



**Verified Carbon
Standard**

DISTRIBUTION OF FUEL EFFICIENT IMPROVED COOKSTOVES IN TANZANIA

Document Prepared by Green Wave Africa Pty Ltd

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed project, led by Green Wave Africa Pty Ltd (**GWA** or the **project proponent**), aims to address the issues of deforestation and indoor smoke pollution in Tanzania by distributing approximately 400,000 fuel-efficient improved cookstoves (ICS) to households. The project is currently in the development phase and will focus on replacing traditional cookstoves with the single pot portable stove, model SSM S-32X, which is designed to burn wood more efficiently and save fuel. Recipients of the ICS will be informed that the use of the ICS generates carbon finance, which will be used to fund the cost of purchasing the ICS and the project's implementation costs.

The project is expected to reduce greenhouse gas (GHG) emissions by reducing the consumption of non-renewable firewood, resulting in an estimated average annual GHG emission reduction of 26,180,279 tCO₂e over a seven-year crediting period. The total expected GHG emission reduction of the project is 3,740,040 tCO₂e. The project's main goal is to benefit the environment and the health of the local population, while also improving their livelihoods by reducing the time and effort spent collecting firewood.

1.2 Sectoral Scope and Project Type

The project is categorised as follows:

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

The project is a grouped project.

1.3 Project Eligibility

The proposed project, involving the distribution and implementation of fuel efficient improved cookstoves in Tanzania, falls within the scope of the Verified Carbon Standard (**VCS**) Program Version 4. As a project focused on improving thermal efficiency and reducing greenhouse gas emissions through the replacement of traditional cooking solutions with ICS, it meets the eligibility criteria outlined by the VCS Program. This includes being a standalone project or a programmatic project, and being implemented in a developing country and resulting in emissions reductions. Therefore, the project is considered eligible for registration under the 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

The project proponent will adhere to the guidelines outlined in Section 3.6.16 of the VCS Standard Version 4.4 (**VCS Standard**) to ensure that any new instances of the project activity meet the eligibility criteria set forth by the VCS Program. The following table provides a detailed overview of the VCS Standard criteria and how the project proponent intends to fulfill them.

No	Criterion	How compliance will be met or otherwise satisfied
1	Meet the applicability conditions set out in the methodology applied to the project.	In order to ensure that new project activity instances are eligible for inclusion, the project proponent will adhere to the criteria outlined in the methodology applied to the project. Specifically, the project will only include instances of fuel ICS that meet the applicability conditions specified in section 3.2 of the methodology. These conditions stipulate that the target end user for the ICS must be a household, and that the proposed ICS must have a thermal efficiency that exceeds 25%. The project proponent will conduct due diligence to confirm that these conditions are met for each new project activity instance.
2	Use the technologies or measures specified in the project description.	The project will adhere to this criterion by utilizing only the specified technology for distribution to households. This is to ensure that the project's objectives for increased thermal efficiency and reduction of greenhouse gas emissions

		are met through the use of the specified technology.
3	Apply the technologies or measures in the same manner as specified in the project description.	The project will ensure that the technologies or measures specified in the project description will be implemented in the same manner as outlined in the project proposal. This includes the replacement of traditional cooking devices with the fuel efficient improved cookstoves in Tanzanian households. No deviation from the originally stated methods of implementation will be made.
4	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	The proposed project activity instances will be implemented within the geographic area of Tanzania and will be subject to the same baseline scenario as previously described in the project description under Section 3.4. This includes the continued use of non-renewable biomass for similar thermal needs, without the proposed project activity.
5	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area. For example, the new project activity instances have financial, technical and/or other parameters (such as the size/scale of the instances) consistent with the initial instances, or face the same investment, technological and/or other barriers as the initial instances.	All new project activity instances in Tanzania will be consistent with the initial instances in terms of financial, technical and other parameters such as size and scale. Additionally, the new instances will face the same investment, technological and other barriers as the initial instances. As per the VCS Standard, the project will demonstrate the additionality through the "activity method", which involves assessing the regulatory surplus and ensuring compliance with the positive list as defined in VMR0006- Methodology for Installation of High Efficiency Firewood Cookstoves Version 1.1. Specifically, there will be no mandated government program or policy in Tanzania that ensures the distribution of new project

		activity instances and all new instances will meet the applicability conditions outlined in Section 7 of the aforementioned methodology.
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1.5 Project Proponent

