

TEMPLATE

MONITORING REPORT

PUBLICATION DATE 14.10.2020

VERSION v. 1.1

RELATED SUPPORT - TEMPLATE GUIDE Monitoring Report v. 1.1

This document contains the following Sections

Key Project Information

A - Description of project

B - Implementation of project

C - Description of monitoring system applied by the project

D - Data and parameters

E - Calculation of SDG Impacts

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KEY PROJECT INFORMATION

Programme of Activity Information – (delete below table if N/A)

GS ID of Programme	GS11009
Title of Programme	TASC Clean Cooking PoA
Version of POA-DD applicable to this monitoring report	5.0
Name and GS ID of fully Validated CPA/VPAs (i.e. non compliance check)	GS11145 TASC Clean Cooking PoA – VPA 1 (Zambia) GS11596 TASC Clean Cooking PoA – VPA 3 (Zambia)

Key Project Information

GS ID (s) of Project (s)	GS11145 GS11596
Title of the project (s) covered by monitoring report	TASC Clean Cooking PoA – VPA 1 (Zambia) TASC Clean Cooking PoA – VPA 3 (Zambia)
Version number of the PDD/VPA-DD(s) applicable to this monitoring report	GS11145: 5 GS11596: 1.6
Version number of the monitoring report	1.6
Completion date of the monitoring report	27/01/2025
Date of project design certification	07/10/2021
Date of Last Annual Report	GS11145: 13/12/2023 GS11596: 13/12/2023
Monitoring period number	VPA 1: MP 5 VPA 3: MP 4
Duration of this monitoring period	VPA 1 (MP5): 01/01/2024 – 30/06/2024 (Inclusive) VPA 3 (MP4): 01/01/2024 – 30/06/2024 (Inclusive)
Project Representative	The African Stove Company Ltd. (TASC)
Host Country	Zambia

Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC), version 3.1
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Targeted	SDG Impact Goals	Amount Achieved	Units/ Products
1 No Poverty	Installation of ICS Monetary savings	44,517 (VPA 1) 99,781 (VPA 3)	ICS
3 Good Health and Well-Being	Households reporting reduction in smoke/ PM emissions while cooking on project ICS	100% (VPA 1 & 3)	Households
5 Gender Equality	Households reporting time saving from fuel collection & cooking time	100% (VPA 1 & 3)	Households
7 Affordable and Clean Energy	ICS installed that are in operation	44,517 (VPA 1) 99,781 (VPA 3)	ICS
8 Decent Work and Economic Growth	Number of person (male and female) hired under Project	18 (VPA 1 & 3) (11 male, 7 female)	Contracted Staff
12 Responsible Consumption and Production	Wood fuel saving while cooking on project ICS	5.45 (VPA 1 & 3)	Tonnes per stove per annum
13 Climate Action	Net emission reductions of CO ₂ for the monitoring period	221,656 (VPA 1) 496,823 (VPA 3)	tCO ₂ e

Table 2 – Product Vintages

VPA 1

		Amount Achieved
Start Dates	End Dates	VERs
01/01/2024	30/06/2024	221,656

VPA 3

		Amount Achieved
Start Dates	End Dates	VERs
01/01/2024	30/06/2024	496,823

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

The goal of the proposed project is to distribute improved cookstoves (ICS) in households in Zambia.

The African Stove Company Ltd. (TASC)¹ is the coordinating/managing entity (CME) of the PoA and is the sole implementer of the VPA. TASC's mission is financing and developing high-impact climate mitigation projects.

44,517 ICS have been distributed under the VPA 1 and 99,781 under VPA 3 in Zambia, all of which have been logged in the respective monitoring databases. The first ICS was distributed in Zambia on 24/07/2020 (VPA 1) and 21/09/ 2021 (VPA 3), and the joint local stakeholder consultation took place on 19/05/2022. The VPA's are considered homogeneous as they share the same project boundary, technology distributed and end-user profile, therefore a consolidated monitoring report is compiled for the VPA's. The monitoring report covers the 5th monitoring period for VPA 1 and the 4th monitoring period for VPA 3.

The project ICS combusts biomass fuels more efficiently, reducing the greenhouse gas (GHG) emissions and particulate emissions (PM), thus improving the indoor air quality in project households. Due to the higher thermal efficiency of the ICS relative to the traditional/baseline stoves, the ICS reduces the amount of non-renewable biomass fuel required for meeting similar thermal energy needs.

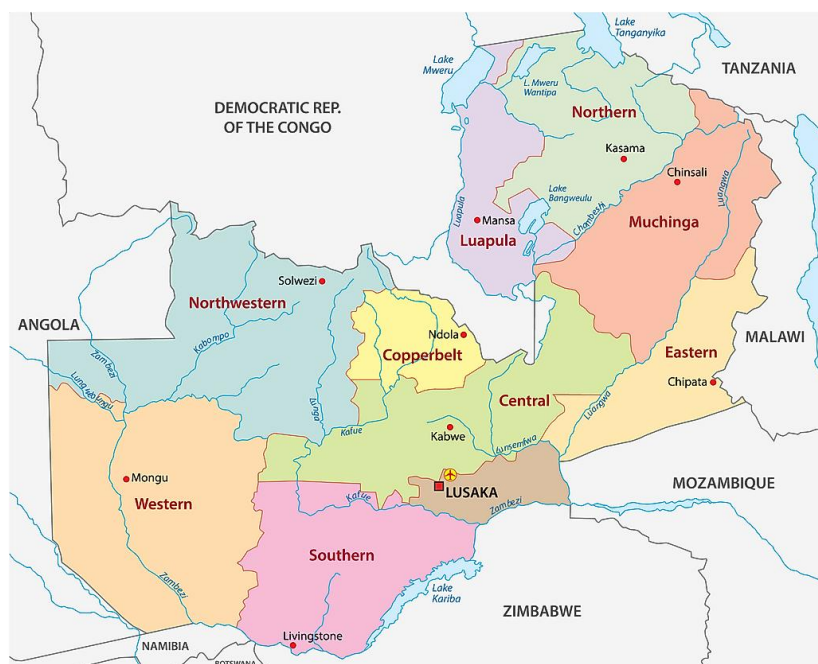
In the absence of the VPA's, inefficient, traditional 3-stone fires would have been used for cooking. Replacing these with project ICS reduces non-renewable biomass fuel consumption and corresponding GHG emissions.

¹ <https://tasc.je/>

TASC confirms that the VPA is not registered with any other compliance or voluntary market-based mechanism and ensures that no double-counting has or will occur. VERs for this vintage cannot and will not be claimed with any other standard.

A.2. Location of project

Host Country: Zambia



Zambia map and provinces

The VPA is implemented across Zambia and not limited to any specific provinces. The GPS coordinates of Zambia are – 13.1339 S, 27.8493 E.

The TASC headquarters is located at:

Warehouse G1, Mungwi Centre,
Plot 7403 Mungwe Road, Light Industrial Area,
Lusaka, Zambia

TASC also has a project office located at:

Hse #30, Lemabani Road,
Mountain View, Katete BOMA,
Eastern Province, Zambia

A.3. Reference of applied methodology

Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC), version 3.1.

A.4. Crediting period of project

Start and end date of crediting period:

VPA 1 (GS11145): 24/07/2020 – 23/07/2025

VPA 3 (GS11596): 21/09/2021 – 20/09/2026

Total length of crediting period (applicable for each VPA):

15 years (5 years, twice renewable)

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

The goal of the proposed project is to distribute improved cookstoves (ICS) to households in Zambia.

The African Stove Company Ltd. (TASC)² is the coordinating/managing entity (CME) of the PoA and is the sole implementer of the VPA. TASC's mission is financing and developing high-impact climate mitigation projects.

The Voluntary Project Activities (VPA's) "TASC Clean Cooking PoA – VPA 1 (Zambia)" and "TASC Clean Cooking PoA – VPA 3 (Zambia)" have been implemented within the project boundary in line with the approved VPA designs. The VPA's distributed ICS technologies which are based on the principle of improving heat transfer from combustion chamber to cooking pot, saving cooking/fuel collection time.

The design of the ICS optimizes the combustion chamber shape, amount of fuel and air flow through the stove. Furthermore, thermal energy is maximized by reducing the thermal mass of the ICS minimizing heat loss through the sides and bottom of the stove. The cooking surface is positioned at the optimal distance from the fire providing optimal gas flow needed for efficient heat transfer. Wood fuel models may have a grate provided at the base of the stove for placing wood fuel on. The clearance between the grate and the floor provides for natural draft of air into the combustion chamber resulting in improved combustion as compared to traditional cook stoves where such natural draft is absent resulting in incomplete combustion of fuel. The combustion chamber may also have a refractory lining that reduces heat loss from the walls of the stove.

