# INSTALLATION OF HIGH EFFICIENCY WOOD BURNING COOKSTOVES IN MALAWI

Document Prepared by

C-Quest Capital Stoves Asia Limited

| | |
|---|---|
| Project Title | Installation of high efficiency wood burning cookstoves in Malawi |
| Version | 02 |
| Report ID | - |
| Date of Issue | 17 January 2022 |
| Project ID | 2342 |
| Monitoring Period | 01 December 2020 to 15 April 2021 |
| Prepared By | C-Quest Capital Stoves Asia Limited |
| Contact | Address: C-Quest Capital Stoves Asia Limited, Brumby Centre, Lot 42, Jalan Muhibbah, 87000 Labuan F. T., Malaysia,<br>Telephone: +6 087 593828<br>Email: cqc-operations@cquestcapital.com<br>Website: www.cquestcapital.com |

# CONTENTS

# 1 PROJECT DETAILS

## 1.1 Summary Description of the Implementation Status of the Project

**A summary description of the implementation status of the technologies/ measures (e.g., plant, equipment, process, or management or conservation measure) included in the project.**

The project involves the distribution and installation of TLC Stoves for use by households in Malawi. Before the adoption of the TLC Stove, households in Malawi used inefficient, conventional open fire. The ICS will burn wood more efficiently thereby improving thermal transfer to pots, hence saving fuel. Not only will this halt the rapidly progressing deforestation in Malawi but will also reduce health hazards from indoor smoke pollution and women and children will have to spend less time collecting firewood. A single TLC Stove will save 7.63 tons of $CO_2e$ per year

The first TLC Stove was installed on 01 December 2020. Till the end of monitoring period, a total of 54,638 TLC Stoves was reported installed under the project.

All the data recorded during stove registration process was captured via hand held digital devices (smart phones and/or tablets). The information collected is then transferred to a centralized online project database. PP has distributed one or two improved cookstoves in the households as per the requirement of the stove users and separate project database has been maintained for single and double stoves distributed per household.

- **The relevant implementation dates (e.g., dates of construction, commissioning, and continued operation periods).**

Installation of ICS

| | |
|---|---|
| Date of first ICS installed | 01 December 2020 |
| No. of ICS (double stove per HH) distributed | 54,638 |

First Monitoring Survey

| | |
|---|---|
| Survey dates for parameters $N_{y,i,j}$ and $B_{y=1,new,i,j,survey}$ | 09 July 2021 to 20 July 2021 |

- **An estimate of annual average and total GHG emission reductions and removals for the project crediting period.**

  The project results in a total emission reduction of 53,969 $tCO_2e$ over the monitoring period of 01 December 2020 to 15 April 2021

## 1.2 Sectoral Scope and Project Type

The project is categorised under type/category as below:

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

The project is a grouped project.

## 1.3 Project Proponent

| | |
|---|---|
| **Organization name** | C-Quest Capital Stoves Asia Limited |
| **Contact person** | Ken Newcombe |
| **Title** | Director |
| **Address** | Brumby Centre, Lot 42, Jalan Muhibbah, 87000 Labuan, Malaysia. |
| **Telephone** | +6 087 423828 |
| **Email** | cqc-operations@cquestcapital.com |

## 1.4 Other Entities Involved in the Project

C-Quest Capital Stoves Asia Limited is the sole entity involved in the project.

## 1.5 Project Start Date

The start date of this project is 01 December 2020, which is the delivery/installation date of first TLC stove.

## 1.6 Project Crediting Period

01 December 2020 to 30 November 2030 (both days included), ten years fixed crediting period.

## 1.7 Project Location

The project location is the geographical boundary of Republic of Malawi. The project boundary is the geographic borders of the Republic of Malawi.