Organization name	Green Wave Pty Ltd
Contact person	Tim Owili
Title	Project Director
Address	10/89 Agha Khan Road, Milimani-Kisumu Kenya
Telephone	+254 742 627 769
Email	team@greenwaveafrica.com

1.6 Other Entities Involved in the Project

No other entities are involved in the project.

1.7 Ownership

The project will be implemented and managed by Green Wave Africa Pty Ltd, which will distribute fuel-efficient improved cookstoves to households in Tanzania. Prior to receiving the cookstoves, recipients will be informed that their use generates carbon finance, which will be used to fund the cost of manufacturing the cookstoves and implementing the project. In accordance with Section 3.6.1(5) of the VCS Standard, all end users and stakeholders involved in the project will be required to sign an agreement transferring ownership rights of carbon assets generated from the project to GWA or its related affiliates.

1.8 Project Start Date

The project is scheduled to commence on October 1, 2023, with the estimated distribution and use of the first improved cookstove (ICS).

1.9 Project Crediting Period

The project's crediting period is a fixed duration of seven years, starting on October 1st, 2023, and ending on September 30th, 2030. The official start date for the crediting period will be determined based on the actual implementation start date of the project.

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 1	5,473,915
Year 2	4,877,258
Year 3	4,291,987
Year 4	3,717,934
Year 5	3,154,932
Year 6	2,602,819
Year 7	2,061,433
Total estimated ERs	26,180,279
Total number of crediting years	7
Average annual ERs	3,740,040

1.11 Description of the Project Activity

The proposed project aims to reduce GHG emissions by distributing fuel efficient improved cookstoves in Tanzania. The ICS to be distributed through the project will replace traditional cooking solutions such as open fire or three-stone fires, which have low thermal efficiency and consume more firewood. The project will distribute approximately 400,000 ICS to households in Tanzania. The ICS will burn wood more

efficiently, resulting in improved thermal transfer to the pot and saving fuel. Each household will receive at least one ICS.

The project will help slow deforestation in Tanzania and also reduce health hazards from indoor smoke pollution. The project will also result in women and children having to spend less time collecting firewood. The project will reduce GHG emissions by using less non-renewable firewood combustion.

Technology

The ICS to be deployed under the project is the SSM S32-X.



SSM S-32X stove model

Technical specifications of SSM S-32X

Number	Parameter	Value
1	Thermal efficiency	50.1% with the pot skirt and 45.7% without the pot skirt
2	Lifespan	10 years
3	Materials Stovetop	- Stove top: Cast iron (32cm in diameter) - Stove body: stainless steel - Insulation: ceramic chamber - Metal liner: 1mm alloy - Grate mouth: stainless steel - Pot skirt: stainless steel
4	Weight	10 kgs
5	Dimensions	Size: - Length: 32cm - Width: 32cm - Height: 27cm
6	Other details	Manufacturer: SSM Stove type: Natural draft

The project will distribute fuel-efficient improved cookstoves with a lifespan of 10 years, as confirmed by the manufacturer, to households in Tanzania that currently use traditional cooking methods such as open fires or three-stone fires. GWA will collect and store information about the recipients, including a unique identification number for each cookstove, identification of the recipient, contact information, and location. This information will be stored in a secure, cloud-based database to ensure proper tracking of the cookstoves and to prevent double counting during monitoring and sampling.

1.12 Project Location

The project will be implemented within the geographical boundaries of the United Republic of Tanzania. The coordinates for Tanzania are defined by its latitude and longitude coordinates of 6.369028° and 34.8888°, respectively, which can be confirmed

by visiting the website <https://www.geodatos.net/en/coordinates/tanzania>. A KML file that outlines these boundaries is attached.