Kuniokoa model wood fuel cookstoves manufactured by Burn Manufacturing LLC were distributed in these VPA's. This cookstove delivers a thermal efficiency of 41.6%

² <https://tasc.je/>

according to an independent lab report from the Kenya Industrial Research and Development Institute (KIRDI) of 19/11/2017.

Funding for this project was supplied by the private sector and no public finance from any Annex 1 party is involved.

Distribution started on 24/07/2020 (VPA 1) and 21/09/2021 (VPA 3) when the first ICS's were distributed to families within Zambia. All of the ICSs were distributed prior to the start of this MP.

The monitoring period covered within this report is 01/01/2024 to 30/06/2024 for both VPA 1 (GS11145) and VPA 3 (GS11596). In the table below, a summary of all field project activities is presented:

VPA 1

Date	Activity
24/07/2020	Project start date (Start of stove distribution)
24/07/2020	Start of project crediting period
11/06/2024 - 14/06/2024	Project KPTs
17/06/2024 - 20/06/2024	Project habit surveys

VPA 3

Date	Activity
21/09/2021	Project start date (Start of stove distribution)
21/09/2021	Start of project crediting period
11/06/2024 - 14/06/2024	Project KPTs
17/06/2024 - 20/06/2024	Project habit surveys

B.1.1 Forward Action Requests

During the Design Review 3 Forward Action Requests (FAR) for VPA 1 were raised. FAR's raised were:

FAR 1: PD shall conduct physical stakeholder consultation prior to the next verification. VVB shall verify.

The in person local stakeholder consultation was completed on 19/05/2022 followed by a 2-month stakeholder consultation round. This was verified and closed during the 2nd verification and performance review of VPA 1.

FAR 2: Prior to first verification, the PP is requested to conduct the KPT test following methodology requirements. The PP must demonstrate at verification that the KPT test has been conducted with the representative samples of the baseline households in the project boundary.

Baseline KPT's were reported in the first monitoring report, verified and certified during MP1.

FAR 3: The VVB during verification shall double check the project database to confirm the PP's monitoring plan that: "Stoves that are distributed to households not using wood fuel on open, 3-stone fires will not be included in the monitoring report for crediting emissions reductions".

The final dataset was shared with the VVB to confirm that no ICS were distributed to households which do not use wood as their primary fuel.

All outstanding FAR's from design review have been closed prior to this monitoring period.

During Performance Review number 2 (GS11145) and Performance Review number 1 (GS11596) the following far was raised for both projects:

FAR 4: KPT shall be conducted prior to the next monitoring period verification.

It is unclear from the FAR raised which KPTs the reviewer was referring to. We believe that this FAR is from the initial Design Review of GS11145, which was closed in the first Monitoring Report and therefore should not be raised again in subsequent performance reviews. For this monitoring period 01/01/2024 – 30/06/2024 in-field project KPTs were conducted from 11/06/2024 - 14/06/2024. Baseline KPTs were conducted and verified during the 1st performance review of GS11145. This FAR should be closed for future monitoring periods because baseline KPTs have been completed and conducting KPTs is a part of the monitoring for parameter $B_{p,y,i}$ (see Section D2 below).

During the second Joint Verification for GS11145 and GS11596 the following FAR was raised based on CAR 11 in the Findings Log:

FAR 5: As per the CAR 11 raised based on the on-site visit for the VPA 1 (MP4): 03/06/2023 – 31/12/2023 (Inclusive) and VPA 3 (MP3): 03/06/2023 – 31/12/2023 (Inclusive) the beneficiary Mushupike Chirwa had the stove with stove id "L6YPS5" and

in the PP's survey records and distribution records, the stove id for Mushupike Chirwa is "H6YUN5".

As shown in the distribution database and End User Agreements (which were provided to the VVB) Mushupike Chirwa received the stove with serial number H6YUN5 on 14 November 2022 in Tsachilile village, Zambia. The serial number recorded by monitors when conducting the KPTs from 14 – 17 November 2023 was H6YUN5 for Mushupike Chirwa, as shown in the KPT records. The stove with serial number L6YPS5 is registered to Mary Banda according to the distribution records and monitoring database, and she also received the stove on 14 November 2022 in Tsachilile village, Zambia as shown in the End User Agreement provided to the VVB. It is possible that, after the KPTs were conducted, the beneficiaries accidentally swapped stoves whilst at a community gathering where villagers come together to cook. This is a common occurrence in rural areas and both beneficiaries are from the same small village. However, a TASC monitor will be sent to the village to find both Mushupike Chirwa and Mary Banda and make sure that they have the correct stoves that were assigned to them during distribution. If not, they will sign new End User Agreements with the serial number of the stove that they currently have. This does not change the number of days that the stoves were operational as they were both distributed on the same day, 14 November 2022

For the next periodic verification VVB is requested to confirm whether the beneficiaries Mushupike Chirwa & Mary Banda are having the stoves assigned to them or an updated End user agreement with serial number of the stove they have, based on the CAR 11.

Monitors were sent to visit these households however one of the beneficiaries they were unable to find. Therefore, we were unable to prove which stove they owned. For this reason, both stoves have been removed from the database and will not be included in future credit generation. Total ERs and technology days have been changed accordingly.

B.2. Post-Design Certification changes

B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

n/a

B.2.2. Corrections

The value of 6.37 tonnes of wood used per household per annum was noted in the VPA 1 DD for parameter $B_{b,y}$. This value was estimated using country statistic values and FAR 2 (Section B.1.1) was raised to address during the first verification of the project. This FAR has been addressed and the parameter $B_{b,y}$ has been set at 6.44.

The parameters EF_{b,i,CO_2} , $EF_{b,i,nonCO_2}$, EF_{p,i,CO_2} , $EF_{p,i,nonCO_2}$ are not entirely as per the VPA-DDs as on registration the NCV value of 0.0156 was used in the calculation instead of the default value of 0.015 as per the methodology. Furthermore, the most recent global warming potential values for CH_4 and N_2O was used in calculating the non- CO_2 emissions factor, which also resulted in a change of the values. Please note that these changes were all done and accepted in previous rounds of performance reviews by Sustain-Cert.

B.2.3. Changes to start date of crediting period

n/a

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

n/a

B.2.5. Changes to project design of approved project

n/a

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

Two different monitoring methods were applied to the VPA's during the monitoring period: the first being a qualitative user habit survey (i.e., project survey and usage survey) and the second being quantitative kitchen performance tests (KPT's). As the VPA's are considered homogeneous in technology, end-user profile, boundary and baseline situation, a cross-VPA sampling campaign was completed; combining the monitoring databases of the VPAs for sampling purposes. The habit surveys were done in the field using trained data capturers (DC's) during the period 17/06/2024 - 20/06/2024. KPT's to determine the quantum of fuel used by project households were done in the field during the period of 11/06/2024 - 14/06/2024.

Habit Surveys

User habit surveys were carried out by using a pre-created webform on the SurveyCTO³ application on DC's smartphones. Samples were drawn at random from the respective monitoring databases by using an MS Excel randomizer and the first 140 households in the random list were selected for sampling. A random sample of 140 instead of 100 was drawn from each database to ensure that the required number of surveys are met as beneficiaries are often not home. Each DC visited the randomly selected households from the Monitoring Database and surveyed the stove user filling in the SurveyCTO form on the DC's smartphone. The results were uploaded directly to TASC's SurveyCTO cloud-based monitoring database and could then be exported into excel spreadsheets for analysis.

This survey captured basic social, economic, and cooking habit information from the participants. Information captured included: name, NRC (National Registration Card) number, contact phone number, device serial number and location (i.e., region, village and GPS coordinates). Further information in these habit surveys included stove usage habits, reduction in smoke/wood consumption/time cooking/time collecting wood and other relevant information on the characteristics of the kitchen to check if there are any changes that may impact the emission reductions e.g., stove stacking, and other relevant information as per the VPA-DD Monitoring Plan.

Kitchen Performance Tests (KPTs)

KPT's were carried out on a random sample of project households according to the KPT Version 4.0 document⁴. The KPT's were implemented in the 5th monitoring period of VPA 1 and 4th monitoring period of VPA 3 to determine the average wood use per household per annum with the ICS and is required to be renewed biennially (Section D.2.).