Malawi map

**Malawi (National)**

Malawi, Northern Point
Latitude: - 9.366667° S
Longitude: 33.000000° E

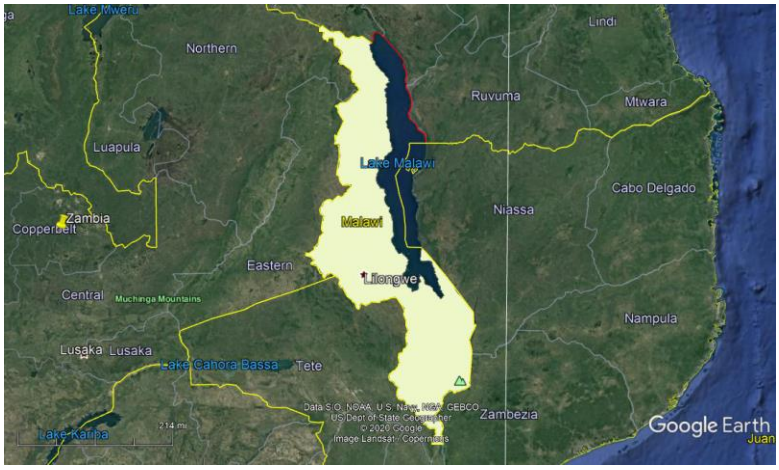
Malawi, Western Point
Latitude: - 13.600000° S
Longitude: 32.666667° E

Malawi, Eastern Point
Latitude: - 14.883333° S
Longitude: 35.916667° E

Malawi, Southern Point
Latitude: - 17.133333° S
Longitude: 35.283333° E

Map:
http://www.ephotopix.com/malawi_region_map.html

Geographical coordinates obtained from Google Earth®




Map of project area (See KML file attached)

Republic of Malawi is divided into 3 regions – Northern, Central and Southern regions. To facilitate the management, implementation, monitoring and sampling stages of the project, the project proponent divides the project boundary into 3 project regions according to the region.

| No. | Project Region | Regions |
|---|---|---|
| 1 | Northern Area | Northern |
| 2 | Central Area | Central |
| 3 | Southern Area | Southern |

## 1.8 Title and Reference of Methodology

VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1[1].

## 1.9 Participation under other GHG Programs

Project is not registered under any other GHG programs.

## 1.10 Other Forms of Credit

Project has not applied for any other programme to create another form of GHG-related environment credit.

## 1.11 Sustainable Development

The project contributes to sustainable development in a number of ways:

a) Environmental Sustainability

- The project will help significantly reduce greenhouse gas emissions over its lifetime.
- The project will help reduce the use of non-renewable biomass from forests, thus assist in conserving existing forest stock and the protection of natural forest eco-systems and wildlife habitats.

b) Social Sustainability

- Considerably less time need to be spent collecting wood fuel for the family home thereby reducing the work burden on rural families and presenting alternative opportunities for economic development.
- The amount of indoor pollutants from the burning of biomass in the family home will be reduced. Less carbon dioxide, carbon monoxide and particulates will be emitted due to the decrease in total biomass burned and an increase in the temperature of combustion.

[1] https://verra.org/methodology/vmr0006-methodology-for-installation-of-high-efficiency-firewood-cookstoves/

- The stove provides a safer method for combusting biomass for cooking, helping to reduce burn injuries, especially for children, in the family home.

c) Economic Sustainability

- The project will help develop a section of the local economy, in the distribution, local assembly, maintenance and monitoring activities.
- Household expenditures on cooking fuel will be reduced through the use of the ICS.
- Saved household labour can be diverted to more productive economic activities.

The project will create local employment opportunities in operational and management roles, as well as future assembly and/or manufacturing initiatives.

# 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

Feedback was requested from local stakeholders for the "Installation of high efficiency wood burning cookstoves in Malawi" program between October 26th, 2020 and November 25th, 2020. Necessary precautions were taken place in light of the COVID-19 pandemic, with feedback having been conducted electronically when possible, minimizing large groups and socially distancing during in person meetings.

The outcomes from the local stakeholder consultation is available in Section 2.2 of the PD

## 2.3 AFOLU-Specific Safeguards

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

# 3 IMPLEMENTATION STATUS

## 3.1 Implementation Status of the Project Activity

Implementation status of the project activity has already been described under section 1.1

## 3.2 Deviations

### 2.3.1 Methodology Deviations

This project did not apply any methodology deviations

### 2.3.2 Project Description Deviations

This project did not apply any deviations related to Project Description.