Source: <https://www.google.com/maps/@-5.8365215,29.4353294,5.75z?hl=en>

1.13 Conditions Prior to Project Initiation

The pre-project condition is the use of non-renewable biomass and outdated cooking technologies, such as open fire or three-stone fires, which lack proper ventilation systems, to meet household thermal energy needs.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There are no laws and/or regulations governing the use of improved cookstoves in Tanzanian households.

1.15 Participation under Other GHG Programs

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

The project has not been registered, nor is it seeking registration under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

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

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project is not 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

Health: Traditional stoves used for daily cooking emit hazardous substances that are detrimental to human health, including carbon monoxide, nitrous oxides, particulate matter, and black carbon. These emissions contribute to the thousands of deaths in Tanzania each year as a result of household air pollution.¹ The project will reduce exposure to these harmful substances, lower the risk of respiratory disease, and improve indoor air quality.

Environment: Traditional cooking solutions rely on non-renewable biomass sources, leading to the cutting down of forests and savannah woodlands. This not only removes a valuable carbon sink but also harms natural forest ecosystems and biodiversity. The

1 Environment for Development. (2022, November 21). Tanzania takes action for clean cooking to save lives and fight climate change. <https://www.efdinitiative.org/news/tanzania-takes-action-clean-cooking-save-lives-and-fight-climate-change#:~:text=Over%2033,000%20Tanzanians%20die%20annually,of%20the%20burning%20of%20firewood>

project aims to conserve existing forest stock, protect natural habitats, and reduce pressure on biodiversity.

Affordable Energy: By distributing high-efficiency cookstoves, the project will reduce the amount of fuel needed for cooking, leading to more affordable energy for its end-users. This will allow households to use the money saved on other pressing needs.

Gender Equality: By reducing the time spent cooking and collecting fuel (activities primarily undertaken by women), the project will open up other opportunities for women. This will promote gender equality and empower women to participate in other activities.

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's 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.

2.2 Local Stakeholder Consultation

The project will conduct a comprehensive local stakeholder consultation in accordance with the VCS rules.

The project's approach to stakeholder consultation will be inclusive and transparent, ensuring that all voices are heard and considered. The project will engage with a variety of stakeholders, including local communities, NGOs, and other relevant parties.

The consultation process will be designed to gather valuable feedback, address concerns, and incorporate suggestions to improve the project's impact and success. The project will use multiple channels for communication to ensure accessibility and ease of participation for all stakeholders.

The stakeholder consultation will be carried out in a timely manner, prior to the project's validation stage. The details of the local stakeholder consultation, including the methodology, timeline, and outcomes, will be provided during the validation process.

2.3 Environmental Impact

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

2.4 Public Comments

As the Grouped Project is not listed under Verra yet, no public comments are available at this point.

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

The methodology applied in the project is VMR0006- Methodology for Installation of High Efficiency Firewood Cookstoves, Version: 1.1.² In addition to this, the following Clean Development Mechanism (CDM) tools, standards, and guidelines are also relevant to the project:

- TOOL01: Tool for the Demonstration and Assessment of Additionality, Version 07

² Methodology for Installation of High Efficiency Firewood Cookstoves, VMR0006, Version 1.1" (Verra, 2021). Retrieved from <https://verra.org/wp-content/uploads/2021/07/VMR0006-Methodology-for-Installation-of-High-Efficiency-Firewood-Cookstoves-v1.1.pdf>.

- TOOL21: Demonstration of Additionality of Small-Scale Project Activities, Version 13.1
- TOOL30: Calculation of the Fraction of Non-Renewable Biomass, Version 03
- Guideline: Sampling and Surveys of CDM Project Activities and Programmes of Activities, Version 04
- Standard: Sampling and Surveys for CDM Project Activities and Programmes of Activities, Version 09.

3.2 Applicability of Methodology

The following table illustrates how the project adheres to the requirements outlined in Section 4 of the methodology for "Installation of High Efficiency Firewood Cookstoves".