KPT's were carried out at randomly sampled households from the Monitoring Database and consisted of tests being done on 4 consecutive days at each household at approximately the same time each day. At the start of the KPT, the amount of woodfuel that was estimated to be required for the next 4 days of usage was weighed and set

³ <https://www.surveyccto.com/>

⁴ <https://cleancooking.org/binary-data/DOCUMENT/file/000/000/604-1.pdf>

aside as a Control Pile. Family members were then instructed to only use wood from this Control Pile during the KPT and to maintain their normal cooking/heating practices to ensure the usage rate of wood during the KPT's was best representative. DC's then visited the same households at roughly the same time on each of the 4 days in order to weigh the wood left in the Control Pile, or to check and weigh any additional wood that needed to be added and measure the moisture content of randomly selected wood pieces. For each visit, the number of people that ate their meals in the household since the DC's last visit was recorded as this number can vary from one day to the next. Also, the age and gender of all persons in the household were recorded. At the end of the KPT the final weight of the remaining wood in the Control Pile was recorded.

Data was captured using the SurveyCTO application on the DC's phone with a specific webform created for the KPT data. The results were uploaded directly to TASC's cloud-based monitoring database and could then be exported into an excel spreadsheet for analysis.

SECTION D. DATA AND PARAMETERS

D.1. Data and parameters fixed ex ante or at renewal of crediting period

SDG13

Data/parameter	$B_{b,y}$
Unit	Tonnes per household per annum
Description	Quantity of fuel consumed in baseline scenario b during year y , in tonnes
Source of data	Baseline kitchen performance tests (KPTs)
Value(s) applied	VPA 1: 6.44 tonnes VPA 3: 6.44 tonnes
Choice of data or Measurement methods and procedures	KPT Version 4.0 ⁵
Purpose of data	Calculation of baseline scenario
Additional comment	Value has been updated as per FAR 2 in section B.1.1 and B.2.2. See Section E below

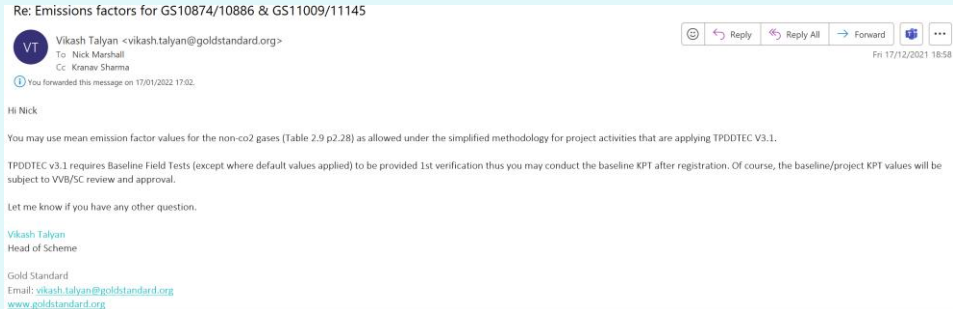
SDG 13

Data/parameter	EF_{b,i,CO_2}
Unit	tCO_2/t_{fuel}
Description	CO_2 emission factor arising from use of fuel type i in baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2: Stationary Combustion, Table 2.5 - Default emission factors for stationary combustion in the residential and agriculture/forestry/fishing/fishing farms categories
Value(s) applied	Fuelwood: $1.6800 tCO_2/t_{fuel}$
Choice of data or Measurement methods and procedures	Mean value of the range of default IPCC values has been applied

⁵ <https://cleancooking.org/binary-data/DOCUMENT/file/000/000/604-1.pdf>

Purpose of data	Calculation of baseline scenario
Additional comment	-

SDG 13

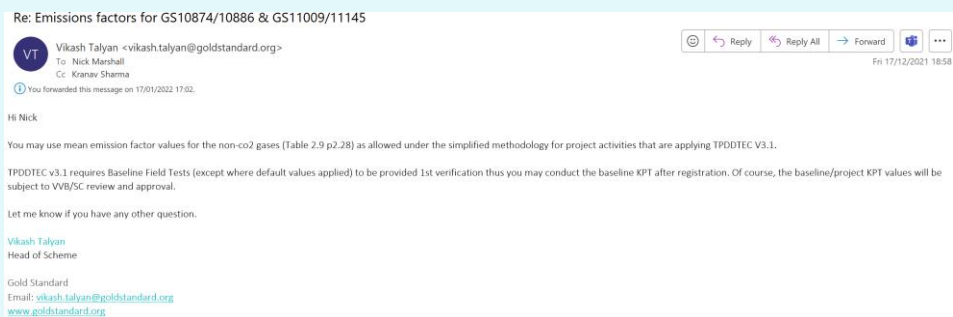
Data/parameter	$EF_{b,i,nonCO_2}$
Unit	tCO_2/t_{fuel}
Description	Non- CO_2 emission factor arising from use of fuel type i in baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2: Stationary Combustion, Table 2.9
Value(s) applied	Fuelwood: $0.5588tCO_2/t_{fuel}$
Choice of data or Measurement methods and procedures	Mean value of the range of default IPCC values has been applied
Purpose of data	Calculation of baseline scenario
Additional comment	Clarification on using the mean value was sought from the Gold Standard and approved. Please see a screenshot of the email below:  The screenshot shows an email from Vikash Talyan (Gold Standard) to Nick Marshall. The subject is 'Re: Emissions factors for GS10874/10886 & GS11009/11145'. The email discusses the use of mean emission factor values for non-CO_2 gases as allowed under the simplified methodology for project activities applying TPDDTEC V3.1. It mentions that TPDDTEC v3.1 requires Baseline Field Tests (except where default values are applied) to be provided for 1st verification, and that baseline/project KPI values will be subject to VVB/SC review and approval. Vikash Talyan is identified as Head of Scheme at Gold Standard.

SDG 13

Data/parameter	EF_{p,i,CO_2}
Unit	tCO_2/t_{fuel}
Description	CO_2 emission factor arising from use of fuel type i in project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2: Stationary Combustion, Table 2.5 - Default emission factors for stationary combustion in the residential and agriculture/forestry/fishing/fishing farms categories
Value(s) applied	Fuelwood: $1.6800 tCO_2/t_{fuel}$

Choice of data or Measurement methods and procedures	Mean value of the range of default IPCC values has been applied
Purpose of data	Calculation of baseline scenario
Additional comment	-

SDG 13

Data/parameter	$EF_{p,i,nonCO2}$
Unit	tCO ₂ /t _{fuel}
Description	Non-CO ₂ emission factor arising from use of fuel type <i>i</i> used in project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2: Stationary Combustion, Table 2.9
Value(s) applied	Fuelwood: 0.5588 tCO ₂ /t _{fuel}
Choice of data or Measurement methods and procedures	Mean value of the range of default IPCC values has been applied
Purpose of data	Calculation of baseline scenario
Additional comment	Clarification on using the mean value was sought from the Gold Standard and approved. Please see a screenshot of the email below:  The screenshot shows an email from Vikash Talyan (Gold Standard) to Nick Marshall. The subject is 'Re: Emissions factors for GS10874/10886 & GS11009/11145'. The email discusses the use of mean emission factor values for non-co2 gases as allowed under the simplified methodology for project activities applying TPDDTEC V3.1. It mentions that TPDDTEC v3.1 requires Baseline Field Tests (except where default values applied) to be provided 1st verification thus you may conduct the baseline KPT after registration. Of course, the baseline/project KPT values will be subject to VVB/SC review and approval. It also includes contact information for Vikash Talyan, Head of Scheme, Gold Standard.

SDG 13

Data/parameter	$NCV_{b,i}$
Unit	TJ/tonne
Description	Net calorific value of the fuel type <i>i</i> used in the baseline
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1: Introduction, Table 1.2 - Default net calorific values
Value(s) applied	Fuelwood: 0.015 TJ/tonnes

Choice of data or Measurement methods and procedures	Default IPCC values have been applied
Purpose of data	Calculation of baseline scenario
Additional comment	-

SDG 13

Data/parameter	$NCV_{p,i}$
Unit	TJ/tonne
Description	Net calorific value of the fuel type i used in the project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1: Introduction, Table 1.2 - Default net calorific values
Value(s) applied	Fuelwood: 0.015 TJ/tonnes
Choice of data or Measurement methods and procedures	Default IPCC values for wood / wood waste are applied.
Purpose of data	Calculation of baseline scenario
Additional comment	If EF is in units of tCO_2/t_{fuel} , remove NCV term from emission calculations.

