source in the MASUPA stoves.

The receipts should be kept to enable the MASUPA team to be able to offer maintenance and repairs.

- VIII. What processes /ways have you put in place to mitigate the pa go credit risks involved.

Trying to increase the carbon market by having already subsidized cook stoves on the market.

The time for project implementation will enable the project cushion the changing market prices over the entire period.

- IX. MINUTE 11: Closing remarks

Thanks, the guests for attending the breakfast meeting and sharing their perspectives and allowing the project team to learn from them from the early stages on wards and on the different levels.

Recommends that they start manufacturing the cookstoves as early as possible to allow the project to start.

We should have more collaboration with local people especially self-help groups at local levels or village levels.

Appreciates everyone for sharing points and feedback, logistics team and infrastructure.

Encourages people to take direction for clean and efficient cook fuel, reducing charcoal on a sustainable basis.

Appreciate the entire team for set up, projection and all.

Lister Byamugisha encourages guests to network and share feedback on an individual level as well.

END OF MEETING.