Applicability criterion	How the project complies
Project activities shall be implemented in domestic premises or in community-based kitchen.	The project's implementation will be limited to domestic premises, specifically households, within the geographic boundary of the United Republic of Tanzania.
The project stove shall have specified highpower 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 proposed project will exclusively utilize the SSM S32-X model cookstove, which has been designed to meet the specified high thermal efficiency requirement of at least 25% as per the manufacturer's specifications. The SSM S32-X model is a single pot cookstove that is designed to exclusively use woody biomass fuel. It has been tested and verified to have an efficiency of 50.1% with the pot skirt, and 45.7% without the pot skirt as per the manufacturer's specifications. The cookstove is suitable for replacing traditional fossil fuel-based stoves and will exclusively use renewable biomass.
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.	Based on research and data from official reports, such as the Global Forest Resources Assessment 2020 Report of the Food and Agriculture Organization of the United Nations (FAO), it can be inferred that non-renewable biomass has been used in Tanzania since at least 2010. The report shows a consistent decrease in forest area, with an average annual net loss of 421,000 hectares or 0.88% from 2010 to 2020, indicating that non-renewable sources of biomass such as firewood have been used to meet energy needs in Tanzania. ³

³ Food and Agriculture Organization of the United Nations. (2020). The State of the World's Forests 2020 - Forests, Biodiversity and People: Key findings and the implications for forest management. Rome, Italy. Available at: <http://www.fao.org/3/ca9825en/ca9825en.pdf> [Accessed 1 Apr. 2023].

For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded.	The ICS is introduced as an energy efficiency measure to replace baseline stoves and reduce the use of nonrenewable biomass for combustion.
The CDM-PDD or CDM-PoA-DD/CPA-DD 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.	All end-users and stakeholders associated with the registration of the ICS will be asked to sign an agreement in accordance with Section 3.6.1(5) of the VCS Standard, transferring the rights to the carbon assets generated from the project to GWA or its respective affiliates.

3.3 Project Boundary

The project boundary for this project is defined by section 5.1 of the CDM Methodology AMS-II.G as the physical and geographical location of each household within Tanzania. The following table sets out the GHG sources, sinks, and reservoirs applicable for the project and respective baseline scenarios in both countries.

Source		Gas	Included?	Justification/Explanation
Baseline	Source 1	CO ₂	Yes	Major source
		CH ₄	Yes	Major source
		N ₂ O	Yes	Major source
		Other	No	No other source identified
Project	Source 1	CO ₂	Yes	Major source
		CH ₄	Yes	Major source
		N ₂ O	Yes	Major source
		Other	No	Not applicable

3.4 Baseline Scenario

The baseline scenario for Tanzania is the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity. The baseline cookstoves in Tanzania are three-stone fires or conventional systems lacking improved combustion air supply mechanism and flue gas ventilation system, i.e., traditional stoves. The use of non-renewable biomass for cooking in Tanzania is prevalent, especially in rural areas. The project's ICS aims to reduce the use of non-renewable biomass, thus contributing to the reduction of environmental and social impacts associated with its use.

3.5 Additionality

- 3.6 The methodology employed for the demonstration of additionality is the 'activity method'. This method consists of two steps: Regulatory Surplus and Positive List. To meet the Regulatory Surplus requirement, the project must not be mandated by any applicable law, statute or framework in Tanzania, or for non-Annex I countries, any systematically enforced law, statute or other regulatory framework. Additionally, the project must be implemented by GWA with voluntary local household participation. To meet the Positive List requirement, the project must distribute the International Carbon Standard (ICS) credits to households, and must not be implemented as part of a government scheme or supported by multilateral funds. As the project meets all the conditions of the Activity Method, it is deemed additional.

3.7 Methodology Deviations

The project did not apply any methodology 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. Refer also to Section 4.4 below.

4.2 Project Emissions

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

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 activity will replace traditional wood based stove with ICS, therefore net GHG emission reductions are calculated by applying Equations 1 and 2.