SDG 13

Data/parameter	$f_{NRB,b,i,y}$
Unit	Fraction
Description	Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass
Source of data	VPA Design Documents
Value(s) applied	Fuelwood: 0.91 Renewable solid biomass fuels (Crop residues / cow dung): 0.0000 Fossil fuels: 1
Choice of data or Measurement methods and procedures	N.A.
Purpose of data	Calculation of baseline scenario
Additional comment	Value once established in the first VPA of a country may be used for subsequent VPAs in that country

D.2 Data and parameters monitored

SDG 13

Data / Parameter	$B_{p,y,i}$
Unit	Tonnes per household per annum
Description	Quantity of fuel consumed in project scenario p during year y, in tonnes, and as derived from the statistical analysis conducted on the data collected during the project performance field tests
Source of data	Field Performance Tests (FPTs) Reported in: pKPT Calculations (cell BA17), TASC Clean Cooking PoA Joint ER calc sheet v1.0
Value(s) applied	0.997 t (VPA 1) 0.997 t (VPA 3)
Measurement methods and procedures	KPT Version 4.0 ⁶
Monitoring frequency	Updated every two years
QA/QC procedures	The equipment used for testing, if any, r will either be externally calibrated or newly purchased at the time of use, so measurements are done with the necessary guarantees. Equipment used for the monitoring period was newly purchased or calibrated before the monitoring campaign started. The Ryobi 2 in 1 moisture meters were purchased on the 06/03/2024. The moisture meters can measure wood moistures between 5 – 50 % and has an error margin of ±%. Three 100kg scales were calibrated on 05/03/2024, while 2x 200kg and 1x 50kg scales were newly purchased on 18/05/2024 and calibrated on 23/05/2024. These scales can weigh between 0.5 – 200kg in 0.05kg intervals.
Purpose of data	For emission reduction calculations
Additional comment	A 'Case of a Single Sample Test' shall be applied with a minimum sample size of 20 and the '90/10 rule' or '90% confidence rule' applied. KPT protocol shall be used for PFT (for e.g.: PCIA KPT protocol may be used)

⁶ <https://cleancooking.org/binary-data/DOCUMENT/file/000/000/604-1.pdf>

Data / Parameter	$U_{p,y}$
Unit	Fraction (or %)
Description	Usage rate in project scenario p during year y determined on a sampling basis
Source of data	Annual usage survey
Value(s) applied	90%
Measurement methods and procedures	Sampling surveys (telephonic / physical) may be conducted to record the continued operation of project devices. The usage rate shall be calculated for each age (simple random / stratified random sampling to be applied as applicable)
Monitoring frequency	Annual
QA/QC procedures	CME provided guidance and training to enumerators to conduct surveys which met the specific requirements of the methodology.
Purpose of data	For emission reduction calculations
Additional comment	The monitored usage rate as per the user habit surveys is 100%. However, the applied value of 90% reflects the implementation of 'Good Practice' monitoring under the VPA and the maximum claimable usage rate as per the GS methodology Usage Rate Guideline version 2.0. The VPA implementer has conducted field team training and supervision, end-user training and follow-ups and an awareness campaign. The VPA implementer conducts community sensitization meetings and has a permanent, full-time dedicated monitoring team employed on the project for this purpose.

Data / Parameter	$N_{p,y}$
Unit	number
Description	Technologies in the Monitoring Database for project scenario p through year y
Source of data	Monitoring Database
Value(s) applied	44,517 (VPA 1) 99,781 (VPA 3)
Measurement methods and procedures	Number of stoves listed in the Monitoring Database
Monitoring frequency	Continuous

QA/QC procedures	Transparent data analysis and reporting
Purpose of data	For emission reduction calculations
Additional comment	ICS included in the VPA will be registered in the monitoring database via the data collection app

Data / Parameter	LE _{p,y}
Unit	Tonnes of CO ₂ equivalent per year
Description	Leakage in project scenario p during year y
Source of data	Leakage assessment
Value(s) applied	0
Measurement methods and procedures	Qualitative / quantitative assessment
Monitoring frequency	Aggregate leakage can be assessed for multiple project scenarios, if appropriate, every two years
QA/QC procedures	N.A.
Purpose of data	For leakage emissions
Additional comment	See Section E.3 for justification

SDG 1

Data / Parameter	BSA / HHS
Unit	Number
Description	Proportion of population living in households with access to basic services
Source of data	1. Monitoring Database ICS distribution records 2. Ex-post Monitoring Survey Records
Value(s) applied	44,517 (VPA 1) ICS in use 99,781 (VPA 3) ICS in use
Measurement methods and procedures	1. Records of number of VPA ICS distributed in Monitoring Database 2. Ex-post monitoring survey to assess the proportion of population with ICS still in operation
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	SDG 1 contribution
Additional comment	-

SDG 3

Data / Parameter	SPM _{HH}
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Unit	%
Description	Air Quality in project households
Source of data	Ex-post monitoring survey records Reported in: Zam_Stove_MRV_HabitSurvey_Joint_MRV_2 ("Stove Smoke")
Value(s) applied	100%
Measurement methods and procedures	Ex-post monitoring survey assessing on a sampled basis the percentage of VPA households reporting reduction in smoke/PM emissions/indoor air pollution while cooking on the project ICS vs. baseline
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	SDG 3 contribution
Additional comment	-

SDG 5

Data / Parameter	HHTS
Unit	%
Description	Time saving per household
Source of data	Ex-post Monitoring Survey Records Reported in: Zam_Stove_MRV_HabitSurvey_Joint_MRV_2 ("Cooking Time", cell "F2")
Value(s) applied	100%
Measurement methods and procedures	Ex-post monitoring survey assessing on a sampled basis the percentage of VPA households reporting reduced fuel collection need while cooking on the project ICS vs. baseline.
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	SDG 5 contribution
Additional comment	-

SDG 7

Data / Parameter	AACS _{HH}
Unit	Number
Description	Number of households and institutions having access to affordable, reliable and modern energy services.
Source of data	ICS Monitoring Database

Value(s) applied	44,517 ICS (VPA 1) 99,781 ICS (VPA 3)
Measurement methods and procedures	Monitoring the number of ICS distributed under the project as an indicator of providing affordable, reliable and modern energy services.
Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	SDG 7 contribution
Additional comment	-

SDG 8

Data / Parameter	QE IG
Unit	Number
Description	Quantitative Employment and income generation
Source of data	Employment records
Value(s) applied	18 employed across VPA 1 and 3 (11 male, 7 female)
Measurement methods and procedures	Recording the number of employees (male / female) in the VPA for ICS distribution, logistics, monitoring & management
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	SDG 8 contribution
Additional comment	Employment contracts are provided also to guarantee the Safeguarding Principle 6.1 Labour Rights. In addition to this, stove manufacturers will be required to show suitable up to date OHS policy which will be shared with the VVB. Total number of employees has increase since the last MP as distribution took place for another VPA and thus more monitors are now necessary.