## 3.3 Grouped Projects

New project activity instances included under this grouped project ensure that it meets the eligibility criteria below.

| No. | Criterion | How the new project activity instances to comply |
|---|---|---|
| 1 | Meet the applicability conditions set out in the methodology applied to the project | New project activity instances (TLC-CQC Rocket Stoves) meet the applicability conditions set out in Section 3.2 of the PD, where the end-user is household and the ICS deployed is 34.5% of thermal efficiency. |
| 2 | Use the technologies or measures specified in the project description. | Only TLC-CQC Rocket stoves have been adopted in the project, |
| 3 | Apply the technologies or measures in the same manner as specified in the project description. | Only TLC-CQC Rocket stoves have been adopted in the project and it replace traditional cookstoves in household |
| 4 | Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area. | The new project activity instances were installed within Malawi only and subject to the same baseline scenario determined in Section 3.4 of PD. |
| 5 | Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area. | All new project activity instances use the activity method for demonstration of additionality.<br><br>**Step 1: Regulatory Surplus**<br><br>There is no mandated government programme or policy in host country of this project ensuring the distribution of new project activity instances. |

| | | |
|---|---|---|
| | | **Step 2: Positive List**<br><br>The inclusion of new project activity instances complies with positive list as it satisfies criterion 1 where it meets all the applicability conditions of the methodology. |
| 6 | Where a capacity limit applies to a project activity included in the project, no project activity instance shall exceed such limit. Further, no single cluster of project activity instances shall exceed the capacity limit, determined as follows:<br>1) Each project activity instance that exceeds one percent of the capacity limit shall be identified.<br>2) Such instances shall be divided into clusters, whereby each cluster is comprised of any system of instances such that each instance is within one kilometer of at least one other instance in the cluster. Instances that are not within one kilometer of any other instance shall not be assigned to clusters.<br>3) None of the clusters shall exceed the capacity limit and no further project activity instances shall be added to the project that would cause any of the clusters to exceed the capacity limit. | No project activity instance exceeds the applicable limit, which is 180 $GWh_{th}/y$.<br><br>The expected annual energy saving for each project activity instance is approximately 0.02 $GWh_{th}/y$ or 0.01% of the limit.<br><br>As the annual energy saving is below 1% of the limit, therefore no project activity instance is identified and divided into clusters. |

# 4 DATA AND PARAMETERS

## 4.1 Data and Parameters Available at Validation

| Data / Parameter | $f_{NRB,y}$ |
|---|---|
| Data unit | Fraction |

| | |
|---|---|
| Description | Fraction of woody biomass saved by the project activity during year *y* that can be established as non-renewable biomass |
| Source of data | IPCC 2019 refinement, UNData & FAO reports. |
| Value applied | 0.91 |
| Justification of choice of data or description of measurement methods and procedures applied | This parameter has determined ex-ante. C4 EcoSolutions (Pty) Ltd was appointed as third party to study and derive the $f_{NRB}$ value for Malawi. |
| Purpose of Data | Calculation of emission reductions |
| Comments | The report of $f_{NRB}$ was made available to VVB during the validation. |

| | |
|---|---|
| Data / Parameter | $NCV_{wood\ fuel}$ |
| Data unit | TJ/tonne |
| Description | Net calorific value of the non-renewable woody biomass that is substituted or reduced |
| Source of data | 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction |
| 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 emission reductions |
| Comments | No comments |

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

| | |
|---|---|
| Value applied | 112 |
| Justification of choice of data or description of measurement methods and procedures applied | IPCC default value |
| Purpose of Data | Calculation of emission reductions |
| Comments | No comments |

| | |
|---|---|
| Data / Parameter | $EF_{wf,non\ CO2}$ |
| Data unit | $tCO_2/TJ$ |
| Description | Non-$CO_2$ emission factor for the use of wood fuel in baseline scenario |
| Source of data | 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion |
| 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 emission reductions |
| Comments | No comments |

| | |
|---|---|
| Data / Parameter | $\eta_{old}$ |
| 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, as 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 emission reductions |
| Comments | No comments |

| | |
|---|---|
| Data / Parameter | $\eta_p$ |
| Data unit | Fraction |
| Description | Efficiency of project stove at the start of project activity. |
| Source of data | Manufacturer's specification |
| Value applied | 0.345 |
| Justification of choice of data or description of measurement methods and procedures applied | This parameter has determined ex-ante |
| Purpose of Data | Calculation of $\eta_{new,y,i,j}$ |
| Comments | No comments |