Emission reductions are calculated as follows:

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

Where:

- i = Indices for the situation where more than one type of project device 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 (tCO₂e).
- $ER_{y,i,j}$ = Emission reductions by cookstove of type i and batch j during year y (tCO₂e).

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

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

The quantity of woody biomass saved due to implementation of improved cookstoves can be estimated using one of the following equations below:

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

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

Where:

- B_{old} = Annual quantity of woody biomass that would have been used in the absence of the project activity (in tonnes per device) to generate useful thermal energy equivalent to that provided by the improved cook stove. The value of B_{old} can be sourced from historical data or baseline field surveys.
- η_{old} = Efficiency of baseline cookstove.
- $\eta_{new,y,i,j}$ = Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y. Alternatively, efficiency may be determined using Equation 5.
- $B_{y=1,new,i,survey}$ = Annual quantity of woody biomass used by improved cookstoves in tonnes per device of type i and batch j, determined in the first year of the implementation of the project through a sample survey.

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

Where:

- η_p = Efficiency of the project stove (fraction) at the start of project activity; the value is 50.1% with a pot skirt and 45.7% without the pot skirt as per the specifications provided by the manufacturer.
- $(DF_n)^{y-1}$ = Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.
- 0.94 = Adjustment factor to account for uncertainty related to project cookstove efficiency test.

If the project households continue to use baseline cookstoves along with the improved cookstoves, B_{old} shall be adjusted ex-post based on the percentage of project households found to continue such practice according to the following equation:

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

Where:

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

For ex ante calculation purposes, the assumption is that the project will distribute 400,000 ICS. The life span of the ICS is ten (10) years. The crediting period is seven (7) years. The project assumes an annual ICS loss rate of 10%.

Calculating the quantity of woody biomass that is saved due to implementation of improved cookstoves (tonnes per ICS during) year 1:

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

$B_{y=1,new,i,survey}$ is assumed to be 1.83 tonnes per device per year.

$$B_{y,savings,i,j} = 1.83 \times [(0.4/0.1) - 1]$$

$$= 5.49 \text{ tonnes}$$

The efficiency of the project stoves is estimated using equation below taking DF_n as 0.99 default value per annum:

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

There the calculated ICS efficiency over the 7-year period is as per the table below.

Year	ICS Efficiency (with pot skirt – 50.1% thermal efficiency)	ICS Efficiency (without pot skirt – 45.7% thermal efficiency)
1	6.90	6.14
2	6.83	6.08
3	6.76	6.02
4	6.69	5.96
5	6.63	5.90
6	6.56	5.84
7	6.49	5.78

Determination of ICS operating during year, y:

$$N_{y,i,j} = 400,000 \times [1 - (y-1) \times 10\%]$$

Worked example for year 2

$$N_{y,i,j} = 400,000 \times [1 - (2-1) \times 10\%]$$

$$400,000 \times 90\% = 360,000$$

Therefore, the number of ICS operating over the seven (7) year crediting period as per the table below:

Year	ICS
1	400,000
2	360,000
3	320,000
4	280,000
5	240,000
6	200,000
7	160,000

The total emission reductions to be achieved by the project over seven (7) years of crediting period is as set out in the table below:

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1	5,473,915	0	0	5,473,915
Year 2	4,877,258	0	0	4,877,258
Year 3	4,291,987	0	0	4,291,987
Year 4	3,717,934	0	0	3,717,934
Year 5	3,154,932	0	0	3,154,932
Year 6	2,602,819	0	0	2,602,819

Year 7	2,061,433	0	0	2,061,433
Total	26,180,279			26,180,279

5 MONITORING

5.1 Data and Parameters Available at Validation

The tables below set out the data and parameters that will be determined or available at validation and that will remain fixed throughout the project crediting period.