SDG 12

Data / Parameter	$B_{y,savings}$
Unit	Tonnes/year
Description	Reduction in domestic fuel consumption
Source of data	Ex-post monitoring survey records
Value(s) applied	5.45 tonnes

Measurement methods and procedures	Ex-post monitoring ($B_{p,y,i}$) via KPTs to determine fuel savings
Monitoring frequency	Annually / bi-annually
QA/QC procedures	-
Purpose of data	SDG 12 contribution
Additional comment	-

D.3. Comparison of monitored parameters with last monitoring period

VPA 1 (GS11145)

Monitored parameter	MP1	MP2	MP3	MP4	MP5
$B_{p,y,i}$	1.77 tpa	1.77 tpa	1.05 tpa	1.27 tpa	0.997 tpa
$U_{p,y}$	90%	90%	90 %	90 %	90%
$LE_{p,y}$	0 tCO ₂	0 tCO ₂	0 tCO ₂	0 tCO ₂	0 tCO ₂
$N_{p,y}$	44,517	44,517	44,517	44,517	44,517
BSA / HHS	44,517	44,517	44,517	44,517	44,517
SPM_{HH}	99%	100%	100%	100%	100%
HHTS	98%	98%	100%	97%	100%
$AACS_{HH}$	44,517	44,517	44,517	44,517	44,517
QE IG	25	25	17 (VPA 1 & 3)	17 (VPA 1 & 3)	18 (VPA 1 & 3) (11 male, 7 female)
$B_{y,savings}$	4.66	4.66	5.38	5.16	5.45

VPA 3 (GS11596)

Monitored parameter	MP1	MP2	MP3	MP4
$B_{p,y,i}$	1.77 tpa	1.05 tpa	1.27 tpa	0.997 tpa
$U_{p,y}$	90%	90%	90%	90%
$LE_{p,y}$	0 tCO ₂	0 tCO ₂	0 tCO ₂	0 tCO ₂
$N_{p,y}$	32,625	99,785	99,785	99,781
BSA / HHS	32,625	99,785	99,785	99,781
SPM_{HH}	99%	100%	100%	100%
HHTS	98%	100%	97%	100%
$AACS_{HH}$	32,625	99,785	99,785	99,781

QE IG	12	17 (VPA 1 & 3)	17 (VPA 1 & 3)	18 (VPA 1 & 3) (11 male, 7 female)
B _{y,savings}	4.66	5.38	5.16	5.45

D.4. Implementation of sampling plan

In order to ensure that an even proportion of old and new stoves were chosen for the KPTs and habit surveys, a tiered random sampling approach was used. All distribution data was put together, then sorted by stove age. Random samples were chosen from each stove age bracket to ensure equal sampling. Stove Age 1 (365 days and under) was excluded because there were so few stoves in that age category. Random samples were generated by creating random numbers next to each stove and sorting from smallest to largest. For habit surveys, 40 samples were selected from each stove age bracket, resulting in a total of 120 habit surveys selected.

All monitored parameters were assessed by using simple random sampling, at the required precision/confidence level. Usage habit surveys were conducted to establish usage and changes in conditions experienced since the implementation of the ICS project. The sample size was done according to the TPDDTEC Version 3.1 document, here it states that for a group size > 1000 a minimum sample size of 100 is needed for such a survey. Samples were selected on a random basis from the Monitoring Database using MS Excel's random selection formula. The habit surveys were conducted on 115 randomly selected households from throughout the project distribution areas to prevent bias to a certain region. Of the 140 samples drawn for habit survey, 115 households from throughout the project distribution areas were visited since some households were not available. Additional samples above the minimum 100 were selected to practice oversampling in case households cannot be contacted for surveys or if data collection errors were discovered.

User Habit Surveys of combined monitoring sample:

Out of the 115 participants in the cross VPA habit survey, all participants were still in possession of their stoves. All of the participants indicated a reduction of smoke since and that it took less time to cook on the distributed ICS than on the traditional 3-stone fire since the implementation of the ICS. Out of the 115 participants, 4 indicated that they only buy wood and 4 both buy and collect wood, 100% of these users indicated that they are saving money since the distribution of the ICS. Furthermore, 111 participants indicated that they collect wood, of which 4 both collect and buy wood. All

wood collectors indicated that they are saving time on collecting fuel wood. All beneficiaries indicated that they save time cooking using the ICS. Most of the beneficiaries save between 1.5 to 2.5 hours of cooking using the new stoves. The amount of time saved cooking is illustrated in the figure below.

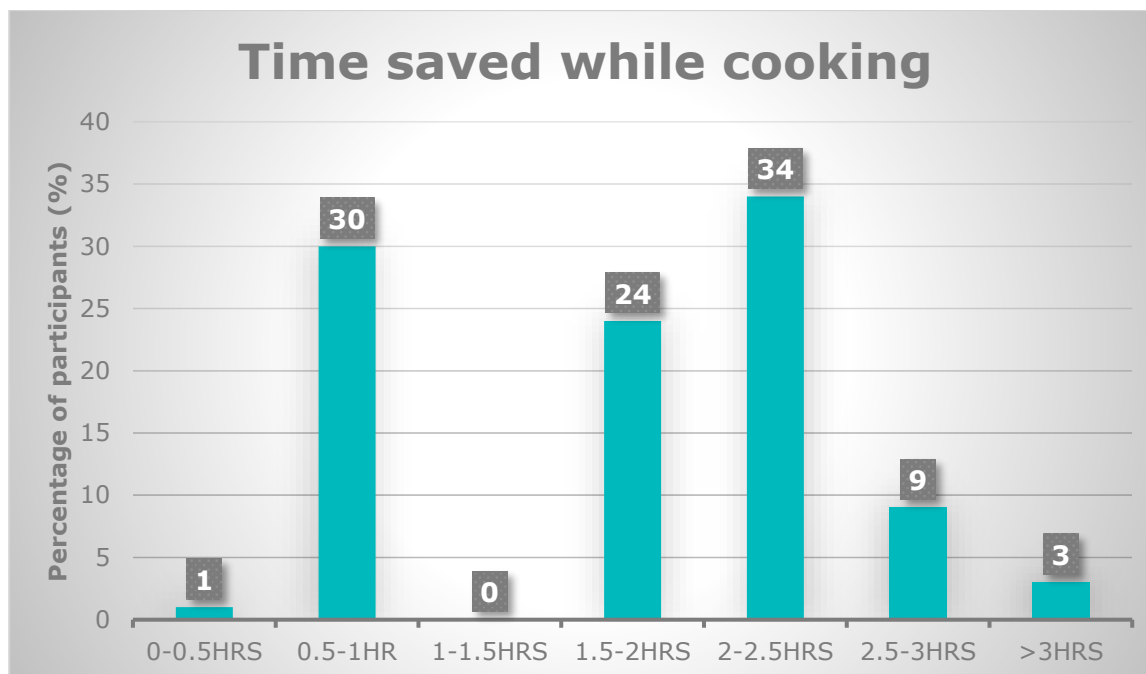


Figure 1: time saved cooking using a new ICS based on data from habit surveys in this monitoring period
Households in the area are typically made up of the following demographics ("Household Demographics", cells H4 – H7, "Zam_Stove_MRV_HabitSurvey_Joint_MRV_2"):

- 2.5 Children under 14 years of age
- 1.7 Females older than 14
- 1.4 Males ages 15 – 59
- 0.1 Males ages 65+

Cooking predominantly was done both inside and outside with 47% of households reporting this habit. 37% of households reported cooking took place outside and 17% of households cook inside ("Cooking Location", cells E2 – E5, "VPA_1and3_Zam_Stove_MRV_HabitSurvey_Joint_MRV_3").

Of the 115 survey participants, 100% of participants used their ICS devices, 59% used their ICS daily and 41% used their ICS several times per week ("Device Usage", cells G2 – G4, "VPA_1and3_Zam_Stove_MRV_HabitSurvey_Joint_MRV_3"). 21 or 18% of users reported that they were still using another stove in addition to the ICS.

Firewood collectors are mainly female with 80% prevalence and the average age of firewood collectors is 37 years old ("Wood Collection", cell N3 and M6, "VPA_1and3_Zam_Stove_MRV_HabitSurvey_Joint_MRV_3"). All the survey respondents indicated that smoke levels are better in the project scenario compared to the baseline scenario.

Overall, there were lots of positive comments made regarding the stoves, including that they are more efficient, economical, portable and safer.

Kitchen Performance Tests (KPTs) of combined monitoring sample:

As stated in Section D.2, KPT's to determine $B_{p,y}$ is monitored on a bi-annual frequency. As VPA 1 and 3 are homogeneous in nature, cross-VPA monitoring was conducted and the sample of project KPT households was drawn at random from the combined monitoring databases of VPAs 1 & 3.

For determining the fuel consumption in the project scenario, the KPT sample size determination was based on the guidance given in the TPDDTEC Version 3.1 methodology. A Single-Sample KPT was used with 90/10 precision giving a sample size of 45. Oversampling was implemented and a random sample of 60 was drawn from the combined project database (i.e., all devices distributed across VPA 1 & 3). For KPTs 20 households from each stove age bracket was selected resulting in 60 KPTs selected. In some cases, households were not reachable, in which case extra samples were drawn in the same way until precision of below 10% was reached, in this case a precision of 7.55% was reached for KPTs. A total of 58 KPTs were completed and 1 outlier was excluded, leaving a valid sample size of 57 KPTs. The outlier was excluded as it used significantly more wood than other households, around 6-10kg of wood per day ("TASC Clean Cooking PoA Joint 3 ER calc sheet", "pKPT calculations" cell "H36, I36, J36"). This is likely related to the large number of adult equivalents in the household during the KPT which was around 7-8 adult equivalents. Both the household size and wood usage are regarded as anomalies as they are ~2 to 3 times more than the daily average consumption or household size before outlier exclusion ("TASC Clean Cooking PoA Joint 3 ER calc sheet v1", "pKPT calculations" cells "J61" and "U61"). Thus, the total number of KPTs considered for determining parameter $B_{p,y}$ was 58. This led to a precision of 7.55% being achieved which falls within the 90/10 precision.