## 4.2 Data and Parameters Monitored

| | |
|---|---|
| Data / Parameter | $N_{y,i,j}$ |
| Data unit | Number |
| Description | Number of project devices of type i and batch j operating during year y |
| Source of data | Monitoring |
| Description of measurement methods and procedures to be applied | Measured based on a representative sample. |
| Frequency of monitoring/recording | At least once every two years |
| Value applied | 54,638 |
| Monitoring equipment | - |

| | |
|---|---|
| QA/QC procedures to be applied | Sampling standard "sampling and surveys for CDM project activities and programme of activities" version 9 was used for determining the sample size to achieve 90/10 confidence precision. |
| 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.<br>Proportion of operational stoves: 100%<br>$N_{y,i,j}$ = 100% * 54,638<br>= 54,638 |
| Comments | No comments |

| | |
|---|---|
| Data / Parameter | $\eta_{new,y,i,j}$ |
| Data unit | Fraction |
| Description | Efficiency of the improved cookstove type *i* and batch *j* during year *y* |
| Source of data | Calculation |
| Description of measurement methods and procedures to be applied | To adopt Option V given in the methodology:<br>"Efficiency of the improved cookstoves to be estimated using equation 5 above where loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored" |
| Frequency of monitoring/recording | Annually |
| Value applied | the value below is applied. |
| Monitoring equipment | Calculated value |
| QA/QC procedures to be applied | - |

| Year (y) | $\eta_{new,y,i,j}$ |
|---|---|
| 1 | 32.43% |

| | |
|---|---|
| Purpose of data | Calculation of emission reductions |
| Calculation method | Calculation was performed using equation below:<br>$\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94$<br>= 0.345 x $(0.99)^{1-1}$ x 0.94<br>= 0.3243 |
| Comments | No comments |

| | |
|---|---|
| Data / Parameter | $B_{y=1,new,i,j,survey}$ |
| Data unit | Tonnes per device per year |
| Description | Annual quantity of woody biomass used by improved cookstoves in tonnes per device of type i and batch j |
| Source of data | Monitoring survey |
| Description of measurement methods and procedures to be applied | Sampling standard "sampling and surveys for CDM project activities and programme of activities" version 9 was used for determining the sample size<br>This value was determined within the first year of the introduction of the devices through sample surveys. |
| Frequency of monitoring/recording | In the first year of project implementation |
| Value applied | 1.33 |
| Monitoring equipment | Weighing scale |
| QA/QC procedures to be applied | Calibration of weighing scales used for measuring the fuel wood was done in house before start using on site. |
| Purpose of data | Calculation of emission reductions |
| Calculation method | - |

| | |
|---|---|
| Comments | At the time of first monitoring survey, the surveyor enquired for firewood consumption for each stove installed in the household. |

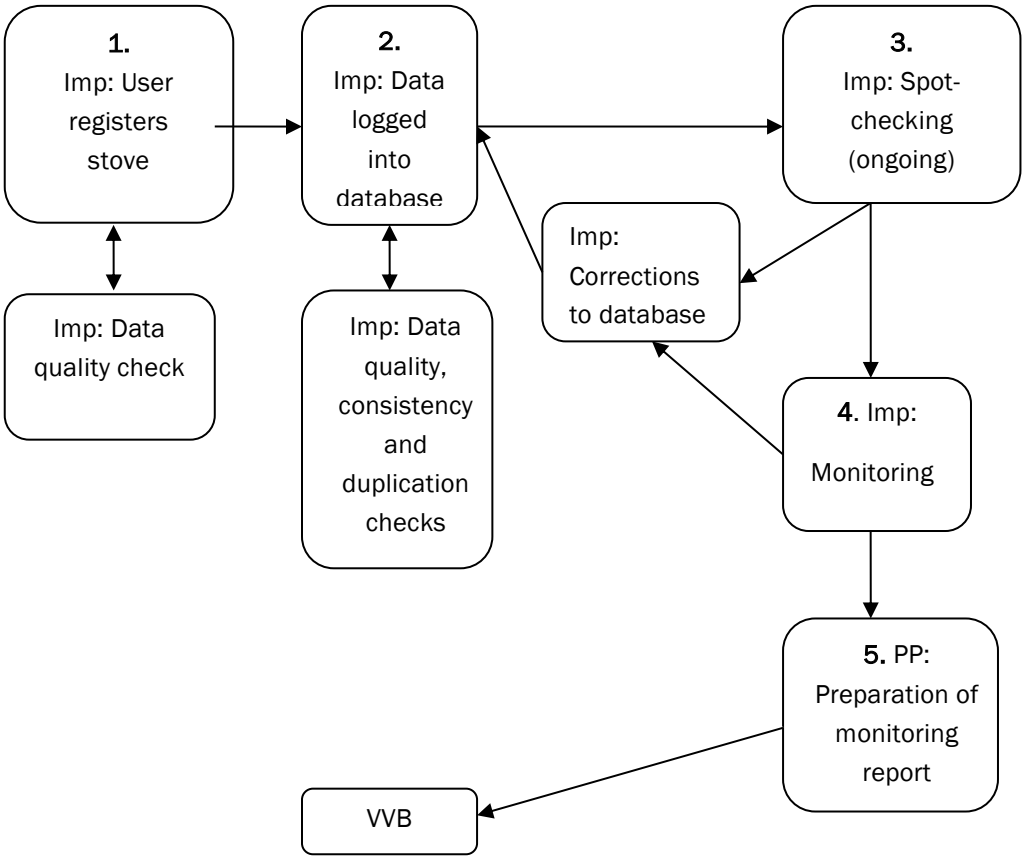
| | |
|---|---|
| Data / Parameter | Life Span |
| Data unit | Number of years |
| Description | The operating lifetime of the project device. |
| Source of data | Manufacturer's specification |
| Description of measurement methods and procedures to be applied | TLC cookstoves manufactured under the project activity match the fixed design specification. This has achieved by using brick molds of specified dimensions to make bricks used for stove construction locally. This ensured, that each stove that is built at individual end user household measures exactly same as the dimensions specified by the manufacturer. Post construction, training has been provided to end users on use, care, and upkeep of these stoves. PP will conduct periodic audits and surveillance of the stoves distributed under the project activity to ensure their proper functioning throughout the project lifetime. This along with spot audits and after installation maintenance services, ensure that the project stoves continue to work at efficiencies as specified by the manufacturer. |
| Frequency of monitoring/recording | Once at the time of project stove installation |
| Value applied | 10 |
| Monitoring equipment | - |
| QA/QC procedures to be applied | - |
| Purpose of data | Calculation of emission reductions |
| Calculation method | - |
| Comments | - |

## 4.3 Monitoring Plan

The project's monitoring system follows the monitoring plan described in section 5.3 of the VCS-PD.

The monitoring system applied involves a number of key elements to ensure that the PP has high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Verified Carbon Units (VCUs) following VCS methodology VMR 0006 version 1.1 on the basis of the amount of non-renewable biomass saved by the ICS in the project activity.

The below flow-chart illustrates the roles and responsibilities of the parties during the implementation of the monitoring plan for the project activity. In the below flowchart, the project implementer is abbreviated to "Imp", and can be the project proponent by the PP.




Below is the description of the above steps on the flow-chart.

1. **Imp: User registers stove:** Project implementer collected/received the necessary information required for the Registration process from the user. Means of collecting this information were through the use of ICTs. Project Implementers' staff double checks the accuracy of information provided, and request for field staff additional clarifications if needed;

2. **Imp: Data logged into database:** Registered data by the staff of the project implementer uploads in the database automatically. PP shall double check the information included on the database and check for duplications. Any duplicate information if investigated, checked for the errors, gets corrected or excluded from the database if it is a true duplicate entry.

3. **Imp: Spot- checking (ongoing):** Project implementer field staff randomly select units included in the database and visit or contact the stove users to cross-check the information on the database with the factual evidence in the field. Any inconsistencies found (e.g., change in the address of a user) gets updated on the database, and in the case, ICS are found to be no longer in use, they got clearly marked as such and excluded from emission reductions calculations.

4. **Imp: Monitoring:** Project implementer follows the requirements as per VCS-PD to collect the necessary information for a monitoring report.

5. **PP: Preparation of monitoring report:** The project implementer or the project proponent prepare the final monitoring report to be provided to the VVB for verification of emission reductions.

The PP coordinates and manages the implementation of g each element of the monitoring plan.

Data measuring, recording Method and Implementation of Sampling Approaches

Steps 1, 2 and 3 captured end user information and populated the database, as well as provided database quality control.

Step 4 involves creating sampling surveys to capture data on number of project devices operating during year y ($N_{y,j,j}$) and quantity of woody biomass used by improved cookstoves ($B_{y=1,new,i,j,survey}$) as described in the table below.

| Parameter | Description of Parameter | Sampling approach (outcome in brackets) |
|---|---|---|
| $N_{y,j,j}$ | Number of project devices operating during year y | Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use [Yes/No] |
| $B_{y=1,new,i,j,survey}$ | Quantity of woody biomass used by improved cookstoves | Interview with end user and measurement of wood fuel used for each project stove [Weight of fuel wood] |

Due to the large number of ICS envisioned to be distributed in the project activity, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling was undertaken that is designed in line with the requirements of the Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities version 09.0.