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of woody biomass saved by the project activity that can be established as non renewable biomass
Source of data	Calculation
Value applied	0.92
Justification of choice of data or description of measurement methods and procedures applied	The default This parameter shall be determined ex ante via calculation of the $f_{NRB,y}$ by determining the share of renewable and non-renewable woody biomass in the total quantity of woody biomass consumption for Tanzania. For the current purpose fRNB of 0.92 had been used.
Purpose of Data	Calculation of emission reductions
Comments	The parameter $f_{NRB,y}$ for Tanzania will be determined ex-ante. These assumptions will be provided to the validation/verification body

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	IPCC
Value applied	112
Justification of choice of data or description of	IPCC default value

measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex ante

Data / Parameter	$EF_{wf,non\ CO_2}$
Data unit	tCO ₂ /TJ
Description	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario
Source of data	IPCC
Value applied	26.23
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex ante

Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline cookstove
Source of data	Methodological default value
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.1 is used for woodstove, as the replaced system is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, i.e. 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’s specification																										
Value applied	<table><tr><th>Year</th><th>ICS Efficiency (with pot skirt – 50.1% thermal efficiency)</th><th>ICS Efficiency (without pot skirt – 45.7% thermal efficiency)</th></tr><tr><td>1</td><td>6.90</td><td>6.14</td></tr><tr><td>2</td><td>6.83</td><td>6.08</td></tr><tr><td>3</td><td>6.76</td><td>6.02</td></tr><tr><td>4</td><td>6.69</td><td>5.96</td></tr><tr><td>5</td><td>6.63</td><td>5.90</td></tr><tr><td>6</td><td>6.56</td><td>5.84</td></tr><tr><td>7</td><td>6.49</td><td>5.78</td></tr></table>			Year	ICS Efficiency (with pot skirt – 50.1% thermal efficiency)	ICS Efficiency (without pot skirt – 45.7% thermal efficiency)	1	6.90	6.14	2	6.83	6.08	3	6.76	6.02	4	6.69	5.96	5	6.63	5.90	6	6.56	5.84	7	6.49	5.78
Year	ICS Efficiency (with pot skirt – 50.1% thermal efficiency)	ICS Efficiency (without pot skirt – 45.7% thermal efficiency)																									
1	6.90	6.14																									
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4	6.69	5.96																									
5	6.63	5.90																									
6	6.56	5.84																									
7	6.49	5.78																									
Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante																										
Purpose of Data	Calculation of emission reductions																										
Comments																											

Data / Parameter	$NCV_{biomass}$
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted or reduced
Source of data	IPCC
Value applied	0.0156
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex ante

Data / Parameter	Leakage Factor
Data unit	Fraction
Description	Net to gross adjustment factor to account for the leakage
Source of data	Default value as per the methodology
Value applied	0.95
Justification of choice of data or description of measurement methods and procedures applied	As per the methodology
Purpose of Data	Calculation of baseline emissions
Comments	

5.2 Data and Parameters Monitored

The tables below set out the data and parameters that will be monitored during the crediting period.

Data / Parameter	$B_{y=1,new,i,survey}$
Data unit	Tonnes
Description	Annual quantity of woody biomass used by improved cookstoves in tonnes per device determined in the first year of the implementation of the project through a sample survey
Source of data	Monitoring survey
Description of measurement methods and procedures to be applied	Minimum sample size will be in line with the latest version of 'Standard for sampling and surveys for CDM project activities and programme of activities or guidelines', version 04.0
Frequency of monitoring/recording	Determined in the first year of project implementation
Value applied	For ex ante calculation, the value is assumed as 5 kg/device/day which is equal to 1.83 tonnes/device/year
Monitoring equipment	Weighing scales to be used for measuring quantity of fuel wood
QA/QC procedures to be applied	Calibration of weighing scales to be used for measuring the fuel wood will get done before start using on site
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	

Data / Parameter	$N_{y,i,j}$
Data unit	Number
Description	Number of project devices operating
Source of data	Monitoring
Description of measurement methods and procedures to be applied	Measured directly from project database. A discount shall be applied based on the percentage of devices that are operational during the monitoring period, as determined by the sample survey. Simple random sampling approach will be used in sampling surveys
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 400,000 ICS
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	The project proponent shall maintain a distribution record to calculate this parameter
Purpose of data	Calculation of emission reductions
Calculation method	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value
Comments	

Data / Parameter	Life span
Data unit	Years
Description	The operating lifetime of the project device
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
Value applied	10
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of data	Calculation of emission reductions
Calculation method	Not applicable
Comments	

5.3 Monitoring Plan

Monitoring will be taken in accordance with the requirements of the methodology - we set this out more fully in the paragraphs below.