From the KPT's it was established that project households use on average 2.73 kg of wood fuel per day, this adds up to an average annual household wood consumption of 0.997 tonnes "TASC Clean Cooking PoA Joint 3 ER calc sheet v1", "pKPT calculations" cell "BD6")., which is a saving of 5.45 tonnes compared to the baseline.

Usage Rate Monitoring

According to the GS Usage Rate Monitoring Guideline, version 2.0, there are 3 levels of usage that can be claimed, each increasing in rigour and maximum claimable usage rates. The 3 levels of usage rates and requirements are presented in the table below.

Level	Applicability	Claimable Usage Rate	Requirements
Mandatory	Mandatory	Up to a maximum 75%	- Define use and non-use - In person household usage survey - Verification of accuracy of results
Good Practice	Optional	Up to maximum 90%	- Field team training and supervision - End-user training and follow up - Awareness campaign
Best Practice	Optional	Above 90%	Continuous use monitoring

Mandatory Usage:

The project adheres to the mandatory usage requirements set out as per Table 1 in the GS usage rate guidelines as follows.

1. Define use and nonuse

Project device usage is defined as "Everyday" and "Several times a week" as determined through the habit survey. Non-usage is defined as "Once a week" and "Never" usage as determined through the habit survey. As the project utilizes KPT's to measure/quantify fuel use, any residual baseline stove usage is also captured in the project wood use. Thus, a higher-than-expected project wood usage value is monitored.

2. In person household usage survey

In person household usage surveys are completed for each monitoring period. Please see "VPA_1and3_Zam_Stove_MRV_HabitSurvey_Joint_MRV_3" for the usage and habit survey results.

3. Verification of accuracy of results

Household surveys were carried out by trained staff employed by TASC (PD). The TASC call center in Lusaka Zambia carried out verification check to confirm stove usage details from a subset of 10 habit/usage survey participants.

Good Practice Monitoring:

1. Field team training and supervision:

TASC teams are trained annually to conduct both Habit Surveys and KPTs. As the staff is shared across the various VPA's it is not necessary to conduct trainings for each VPA. The initial training session occurred in 2021 followed by subsequent online and in person training throughout the project lifetime. An in-person training session was held on 20/05/2024 before the onset of monitoring activities for this monitoring period. During these training sessions the monitors/DCs are refreshed on how to conduct KPT's, habit surveys and also on general knowledge around the project and the workings of the cookstoves.

2. End-User training and follow-up visits:

Before distribution in each village/area sensitization meetings are held to explain to communities how the stove works and together with stove distribution each participant receives a how to guide. The field monitoring team then follows up with regular community and household visits throughout the year to encourage ICS adoption and respond to any feedback.

TASC also has a call centre which conducts follow-up calls with stove recipients on their experiences with the stoves.

3. Awareness campaign:

TASC has a dedicated field team conducting ongoing monitoring activities in the field to ensure data quality is up to standard. This also helps to encourage users of the stoves to use the stoves and provides them with a chance to raise queries on the stoves and the project.

Best Practice Monitoring:

Best practice monitoring has not been applied during this monitoring period.

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

SDG 1: No Poverty

$BSA_{Baseline}$ Number of ICS distributed in baseline
= 0

$HHS_{Baseline}$ % HH reporting money saving due to reduced fuel consumption in baseline
= 0

SDG 3: Good Health and Well Being

$SPM_{HH,Baseline}$ % HH reporting reduction in smoke/PM emissions while cooking on improved stove in baseline
= 0

SDG 5: Gender Equality

$HHTS_{Baseline}$ % HH reporting time saving from fuel collection due to reduced fuel consumption in baseline
= 0

SDG 7: Affordable and Clean Energy

$ACS_{Baseline}$ Access to affordable and clean energy (Number of operating ICS units under Baseline)
= 0

SDG 8: Decent Work and Economic Growth

$QE\ IG_{Baseline}$ Quantitative Employment and income generation (Number of person (male and female) hired under Baseline)
= 0

SDG 12: Responsible Consumption and Production

$B_{b,y,i}$ Fuel consumption for fuel type i used in baseline b in year y in tonnes, from baseline KPTs
= 6.44t

SDG 13: Climate Action

$BE_{b,y}$ Baseline emissions for baseline scenario b in year y (tCO₂e/yr)
= 262,221 (VPA 1)
= 587,769 (VPA 3)

$BE_{b,y} = \sum_{b,p} N_{p,y} * U_{p,y} * (ER_{b,p,y,CO2} + ER_{b,p,y,nonCO2})) - \sum LE_{p,y}$

Where:

$\Sigma_{b,p}$	Sum over all relevant (baseline b) couples = 44,517 ICS (VPA 1) = 99,781 ICS (VPA 3)
$N_{p,y}$	Cumulative number of project technology-days included in the sales/distribution database for project scenario p against baseline scenario b in year y = 44,517 * Total Technology days (VPA 1) = 8,102,094 days (VPA 1) = 99,781 * Total Technology days (VPA 3) = 18,160,142 days (VPA 3)
$U_{p,y}$	Cumulative usage rate for technologies in baseline scenario p in year y, = 90%
ER_{b,y,CO_2}	Specific CO ₂ emission savings for an individual technology of Baseline b in year y, in tCO ₂ /day as derived from the statistical analysis of the data collected from the field tests and adjusted for the 90% usage rate = 0.0270 tCO ₂ /day (Ex-Post, cell I9)
$ER_{b,y,nonCO_2}$	Specific non-CO ₂ emission savings for an individual technology of Baseline b in year y, in tCO ₂ /day as derived from the statistical analysis of the data collected from the field tests and adjusted for the 90% usage rate = 0.0090 tCO ₂ /day (Ex-Post, cell I10)

$$ER_{b,p,y,CO_2} = \sum_i \{ f_{NRB,b,i,y} * B_{b,y,i} * NCV_{b,i} * EF_{b,i,CO_2} \}$$

Where:

$f_{NRB,b,i,y}$	Fraction of woody biomass used in year y for fuel type i that can be established as non-renewable biomass (NRB) = 0.91
$B_{b,y,i}$	Fuel consumption for fuel type i used in baseline b in year y in tonnes, from baseline KPTs = 6.44t
$NCV_{b,i}$	Net calorific value of the fuel type i used in baseline b (TJ/tonnes) = 0.015
EF_{b,i,CO_2}	CO ₂ emission factor of the fuel type i used in the baseline = (112 tCO ₂ /TJ * 0.015 TJ/t) as per calculation in the ER sheet (Ex-Ante, cell E13)

$$= 1.68 \text{ tCO}_2/\text{tonne of wood (Ex-Post, cell I7)}$$

i Fuel Type

$$ER_{b,p,y,\text{nonCO}_2} = \sum_i \{ B_{b,y,i} * NCV_{b,i} * EF_{b,i,\text{nonCO}_2} \} - \sum_i \{ B_{p,y,i} * NCV_{p,i} * EF_{p,i,\text{nonCO}_2} \}$$

Where:

$$\begin{aligned} EF_{b,i,\text{nonCO}_2} & \text{ non-CO}_2 \text{ emission factor of the fuel type } i \text{ used in the baseline} \\ & = (34.27 \text{ (CH}_4\text{)} + 2.98 \text{ (N}_2\text{O)}) \text{ tCO}_2/\text{TJ} * 0.015 \text{ TJ/t, as per calculation in} \\ & \text{the ER sheet (Ex-Ante, cell E14)} \\ & = 0.5588 \text{ tCO}_2/\text{tonne of wood (Ex-Post, cell I8)} \end{aligned}$$

E.2. Calculation of project value or estimation of project situation of each SDG Impact

SDG 1: No Poverty

$$\begin{aligned} \text{Net Benefit (SDG 1)} & = BSA_{\text{Project}} - BSA_{\text{Baseline}} \\ & = 44,517 \text{ (VPA 1)} \\ & = 99,781 \text{ (VPA 3)} \end{aligned}$$