Step 5 involved monitoring analyses and accuracy and precision checks. The project proponent scrutinized the monitoring data to confirm accuracy of results, analyzed the data, and estimated the resulting emissions reductions outlined in this monitoring report.

The following parameters were obtained though sampling:

1. $N_{y,i,j}$: Number of stoves in operation
2. $B_{y=1,new,i,j,survey}$: Quantity of woody biomass used by improved cookstoves

Simple random sampling was used for all monitoring parameters in accordance with the Sampling Plan of section 5.3 of the VCS-PD. The objective was to obtain reliable and unbiased estimates of the monitoring parameters. Reliability levels were set at 90% confidence and 10% precision as per VMR 0006 version 1.1.

A single homogeneous population (Primary Sampling Unit, as per VCS-PD) was considered for both parameters.

The following table summarizes the sample sizes and results.

| Monitored Parameter | Sample size | Survey Results | Precision achieved |
|---|---|---|---|
| Number of stoves in operation ($N_{y,i,j}$) | 31 | 1.00 | 0.00% |
| Quantity of woody biomass used by improved cookstoves ($B_{y=1,new,i,j,survey}$) | 31 | 3.65 Kg/day/stove | 4.79% |

Implementation and quality assurance and control and procedures used for handling any internal auditing performed and any non-conformities identified: project proponent trained monitoring personnel on monitoring procedures, including provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response. The monitoring survey included several questions to support the information on the key monitoring parameters. These included visual inspections to confirm stove use and presence of baseline stoves, comments by surveyors, check of randomly selected households against actual household information, and refusal tracking. These strategies aimed at minimizing surveyor or non-response biases. The questionnaire was piloted in the field prior to implementation.

# 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

## 5.1 Baseline Emissions

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

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

Where:

| | | |
|---|---|---|
| i | = | Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire |
| J | = | Indices for the situation where there is more than one batch of improved cookstove of type i |
| $ER_y$ | = | Emission reductions during year y in t $CO_2e$ |
| $ER_{y,i,j}$ | = | Emission reductions by improved cookstove of type i and batch j during year y in t $CO_2e$ |

$$ER_{y,i,j} = B_{y,savings,i,j} \times NCV_{wood\ fuel} \times f_{NRB,y} \times \left(EF_{wf,CO2} + EF_{wf,non\ CO2}\right) \times N_{y,i,j} \times 0.95 \quad \text{Equation (2)}$$

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)[2] |
| $EF_{wf,CO2}$ | = | $CO_2$ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 $tCO_2/TJ$)[3] |

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

[3] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

| | | |
|---|---|---|
| $EF_{wf,non\ CO2}$ | = | Non-$CO_2$ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 $tCO_2/TJ$)[4] |
| $N_{y,i,j}$ | = | Number of improved cookstoves of type i and batch j operating during year y |
| 0.95 | = | Discount factor to account for leakage |

To calculate $B_{y,savingsi,j}$, we use equation 4 of the applied methodology[5]

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

Where:

| | |
|---|---|
| $B_{y=1,new,i,survey}$ | Annual quantity of woody biomass used by improved cook stoves in tonnes, determined in the first year of the implementation of the project through a sample survey |
| $\eta_{old}$ | Efficiency of baseline cookstove. A default value of 0.10 has been used as 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 improved cook stove determined using Equation 5 of the methodology. |

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

Where:

| | |
|---|---|
| $\eta_p$ | Efficiency of project stove (fraction) at the start of project activity |
| $(DF_n)^{y-1}$ | Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). default value of 0.99 efficiency loss per year has considered for the project activity |
| 0.94 | Adjustment factor to account for uncertainty related to project cookstove efficiency test |

[4] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

[5] Equation 3 of methodology VMR 0006

The full set of emission reductions calculation for single stove per HH and double stove per HH is provided in separate Excel spread sheets.

## 5.2 Project Emissions

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

## 5.3 Leakage

Leakage is considered as default 0.95 in accordance with methodology.

## 5.4 Net GHG Emission Reductions and Removals

| Year | Baseline emissions or removals ($tCO_2e$) | Project emissions or removals ($tCO_2e$) | Leakage emissions ($tCO_2e$) | Net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| 01 December 2020 to 31 December 2020 | 713 | 0 | 0 | 713 |
| 01 January 2021 to 15 April 2021 | 53,256 | | | 53,256 |
| **Total** | **53,969** | **0** | **0** | **53,969** |