Sample Plan

Due to the large scale of the Verra cookstove project, a representative sampling plan will be implemented to ensure efficient monitoring and data collection. The sampling plan will be developed in accordance with the requirements outlined in the 'Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities Version 09.0' (**CDM Sampling Standard**) to ensure its validity and reliability. Samples will be selected from the project database, which will be administered by the project proponent, GWA. The database will include information such as the unique identification number of the cookstoves, recipient's identification, name of end users, mobile phone number (where available), address/location of the end user's house (GPS), and cookstove distribution date. This information will be stored in a secure cloud-based database, ensuring that each cookstove can be traced to avoid double

counting and serve as the database for monitoring and sampling purposes. Furthermore, the database will be accessible to all relevant GWA personnel, enabling another layer of quality control and quality assurance capability.

Sampling Design

Objectives and Reliability Requirements

The objectives of the sampling design for this Verra cookstove project are to obtain an unbiased and reliable estimate of the proportion or mean value of key variables throughout the crediting period. The CDM Sampling Standard stipulates that, when biennial inspections are chosen, a 95% confidence interval and a 10% margin of error must be achieved for the sampling parameter. Additionally, when annual inspections are chosen, a 90% confidence interval and a 10% margin of error should be achieved for the sampled parameter. In order to meet these requirements, the sample size will be set to achieve a 90/10 precision for parameters monitored annually and a 95/10 precision for parameters monitored biennially.

To ensure accurate and reliable data collection, GWA will provide calibration certificates for any weighing instruments used in the monitoring process. Additionally, details of all measuring equipment will be maintained, including the type, serial number, and date of calibration. The personnel responsible for conducting testing will receive training and documentation of such training will be made available for the auditor to review. Furthermore, the project proponent, GWA, will ensure that all the equipment used for data collection are up to date and meet the accuracy requirements for the project.

The monitored parameters are set out in the table below.

No	Monitoring parameters	Sampling parameters	Parameter type	Monitoring frequency
1	$N_{y,i,j}$ Number of project devices of type i and batch j operating in year y	Proportion of ICS still in operation	Proportion	Biennially
2	$B_{y=1,new,i,survey}$ Quantity of woody biomass used by project devices in tonnes per device of type i. and batch j	Daily consumption of woody biomass per ICS	Mean value	Determined in the first year of project implementation

Target Population

The target population will be the complete number of devices (ICS) distributed under the project activity.

Sampling Method

The sampling method for each survey will be determined using a scientifically valid and statistically robust method, specifically a random sample of the total population of distributed ICS from records generated in the monitoring database. This method will be in line with the precision requirements outlined in the project's sampling plan, and in accordance with the guidance provided in the 'Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities Version 09.0'. The project team will ensure that the sampling method is implemented in a consistent and unbiased manner, to ensure the accuracy and integrity of the data collected.

Sample Size

The sample size for each monitoring activity will be determined based on the total number of ICS distributed and included in the monitoring database. The sample size calculation will be done according to the guidelines provided in the applied methodology. These guidelines take into account the size of the target population of the project.

The minimum sample size will be calculated based on the following criteria: If the project target population is less than 300, a minimum sample size of 30 will be used. If the project target population is between 300 and 1000, a minimum sample size of 10% of the group size will be used. If the project target population is greater than 1000, a minimum sample size of 100 will be used. A sample size calculation sheet will be used to calculate the number of samples needed, in order to ensure a reliable estimate of the key variables over the crediting period.

Sampling Frame

The sampling frame for the project will be established using the comprehensive listing of the distributed ICS recorded in the monitoring database. This database will serve as the foundation for the sampling plan, and will be used to ensure that a representative sample of the total population of distributed ICS is selected. The sampling frame will be updated regularly to ensure that it remains current and accurate, and that the sample selected from it is truly representative of the population being studied. The sampling frame will be designed in accordance with the requirements of the CDM Sampling Standard and will be subject to regular review and quality assurance checks to ensure its reliability and validity. Additionally, a robust system will be implemented to track and verify the accuracy of the information recorded in the sampling frame, to ensure that the sample selected is truly representative of the population being studied.

Organizational structure, responsibilities and competencies of the personnel

The project will be managed by GWA's staff, who will provide the necessary managerial, technical, legal, communication and administrative functions to operate and manage the project in accordance with the applied methodology. The ICS will be procured from overseas.

The organizational structure for the project will include field staff, technical/compliance staff, and management. Field staff will mainly be responsible for establishing partnerships with community stakeholders to facilitate the distribution of the ICS, managing the distribution of the ICS, and conducting surveys and other related activities. Technical/compliance staff will be responsible for database development and management, ensuring compliance with the VCS rules and regulations, and other related activities. Management will be responsible for supplier relationships, engaging technical experts as required, supporting the compliance regime, and other ad-hoc activities that may arise. Each tier of staff will be appropriately trained in their respective areas of responsibility, such as conducting surveys, stakeholder/community engagement, and so on.

Some activities associated with the project will be undertaken by external third parties but will be managed or procured by GWA, these include (but not limited to): manufacturing and supplying the ICS, carrying out independent audits, financial auditing as required by law, preparing or reviewing operating policies and procedures and other related activities.

GWA also envisages hiring temporary personnel (from time to time) to assist/complement in the distribution of the ICS and other related activities. However, GWA personnel will be responsible for managing the conduct and quality of work carried out by the temporary hires.

Broadly, GWA will be responsible for (but not limited to) the following:

- Carrying out all day-to-day activities associated with the project, including conducting household surveys, engaging with households and other related matters.
- Ensuring compliance with the VCS rules and regulations.
- Procuring and arranging for the transport and distribution of the ICS.
- Forming and maintaining partnerships with local stakeholders to help facilitate the distribution of the ICS.
- Distributing the ICS and/or hiring temporary personnel to complement the distribution effort.
- Developing (or procuring the development of) the database.
- Collection and management of all the collected data.
- Engaging independent auditors and other technical consultants and experts (e.g., auditors) as required.

Overall, GWA will be responsible for the overall management and implementation of the project, and will ensure that all necessary resources, training, and support are provided

to staff to enable them to effectively perform their roles and meet the project's objectives.

Policies for oversight and accountability of monitoring activities

Policies for oversight and accountability of monitoring activities will be developed to ensure the integrity and effectiveness of the monitoring process. These policies will clearly outline the roles and responsibilities of staff in relation to monitoring, and will be incorporated into relevant staff job descriptions. To support staff in fulfilling these responsibilities, internal awareness training and resources will be provided and made available to staff. In addition, regular monitoring and evaluation of the policies and procedures will be conducted to identify any necessary improvements or adjustments and to ensure their ongoing effectiveness.

Quality Assurance and Quality Control

Quality control and quality assurance measures will be implemented throughout the project to ensure the accuracy and integrity of the data collected. Trained personnel will be responsible for the collection and management of the data, and random verification checks will be conducted periodically through household visits or phone calls. Any updates or corrections to the data will be made as necessary following these checks. The project's data will be stored in a secure, cloud-based database that is accessible to all relevant GWA personnel, providing an additional layer of quality assurance and control. Third-party stakeholders involved in the project may also be given access to the data to ensure its currency. Additionally, a personnel training register will be maintained to document the training received by project personnel.

Procedures for handling with non-conformances with the validated monitoring plan

In the event of non-conformances with the validated monitoring plan, GWA will implement a system for logging and reporting such incidents. This system will include a mechanism for documenting any corrective actions taken to address the non-conformance and ensure process integrity. Additionally, relevant GWA personnel will receive training on the use of this system for project management and ongoing reporting. Data adjustments may be made as necessary to ensure the integrity of the monitoring process.