Where:

$$\begin{aligned} BSA_{\text{Baseline}} & \text{ Number of ICS distributed in baseline} = 0 \\ BSA_{\text{Project}} & \text{ Number of ICS distributed in Project} = 44,517 \text{ (VPA 1)} \\ BSA_{\text{Project}} & \text{ Number of ICS distributed in Project} = 99,781 \text{ (VPA 3)} \end{aligned}$$

$$\begin{aligned} \text{Net Benefit (SDG 1)} & = HHS_{\text{Project}} - HHS_{\text{Baseline}} \\ & = 100\% \end{aligned}$$

Where:

$$\begin{aligned} HHS_{\text{Baseline}} & \text{ \% HH reporting money saving due to reduced fuel consumption in baseline} \\ & = 0 \\ HHS_{\text{Project}} & \text{ \% HH reporting money saving due to reduced fuel consumption in project} \\ & = 100\% \end{aligned}$$

SDG 3: Good Health and Well Being

$$\begin{aligned} \text{Net Benefit (SDG 3)} & = SPM_{\text{HH,Project}} - SPM_{\text{HH,Baseline}} \\ & = 100\% \end{aligned}$$

Where:

$$SPM_{\text{HH,Baseline}} \text{ \% HH reporting reduction in smoke/PM emissions while cooking on improved stove in baseline}$$

$$= 0$$

$$\begin{aligned} \text{SPM}_{\text{HH,Project}} & \text{ \% HH reporting reduction in smoke/PM emissions while cooking on} \\ & \text{improved stove in project} \\ & = 100\% \end{aligned}$$

SDG 5: Gender Equality

$$\begin{aligned} \text{Net Benefit (SDG 5)} & = \text{HHTS}_{\text{Project}} - \text{HHTS}_{\text{Baseline}} \\ & = 100\% \end{aligned}$$

Where:

$$\begin{aligned} \text{HHTS}_{\text{Baseline}} & \text{ \% HH reporting time saving from fuel collection due to reduced fuel} \\ & \text{consumption in baseline} \\ & = 0 \end{aligned}$$

$$\begin{aligned} \text{HHTS}_{\text{Project}} & \text{ \% HH reporting time saving from fuel collection due to reduced fuel} \\ & \text{consumption in project} \\ & = 100\% \end{aligned}$$

SDG 7: Affordable and Clean Energy

$$\begin{aligned} \text{Net Benefit (SDG 7)} & = \text{ACS}_{\text{Project}} - \text{ACS}_{\text{Baseline}} \\ & = 44,517 \text{ (VPA 1)} \\ & = 99,781 \text{ (VPA 3)} \end{aligned}$$

Where:

$$\begin{aligned} \text{ACS}_{\text{Baseline}} & \text{ Access to affordable and clean energy (Number of operating ICS units under} \\ & \text{Baseline)} \\ & = 0 \end{aligned}$$

$$\begin{aligned} \text{ACS}_{\text{Project}} & \text{ Access to affordable and clean energy (Number of operating ICS units under} \\ & \text{Project)} \\ & = 44,517 \text{ (VPA 1)} \\ & = 99,781 \text{ (VPA 3)} \end{aligned}$$

SDG 8: Decent Work and Economic Growth

$$\begin{aligned} \text{Net Benefit (SDG 8)} & = \text{QE IG}_{\text{Project}} - \text{QE IG}_{\text{Baseline}} \\ & = 18 \text{ (VPA 1 \& 3) (11 male, 7 female)} \end{aligned}$$

Where:

$$\begin{aligned} \text{QE IG}_{\text{Baseline}} & \text{ Quantitative Employment and income generation (Number of person (male} \\ & \text{and female) hired under Baseline)} \\ & = 0 \end{aligned}$$

QE IG_{Project} Quantitative Employment and income generation (Number of person (male and female) hired under Project)
= 18 (Total across both VPAs) (11 male, 7 female)

SDG 12: Responsible Consumption and Production

$$B_{y,savings} = B_{b,y,i} - B_{p,y,i}$$

Where:

$B_{y,savings}$ Reduction in domestic fuel consumption (tonnes/year)
= 5.45t

$B_{b,y,i}$ Fuel consumption for fuel type i used in baseline b in year y in tonnes, from baseline KPTs
= 6.44t

$B_{p,y,i}$ Fuel consumption for fuel type i used in project p in year y in tonnes, as derived from the statistical analysis of the data collected from the field tests
= 0.997t

SDG 13: Climate Action

For a complete overview of the ex-ante and ex-post CO₂ equivalent emissions reductions calculations please refer to the VPA Emissions Reductions Calculation Sheet.

The overall GHG reductions achieved by the project activity will be calculated as follows:

$$ER_y = \sum BE_{b,y} - \sum PE_{p,y} - \sum LE_{p,y}$$

Where:

ER_y Emission reduction for total project activity in year y (tCO₂e/yr)
= 221,656 (VPA 1)
= 496,823 (VPA 3)

$BE_{b,y}$ Baseline emissions for baseline scenario b in year y (tCO₂e/yr)
= 262,221 (VPA 1)
= 587,769 (VPA 3)

$PE_{p,y}$ Project emissions for project scenario p in year y (tCO₂e/yr)
= 40,565 (VPA 1)
= 90,926 (VPA 3)

$LE_{p,y}$ Leakage for project scenario p in year y (tCO₂e/yr)
= 0

As per the methodology the governing equation for the emission reduction calculations is as follows with $(\sum BE_{b,y} - \sum PE_{p,y})$ is directly merged in to the following equation.

$$ER_y = \sum_{b,p} N_{p,y} * U_{p,y} * (ER_{b,p,y,CO_2} + ER_{b,p,y,nonCO_2}) - \sum LE_{p,y}$$

Where:

$\sum_{b,p}$	Sum over all relevant (baseline b/project p) couples = 44,517 ICS (VPA 1) = 99,781 ICS (VPA 3)
$N_{p,y}$	Cumulative number of project technology-days included in the sales/distribution database for project scenario p against baseline scenario b in year y = 8,102,094 days (VPA 1) = 18,160,142 days (VPA 3)
$U_{p,y}$	Cumulative usage rate for technologies in project scenario p in year y, based on cumulative adoption rate and drop off rate revealed by usage surveys (fraction) = 90%
ER_{b,p,y,CO_2}	Specific CO ₂ emission savings for an individual technology of Project against an individual technology of Baseline b in year y, in tCO ₂ /day as derived from the statistical analysis of the data collected from the field tests = 0.0228 tCO ₂ e/day
$ER_{b,p,y,nonCO_2}$	Specific non-CO ₂ emission savings for an individual technology of Project against an individual technology of Baseline b in year y, in tCO ₂ /day as derived from the statistical analysis of the data collected from the field tests = 0.0076 tCO ₂ e/day
$LE_{p,y}$	Leakage for project scenario p in year y (See Section E.3) = 0% = 0 tCO ₂ e/yr

$$ER_{b,p,y,CO_2} = \sum_i \{ f_{NRB,b,i,y} * B_{b,y,i} * NCV_{b,i} * EF_{b,i,CO_2} \} - \sum_i \{ f_{NRB,b,i,y} * B_{p,y,i} * NCV_{p,i} * EF_{p,i,CO_2} \}$$

Where:

$f_{\text{NRB},b,i,y}$	Fraction of woody biomass used in year y for fuel type i that can be established as non-renewable biomass (NRB) = 0.91
$B_{b,y,i}$	Fuel consumption for fuel type i used in baseline b in year y in tonnes, from baseline KPTs = 6.44t
$B_{p,y,i}$	Fuel consumption for fuel type i used in project p in year y in tonnes, as derived from the statistical analysis of the data collected from the field tests = 0.997t
$\text{NCV}_{b,i}$	Net calorific value of the fuel type i used in baseline b (TJ/tonnes) = 0.015
$\text{NCV}_{p,i}$	Net calorific value of the fuel type i used in project p (TJ/tonnes) = 0.015
$\text{EF}_{b,i,\text{CO}_2}$	CO_2 emission factor of the fuel type i used in the baseline = 112 tCO ₂ /TJ = 1.6800 tCO ₂ /tonne of wood
$\text{EF}_{p,i,\text{CO}_2}$	CO_2 emission factor of the fuel type i used in the project = 112 tCO ₂ /TJ = 1.6800 tCO ₂ /tonne of wood
i	Fuel Type

$$\text{ER}_{b,p,y,\text{nonCO}_2} = \sum_i \{ B_{b,y,i} * \text{NCV}_{b,i} * \text{EF}_{b,i,\text{nonCO}_2} \} - \sum_i \{ B_{p,y,i} * \text{NCV}_{p,i} * \text{EF}_{p,i,\text{nonCO}_2} \}$$

Where:

$\text{EF}_{b,i,\text{nonCO}_2}$	non-CO ₂ emission factor of the fuel type i used in the baseline = 30.6 (CH ₄), 3.35 (N ₂ O) tCO ₂ /TJ = 0.5588 tCO ₂ /tonne of wood
$\text{EF}_{p,i,\text{nonCO}_2}$	non-CO ₂ emission factor of the fuel type i used in the project = 30.6 (CH ₄), 3.35 (N ₂ O) tCO ₂ /TJ = 0.5588 tCO ₂ /tonne of wood
LE_y	Leakage for project scenario p in year y = 0%

E.3. Calculation of leakage

$\text{LE}_{p,y}$	Leakage for project scenario p in year y = 0 tCO ₂ e/yr
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Leakage Calculation Justification:

<i>The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.</i>	The traditional stoves being replaced are 'three stone' open fires. These are rudimentary devices, crafted locally and have no market value. Households outside the project boundary can set up their own 3-stone fires and hence there is no risk that the baseline devices from the project can move outside the boundary. This leakage source can therefore be discounted.
<i>The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.</i>	There is no risk of this as non-renewable biomass is available in abundance within the project boundary and there is no scenario where the NRB saved from this VPA will be used by non-project users. This leakage source can therefore be discounted.
<i>The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario.</i>	Considering the size of the project boundary, rate of deforestation and the size of the VPA there is no risk that the VPA impacts the NRB of the project wood collection area. Furthermore, the fNRB will be re-assessed at the start of the subsequent VPA crediting period.
<i>The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.</i>	The climate in Zambia is temperate to hot. There is very little space heating by stoves in the population. No evidence exists that the project will result in increased fuel use for heating from inefficient stoves. The end-user habit surveys found no other fuel usage in project households other than wood. Project KPTs also cover all fuel use in the household and so ensure that any fuel

	usage, other than cooking, is also accounted for in the project scenario. As per the KPT protocol, the total amount of wood used daily by each sampled household is measured/weighed. The wood is not separated and weighed for different activities but rather all the wood collected and used on a daily basis is weighed/measured. This includes the use of wood for other practices such as heating and even wood used in other stove types (e.g. baseline 3 stone fires). Therefore, there is no possible leakage in this scenario.
<i>By virtue of promotion and marketing of a new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.</i>	The baseline appliances, as documented in the PDD and established through the baseline surveys, are 3-stone, open fires. The use of these open fires is commonplace in rural Zambia and is a more GHG intensive technology than the ICS distributed in the project scenario.

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	VPA	Baseline estimate	Project estimate	Net benefit
13	Tonnes CO ² equivalent emissions	1	262,221	40,565	221,656
		3	587,769	90,926	496,823
				44,517	44,517
1	Number of ICS distributed	1	0	99,781	99,781
	Monetary savings	3	0	61.88 kwacha (VPA 1 & 3)	61.88 kwacha (VPA 1 & 3)
3	% HH reported reduction in smoke/PM	1	0	100%	100%
	Emissions while cooking on ICS	3	0	100%	100%
5	% HH reporting time saving from fuel	1	0	100%	100%

	collection due to reduced consumption	3	0	100%	100%
7	Access to affordable and clean energy (number of ICS distributed)	1 3	0 0	44,517 99,781	44,517 99,781
8	Quantitative employment and income generation (Number of persons hired)	1 3	0 0	18 (VPA 1 & 3)	18 (11 male, 7 female) (VPA 1 & 3)
12	Wood fuel savings while cooking on project ICS in tonnes per annum	1 3	6.44 6.44	0.997 0.997	5.45 5.45

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	VPA	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values ⁷ achieved during this monitoring period
13	1 3	219,106 (tCO ₂ e) 490,925 (tCO ₂ e)	221,656 (tCO ₂ e) 496,823 (tCO ₂ e)
1	1 3	45,000 (Number of ICS distributed) 32,700 (Number of ICS distributed) 67.5 kwacha (monetary savings)	44,517 (Number of ICS distributed) 99,781 (Number of ICS distributed) 61.88 kwacha (VPA 1 & 3) (monetary savings)
3	1 3	100% 100%	100% 100%
5	1 3	100% 100%	100% 100%
7	1 3	45,000 (Number of ICS distributed) 32,700	44,517 (Number of ICS distributed) 99,781 (Number of ICS distributed)
8	1 3	30 (Number of persons hired) 30 (Number of persons hired)	18 (Number of persons hired)(11 male, 7 female) 18 (Number of persons hired)(11 male, 7 female)

⁷ Whenever emission reductions are capped, both the original and capped values used for calculations must be transparently reported. Use brackets to denote original values.

12	1	4.89 (tonnes/year)	5.45 (tonnes/year)
	3	4.89 (tonnes/year)	5.45 (tonnes/year)

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

Ex-ante values were based on the total number of days that the monitoring period lasts, assuming that all ICS were distributed before day 1. $B_{y,savings}$ was calculated ex-ante and based on assumed project fuel use values in VPA-DD; ex-post savings are monitored using project field KPTs which has shown a higher level of fuel savings per ICS than expected in the baseline. The calculations for ex-ante pKPT were done using a ratio between the thermal efficiencies of the baseline 3-stone fire and the ICS. The methodology default thermal efficiency for a three-stone fire is 0.1 and a sample efficiency test for the ICS showed a thermal efficiency of 0.416. Using the ratio in thermal efficiencies, ex-ante pKPT was calculated as 24% of the bKPT or 1.5487 tonnes per household per year. Therefore net, ex-post ERs are marginally higher than estimated in the VPA-DDs since our pKPT of 0.997 tonnes per household per year was slightly lower than the ex-ante pKPT.

In the ex-post scenario, no leakage was observed and therefore no adjustment applied, but a usage rate adjustment of 0.90 was applied. This further leads to differences in the calculated ex-ante and ex-post emissions reductions.

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

SDG 1 & 7: For VPA 3 more stoves were distributed than expected as more investment than was envisaged in the VPA was obtained by the Project Participants.

SDG 12: Ex-ante wood savings were estimated/calculated based on baseline fuel use values and the improved thermal efficiency of the project stove, the ex-post values were determined through KPT's by subtracting pKPT value from the measure bKPT value. This resulted in an increase of the SDG 12 impact observed.

SDG 13: In VPA 3 there was an increase in SDG 13 impact in relation to the Ex-Ante values. This is due to the monitored project KPT ($B_{p,y}$) value being lower than the estimated Ex-Ante value. Also, as mentioned in Section E.5. significantly more ICS

devices have been distributed as against the Ex-Ante scenario. Thus, the emission reductions for VPA 3 are higher than Ex-Ante estimates.

SECTION F. SAFEGUARDS REPORTING

Risk identified in PDD	Actions to Mitigate	Mitigated? (yes/no)
Principle 6.1 Labour Rights: The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions	This is in effect a monitored parameter (QE IG) for SDG 8. Legal employment contracts for project staff in Zambia are provided to the VVB as evidence. Stove manufacturers will be required to show suitable, up-to-date OHS policy.	Yes
Principle 6.1 Labour Rights: Working agreements with all individual workers shall be documented and implemented and include: a. Working hours (must not exceed 48 hours per week on a regular basis), AND b. Duties and tasks, AND c. Remuneration (must include provision for payment of overtime), AND d. Modalities on health insurance, AND e. Modalities on termination of the contract with provision for voluntary resignation by employee, AND f. Provision for annual leave of not less than 10 days per year, not including sick and casual leave.	This is in effect a monitored parameter (QE IG) for SDG 8. Legal employment contracts for project staff in Zambia are provided to the VVB as evidence.	Yes

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

There were no inputs and grievances received during the monitoring period. TASC maintains a grievance logbook for each VPA which is present at the TASC offices in Katete, Zambia. Stoves are also fitted with the phone number for our call center in Lusaka. An additional grievance logbook is present in Lusaka for the overall PoA GS11009.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

There are no stakeholder mitigations agreed in the monitoring period.

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

There were no legal contests during the monitoring period.

Revision History

Version	Date	Remarks
1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption