Monitoring report form for CDM programme of activities

(version 01.0)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form for CDM programme of activities" at the end of this form.

MONITORING REPORT		
Title of the programme of activities (PoA)	GS 1265 – African Biomass Energy Conservation PoA	
UNFCCC reference number of the PoA	GS 1265	
Version number(s) of the PoA-DD(s) applicable to this monitoring report	Version 13	
Coordinating/managing entity (CME)	Hestian Innovation Limited	
Version number of this monitoring report	3.1	
Completion date of this monitoring report	11/06/2018	
Monitoring period number and dates covered by this monitoring report	First (1st) Monitoring Period PoA: 17/10/2012 – 15/03/2017 Monitoring Period for the VPA: 01/05/2014 - 15/03/2017	
Monitoring report number for this monitoring period	1	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a specific-case VPA covered in this monitoring report? (yes/no)
	Burundi, Dem. Rep of Congo, Eritrea, Ethiopia, Lesotho, Malawi, Mozambique, Rwanda, Somalia, Tanzania, Uganda, Zambia and Kenya.	No No No No No Yes No No No No No No No
Sectoral scope(s)	Sectoral Scope 3 (Energy Demand)	
Selected methodology(ies)	Gold Standard Methodology: Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0	
Selected standardized baseline(s)	N/A	

Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case-case VPAs in the PoA covered in this monitoring report	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0	172,539

PART I - Programme of activities

SECTION A. Description of PoA

A.1. Brief description of the PoA

The goal of the PoA is to generate verifiable reductions of greenhouse gas emissions from non-renewable biomass in each of its voluntary project activities, while creating tangible sustainable development benefits.

The improved household wood stoves and institutional wood stoves reduce fuel consumption by improved combustion and improved heat transfer. The stoves raise the cooking pot to the hottest point above the flame. The improved household cook-stoves target predominantly low-income households using non-renewable biomass energy on traditional/unimproved/low-efficiency stoves. The institutional cook stoves target institutions that regularly cook for large groups of people, such as schools, health centres, prisons, barracks etc. that use non-renewable biomass energy on traditional/unimproved/low-efficiency stoves.

The PoA will create tangible sustainable development benefits for the Host Parties.

The target number of VERs for each VPA shall not exceed the small-scale VPA aggregate energy savings limit of 180 GWh thermal per year in fuel input.

There is no limit to the planned number of VPAs or the 'planned total ERs of the PoA'. By way of example only, for cookstove projects, 5 VPAs per country could be equivalent to over 400,000 VERs per country per year over 7 years.

During monitoring period covered in this monitoring report 178 344 household cook stoves and 1 040 institutional cook stoves were disseminated within the program of activities.

Total number of emission reduction achieved by VPA 2446 during the monitoring period is 172,539, while baseline emissions would have been 367,720.

To date, cookstoves have been disseminated under GS 1265 in Malawi and Rwanda, and a local stakeholder consultation for improved cookstoves has been held in Zambia. It is likely that stakeholder consultations will be held in other countries. PP is currently engaging in discussions with various entities toward starting projects in other PoA countries.

A.1.1. Generic VPA(s)

Title, identification/reference number and/or version number of the generic VPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
VPA GS 2397 - African Biomass Energy Conservation PoA – Rwanda Biomass Conservation (Domestic cook stoves Rwanda)	Sectoral Scope 3 (Energy Demand)	Gold Standard Methodology: Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0

Title, identification/reference number and/or version number of the generic VPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
GS 1330 – GS 1265 – African Biomass Energy Conservation PoA – Malawi Biomass Conservation (Domestic cook stoves Malawi)	Sectoral Scope 3 (Energy Demand)	Gold Standard Methodology: Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0
GS 2444 – GS 1265 – African Biomass Energy Conservation PoA – Malawi Biomass Conservation (Domestic & Institutional cook stoves Malawi)	Sectoral Scope 3 (Energy Demand)	Gold Standard Methodology: Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0

A.1.2. Specific-case VPA(s) covered in this monitoring report

Reference number of the specific-case VPA included in the PoA as of the end of this monitoring period	Title, identification/ reference number and version number of the generic VPA to which the specific-case VPA applies	Crediting period dates of the specific-case VPA	Is this specific-case VPA covered in this monitoring report? (yes/no)
VPA GS 2446	GS 1330 – GS 1265 – African Biomass Energy Conservation PoA – Malawi Biomass Conservation (Domestic cook stoves Malawi)	01/03/2013 – 29/02/2020	Yes

A.2. Contact information of the coordinating/managing entity (CME) and/or responsible persons(s)/entity(ies)

Conor Fox
Hestian Innovation Limited (Hestian)
conor.fox@hestian.com

Hestian is also the CME as per Appendix 1.

SECTION B. Implementation of PoA

B.1. Implementation of the management system of the PoA

GS project registration date is 23/04/2014.

Start date of the Crediting Period of the PoA – 24/11/2008 (Start date of CP of GS 2444). PoA and each VPA under the PoA will have 7 years long renewable crediting period.

To ensure continuous feedback with local stakeholders the grievance mechanism has been established within the implementation of PoA.

The approaches and tools considered for the users to be able to convey/register any probable feedback continuously include: 1) submission of the feedback to VPA implementers in their offices; 2) submission of the feedback to VPA implementers via email; 3) submission of the feedback to VPA implementers via phone; 4) submission of the feedback to VPA implementers via online form.

Offices of VPAs implementers (Area 55 Consulting Office in Lilongwe, Malawi and Billem Innovations Office in Kigali, Rwanda) were defined as appropriate and publicly accessible locations at which local stakeholders can provide their feedback on the project. These locations are also conducive to continuous and regular checks for stakeholder comments. The logbooks are kept at the offices of VPA implementers to record the feedback from the stakeholders.

Email addresses and phone numbers of the Project Implementers have been provided for continuous input / grievance for the convenience of stakeholders with internet access (Maya Khonje Stewart, Area 55 / Maeve, 00265 999 383 457 for Malawi; Francine Mukareberwa, Billem Innovations, mukafrancy@yahoo.co.uk, 00250 782 895546, 00250 735 004 041 for Rwanda). The table for recording input / grievance is also available on the Project Developer's website in both English and Kinyarwanda, and an email address for the Gold Standard's regional manager has also been provided.

Local stakeholders have not provided any feedback via the established grievance mechanism as there were no submissions via any of the provided feedback submission tools described above.

Total sales records database has been maintained so that end users can be traced (i.e. name, address and telephone number, if available) documenting the date and place of sale and the number of stoves bought. The database also contains stoves serial numbers and VPA id information. In the case of bulk sales of domestic cookstoves in Malawi (there are no bulk sales in Rwanda to date), which represent less than 50% of the customers, information is kept on the place of sale and of the date of delivery with a conservative means of estimating when the stove is first used (each stove is assumed to be first used after 25 days since date of delivery based on the bulk sales analysis of the average time between delivery to retail outlet and purchase by end-user)[1].

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Separate databases are maintained for the Chitetezo Mbaula domestic cookstove in Malawi, the Mayankho Fixed Institutional Stove in Malawi and The Canarumwe domestic cookstove in Rwanda.

The domestic cook-stove model disseminated within PoA is a Ceramic Stove called the Chitetezo Mbaula in Malawi and Canarumwe in Rwanda. This stove can be used as a portable stove or can be fixed, and has a laboratory test efficiency of 30.6% (more than three times the default 10% efficiency of the baseline three stone and unimproved cook-stoves) which results in reduced fuel consumption by improved combustion, improved heat transfer, raising the cooking pot to the hottest point above the flame, and improved heat retention. The Ceramic Stove is produced at a local level using locally available materials, thereby creating employment in a 'green' industry.

The institutional cook stoves (Mayankho Fixed Institutional Stove) target institutions that regularly cook for large groups of people, such as schools, health centres, prisons, barracks etc. that use non-renewable biomass energy on traditional/unimproved/low-efficiency stoves. Mayankho Fixed Institutional Stove could have pot size with the volume from 20 to 200 litres. Based on the monitoring data the average efficiency of Mayankho Fixed Institutional Stoves is 0.386 tonnes of wood / 10,000 meals.

The serial numbers allocated to each device under the PoA allow unique identification and tracking of the devices to avoid double accounting. Based on the serial numbers, a device can only count in one VPA.

Data will be kept for the whole crediting period of the VPA and an additional two years.

Mode of use is assumed to be domestic for household cookstoves and has verified in monitoring and usage surveys. The surveys revealed that there is not a significant amount of surveyed customers that use the improved stoves for non-domestic or non-institutional purposes (e.g. commercial, etc.), hence there is not a need at this time to set up a new cluster with accompanying monitoring activities (e.g. usage surveys, stove performance tests etc.).

Monitoring is based on representational sampling. Malawi and Rwanda are monitored apart. Households that predominantly heat and cook with firewood in both countries have very similar characteristics and the difference from one village to another in Malawi or Rwanda is quite small. To date there is only one VPA in Rwanda that is populated. In Malawi there are five VPAs which have very similar project and baseline scenarios and provide legitimate samples for monitoring purposes for the cluster in question, hence sampling of households and/or institutions for usage/monitoring surveys, KPTs and WBTs across different activities is conducted.[2]

The following monitoring tasks will been undertaken (periodically):

- At least 30 households (HHs) and / or institutions are sampled for monitoring surveys every year[3],

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4th Periodic Verification Report "Integrated Biomass Energy Conservation Project, Malawi (GS613)

[2] The similarity of the project and baseline scenarios and the associated legitimacy of sampling candidates from various VPAs to facilitate cost effective but comprehensive monitoring can be validated for forthcoming VPAs.

[3] In some cases the target of 30 was not made for a specific age-group due to high levels of non-response, e.g. (TBC)

- At least 100 HHs and/or institutions have been sampled for usage rates every year (stoves aged 0-1 will be at least 6 months old on average, stoves aged 1-2 will be at least 18 months old on average, stoves aged 2-3 will be at least 30 months old on average etc.) with at least 30 samples from each age-group being credited (e.g. customers with stoves aged 0-1, customers with stoves aged 1-2 etc.)[4],

- Using the results of actual usage surveys, the mean number of months when only 50% of customers are using their stoves has been used to calculate (or estimate until enough historical data is available for calculation) the "average lifespan" of a stove, after which VERs will no longer be claimed. The most conservative value among estimated life-span for the clay stoves (Chitetezo Mbaula Malawi and Canarumwe in Rwanda) equal to 1417 days is used for calculation of emission reductions.[5] Ex-ante life-spans of 10 years is predicted for the Mayankho Fixed Institutional Stove. The oldest Mayankho Fixed Institutional Stove stove at the end of time of completing this report was still working and it was installed in 2010 (so it has been functional for 6 years),

- In cases, where users retain the baseline technology as a backup or auxiliary technology in parallel with the improved technology, the extent to which the baseline technology is used has been quantitatively assessed through monitoring surveys and an appropriate and conservative adjustment factor has been applied,

- At least 30 both HHs and institutions have been sampled for stove performance tests (KPT) conducted every second year and KPT results are used for updating the project fuel consumption level. For HHs, the project KPT has been performed twice in Malawi (2009 and 2011) and once in Rwanda (2013) and after GS Design Change approval annual Water Boiling Tests (WBT) are to be conducted to adjust the project fuel consumption level. The monitoring requirements for WBT as specified in the GS TAC rule update from December 2015 are to be followed.

- Leakage is assessed every 2 years,

- fNRB is monitored over time and any new official fNRB can be applied if they are officially published or officially recognised by the DNA of the Host country.

For site-visits when new technologies / methodologies are introduced into the programme subsequent to programme registration, one or two more easily accessible areas or project activity which are representative of the project targets will be identified, from which the Gold Standard or representative can randomly select from the sales database, a small sample (10-15 end users) to be interviewed.

Single sample test is applied for household cook-stoves. Until such time as a default value is applicable for institutional cook stoves, baseline and project fuel tests are to be used for institutional cook stoves.

All parties involved in implementing a VPA are aware and agree that the VPAs are subscribed to the PoA.

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[4] Ibid.

[5] Based on a survey of 144 households sampled and surveyed and stratified into the age-groups within 16 geographic areas, locally known as GVHs, statistical analysis gave a total days of technical life-time of Portable Clay Stoves (PCS) of 1,417 days. 4th Periodic Verification Report "Integrated Biomass Energy Conservation Project, Malawi (GS613), by TUV Nord, Page 29 of 115

B.2. Implementation of single sampling plan(s)

List of VPAs to which sampling method applied	Date of data collection	Implemented Sampling design: Sample Size – households (Hhs) Sampling method (random; representative) Required precision / confidence	Analysis & Source of collected data
Usage & Monitoring Surveys			
GS2446 (PCS in Malawi)	25/11/2013 - 28/11/2013	144 HH (1 year: 38; 2 years: 32; 3 years: 36; 4 years: 38) responses from a sample of 160. Sampled from Balaka in Southern Malawi. GVHs (micro geographic areas) randomly sampled; then households randomly sampled. 144 in person; 0 by phone.	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Results of analysis based on usage age: age 0-1 – 85.71%; age 1-2 – 76.95%; age 2-3 – 68.19%; age 3-4 – 59.43%. Leakage rate accounting for baseline stoves use: 2.14 % Deduction (discount factor) for households with more than 1 stove installed: 17.95% Source of collected data: Usage & Monitoring Survey Report Portable Clay Stoves (PCS) – 2013
	02/09/2014 - 02/10/2014	269 HH (1 year: 96; 2 years: 92; 3 years: 47; 4 years: 34) responses from a sample of 280. Sampled from Balaka, Blantyre, Lilongwe & Salima in Central & Southern Malawi. GVHs randomly sampled; then households randomly sampled. Old stoves sampled in areas where dissemination oldest. 209 in person; 60 by phone.	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Results of analysis based on usage age: age 0-1 – 95.13%; age 1-2 – 80.82%; age 2-3 – 66.50%; age 3-4 – 52.18%. Leakage rate accounting for baseline stoves use: 2.32 % Deduction (discount factor) for households with more than 1 stove installed: 11.46% 100% of stoves used for domestic purposes Source of collected data: Usage & Monitoring Survey Report Portable Clay Stoves (PCS) – 2014

	15/06/2015 - 29/09/2015	136 HH (1 year: 30; 2 years: 34; 3 years: 38; 4 years: 34) response from a sample of 160 in rural and peri-urban areas. 40 HHs of 4 different age-groups from 4 different Districts (Kasungu, Balaka, Ntcheu & Lilongwe) randomly sampled form most populous villages in Traditional Authorities with most stoves. In peri-urban areas (e.g. in Lilongwe in the villages surrounding the Capital City) there is more mobility and it is difficult to trace end-users or are often not available during the day for survey.	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Results of analysis based on usage age: age 0-1 – 93.17%; age 1-2 – 87.70%; age 2-3 – 82.23%; age 3-4 – 76.76%. Leakage rate accounting for baseline stoves use: 6.61 % Deduction (discount factor) for households with more than 1 stove installed: 18.56% Source of collected data: Usage & Monitoring Survey Report Portable Clay Stoves (PCS) – 2015
	08/08/2016 - 22/09/2016	122 HH (1 year: 31; 2 years: 31; 3 years: 30; 4 years: 30) responses from a sample of 160 households. 40 HHs from each of 4 different age-groups from 4 different Districts (Balaka, Dedza, Ntcheu, Nsanje) were randomly sampled form most populous villages in Traditional Authorities with most stoves.	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Results of analysis based on usage age: age 0-1 – 71.16%; age 1-2 – 70.77%; age 2-3 – 70.39%; age 3-4 – 70.00%. Leakage rate accounting for baseline stoves use: 15.92 % Source of collected data: Usage & Monitoring Survey Report Portable Clay Stoves (PCS) – 2016
	20/01/2017 – 10/02/2017	114 HH (2 years: 42; 3 years: 35, 4 years: 37) responses from a sample of 135 households. 45 HHs from each of 3 different age-groups (there were no stoves of age group 1 at the time of monitoring) from 4 different Districts (Lilongwe, Nsanje, Dedza, Balaka) were randomly sampled.	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Results of analysis based on usage age: age 1-2 – 86.08%; age 2-3 – 71.37%; age 3-4 – 56.66%. Source of collected data: Usage & Monitoring Survey Report Portable Clay Stoves (PCS) – 2017
KPTs			
GS2446 (PCS in Malawi)	2009	252 HHs with complete data sets	1.566 tonnes biomass / HH p.a.

	30/03/2011 - 04/04/2011	103 HHs (aging stove tests over 72 hours from households that purchased stoves in the first year of project 24/11/2008 to 23/11/2009)	1.813 tonnes biomass / HH p.a.
WBTs			
GS2446 (PCS Malawi)	05/2012 to 03/2013	12 stoves (3 stoves each for age groups 0-1, 1-2, 2-3, 3-4) - initial WBTs carried out in May 2012 but when it came to completing report it was found that there was not sufficient data and another round of tests was completed in February 2013 - villages selected that have stoves of all age groups and HHs within these villages randomly sampled for WBTs	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Including simmer: $Eff_{P,PCS,0-1}$ = 25.61%; $Eff_{P,PCS,1-2}$ = 25.15%; $Eff_{P,PCS,2-3}$ = 24.69%; $Eff_{P,PCS,3-4}$ = 24.23% Simple overall average efficiency 24.92% Source of collected data: Water Boiling Tests for Aging Stoves - 2013
	2015/2016	Because of various logistical challenges it was not possible to test stoves in 2015 and until July – September 2016. 25 stoves (appr. 6 stoves from each age-group 0-1, 1-2, 2-3, 3-4) WBTs were conducted in August and September 2016.	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Including simmer: $Eff_{P,PCS,0-1}$ = 25.73%; $Eff_{P,PCS,1-2}$ = 25.67%; $Eff_{P,PCS,2-3}$ = 25.60%; $Eff_{P,PCS,3-4}$ = 25.54% Simple overall average efficiency 25.51% Source of collected data: Report on Water Boiling Tests 2016 Aging Chitetezo Mbaula Household Cookstoves
	25/01/2017 – 26/02/2017	WBTs were conducted in January-February, 2017. 16 stoves (from age-group 1-2, 2-3, 3-4) were tested	Values used in emission reduction calculations were calculated based on survey results using statistical analysis. Including simmer: $Eff_{P,PCS,1-2}$ = 26.65%; $Eff_{P,PCS,2-3}$ = 25.53%; $Eff_{P,PCS,3-4}$ = 24.42% Simple overall average efficiency 25.52% Source of collected data: Report on Water Boiling Tests 2017 Aging Chitetezo Mbaula Household Cookstoves

Average usage rate for each age group was calculated using monitoring surveys results.

Single weighted usage parameter is calculated for each VPA based on the number of project technology-days in each age group:

(Usage rate for age 0-1 * Number of technology days of age 0-1 + Usage rate for age 1-2 * Number of technology days of age 1-2 + Usage rate for age 2-3 * Number of technology days of age 2-3 + Usage rate for age 3-4 * Number of technology days of age 3-4) / (Total number of technology days)

KPTs performed in 2009 and 2011 as part of GS 613 will be used for all activities in Malawi in the first crediting period of PoA GS 1265. The average of $P_{P, PCS, 2009}$ and $P_{P, PCS, 2011}$ are used to estimate the monitored consumption of fuels:

1.690 Tonnes of dry biomass = ((1.566 + 1.813 tonnes biomass)/2)

The baseline fuel consumption will be fixed for the entire crediting period and project fuel consumption has to be updated either by biennial project KPTs or annual WBTs as explained in the GS TAC rule update from 12/2015.

In Malawi, WBTs conducted in 2015 have errors and did not properly follow sampling procedure so the project developer proposed to conduct WBTs in 2016 following the rule update of December 2015 for stoves of all age groups. The results are likely to be conservative as tests will happen a year after the date of verification hence 0-1 year old stove will actually be 1-2 year old stoves etc. For the years of 2014 and 2015 the lowest most conservative values among the available monitoring results (based on the results of Water Boiling Tests for Aging Stoves in 2013, 2016 and 2017) have been used. Average value of WBT results were used in emission reduction calculations.

All WBTs for activities under PoA GS1265, in both Malawi and Rwanda, in future are to comply with the guidance approved by TAC (conducted by an independent expert/entity, minimum sample size following 90/10 for each age group etc.).

SECTION C. Post-registration changes to the PoA (including the generic VPA(s))

C.1. Corrections

The VPAs under PoA 1265 using v.1.0 of TPDDTEC can establish the baseline fuel consumption through project fuel consumption and baseline/project fuel efficiencies without the need of applying the cap of 0.5 t/capita/year. The baseline fuel consumption is fixed for the whole crediting period and the project fuel consumption is updated by biennial project KPTs or aging test approach for project fuel updates (for details please see http://www.goldstandard.org/sites/default/files/documents/tpddtec_-_rule_update_dec_2015_publication_181215.pdf). The parameter sections and monitoring sections in PoA-DD and VPA-Dds were revised accordingly. The PP will update the project fuel consumption by aging test approach for project fuel updates. This is explicitly described in D.7.1. Data to be monitored (in the CDM-SSC-CPA-DD-FORM format) in each VPA under the monitoring parameter “Bp,PCS,0“ under the “monitoring frequency” section “Domestic cook stoves in VPAs using V.01 of TPDDTEC establish baseline fuel consumption through project fuel consumption using a KPT and baseline/project fuel efficiencies without applying the cap 0.5t/capita/year. The baseline fuel consumption will be fixed for the entire crediting period and project fuel consumption is updated by annual WBTs as explained in the GS TAC rule update from December 2015.”

Start date of the Crediting Period of the PoA – 24/11/2008 (Start date of CP of GS 2444).

C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic VPA-DD(s)), if a monitoring plan was not included at the time of registration

Monitoring plan included in the approved design change to PoA DD prior to submission of this monitoring report.

C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

There are no post-registration permanent changes to the monitoring plan being submitted in this monitoring report.

C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic VPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case VPAs in the PoA

The following changes to the programme design in the registered PoA-DD, including corresponding changes to the project design in the registered generic VPA-DD(s) were approved:

- the scale of programme of activities GS 1265 was changed from micro to small scale changing the limit from 10kVERs p.a. to the small-scale VPA aggregate energy savings limit of 60 GWh per year or 180 GWh thermal per year in fuel input (and VER equivalent), and
- existing SSC project activity GS613 (last issued up until 1/10/13) migrated into VPA GS2444 included in PoA GS1265;
- micro-scale activities GS 2444, GS 2445, GS 2446, GS 2447 (all Malawi) migrated to SSC activity VPA GS1330 included in PoA GS1265;
- micro-scale activities GS 1329, GS 2397, GS 2398, GS 2449, GS 2450 (all Rwanda) migrated to SSC activity VPA GS2397 included in PoA GS1265;

All VPAs will then be populated up to the SSC threshold limit.

New SSC activities GS 2445, GS 2446, GS 2447, GS 1329, GS 2398, GS 2449, GS 2450 will be populated with stoves until they reach the SSC threshold.

The eligibility criteria for inclusion of specific-case VPAs in the PoA-DD were updated to reflect the change of the scale of the project activity from micro-scale to small-scale. The emission reduction target for the VPA shall not exceed the small-scale aggregate energy savings limit of 60 GWh per year or 180 GWh Thermal per year in fuel input (This equates to no more than 81,412 tCO2e for VPAs in Malawi).

Design Change approval date 24/11/2016 for:
PoA DD GS1265 Version 13
VPA DD GS 2444 Version 13
VPA DD GS 2397 Version 8
VPA DD GS 1330 Version 10

C.5. Types of changes specific to afforestation and reforestation activities

N/A

PART II - Specific-case component project activity(ies)

SECTION D. Description of specific-case VPA(s)

D.1. Brief description of implemented specific-case VPA(s)

There is 1 specific-case VPA included in the monitoring report. The VPA foresees dissemination of improved cookstoves (i.e. the technology) that are more efficient and use less wood for household cooking and heating than the traditional stoves. Project activities also aim promotion of improved kitchen and firewood management practices e.g. use of less firewood, use of dry firewood, using a pot lid while cooking and soaking legumes before cooking (i.e. practices) to households. The improved technology and practices are intended to replace less efficient technologies and practices and result in biomass conservation and a reduction of greenhouse gas emissions into the atmosphere from the burning of solid biomass.

VPA GS 2446 foresees dissemination of improved household cookstoves in the Northern, Central and Southern Districts of Malawi. The monitoring period is defined at PoA level and the first monitoring period for all VPAs, incuding VPA GS 2446, is 17/10/2012 – 15/03/2017. Beginning of PCS distribution under the VPA 2446 is 01/05/2014 and the end of distribution is 24/02/2015. The start date of the crediting period is 01/03/2013 in line with the VPA DD (Section A.9.1). The actual dissemination started at a later date. There were no stoves disseminated under the VPA between the start of the crediting period and 01/05/2014. The number of PCS distributed within VPA is 25,053. Monitoring period covered in this monitoring report is 17/10/12 – 15/03/17 (both dates included).

D.2. Geographical references or other means of identification of the location of the specific-case VPA(s)

GS 2446 VPA is promoting PCSs in Malawi. Malawi is a landlocked country which shares its northwest border with the Republic of Zambia, northeast border with the United Republic of Tanzania, and its borders at east, south and west with the Republic of Mozambique.

Physical/geographical location of Malawi is the following: 13.9500° S, 33.7000° E.

SECTION E. Post-registration changes to specific-case VPA(s)

E.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

Due to logistical and financial reasons in exceptional cases it was not possible to conduct monitoring activities in some periods of PoA implementation. In particular:

- In Malawi, WBTs conducted in 2015 have errors and did not properly follow sampling procedure so the project developer proposed to conduct WBTs in 2016 following the rule update of December 2015 for stoves of all age groups. The results are likely to be conservative as tests will happen a year after the date of verification hence 0-1 year old stove will actually be 1-2 year old stoves etc. For the years of 2014 and 2015 the lowest most conservative values among the available monitoring results (based on the results of Water Boiling Tests for Aging Stoves in 2013, 2016 and 2017) have been used.

The baseline and monitoring methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption" Version 2.0, including rule update 18 December 2015, will be used for future monitoring periods.

E.2. Corrections

The VPAs under PoA 1265 using v.1.0 of TPDDTEC can establish the baseline fuel consumption through project fuel consumption and baseline/project fuel efficiencies without the need of applying the cap of 0.5 t/capita/year. The baseline fuel consumption is fixed for the whole crediting period and the project fuel consumption is updated by biennial project KPTs or aging test approach for project fuel updates (for details please see http://www.goldstandard.org/sites/default/files/documents/tpddtec_-_rule_update_dec_2015_publication_181215.pdf). The parameter sections and monitoring sections in PoA-DD and VPA-Dds were revised accordingly. The PP will update the project fuel consumption by aging test approach for project fuel updates. This is explicitly described in D.7.1. Data to be monitored (in the CDM-SSC-CPA-DD-FORM format) in each VPA under the monitoring parameter "Bp,PCS,0" under the "monitoring frequency" section "Domestic cook stoves in VPAs using V.01 of TPDDTEC establish baseline fuel consumption through project fuel consumption using a KPT and baseline/project fuel efficiencies without applying the cap 0.5t/capita/year. The baseline fuel consumption will be fixed for the entire crediting period and project fuel consumption is updated by annual WBTs as explained in the GS TAC rule update from December 2015."

Design Change approval date 24/11/2016 for:
PoA DD GS1265 Version 13
VPA DD GS 2444 Version 13
VPA DD GS 2397 Version 8
VPA DD GS 1330 Version 10

E.3. Changes to the start date of the crediting period of the specific-case VPA(s)

Start date of the Crediting Period of the PoA – 24/11/2008 (Start date of CP of GS 2444).

The start date of the crediting period of each VPA shall be as per the start date of very first cookstove installed in the activity.

The monitoring period for GS2397 shall not start prior to 20/09/2014 since some of the VPAs which were merged into GS2397 already issued credits and the monitoring period ending most recently of those VPAs was on 19/09/2014. For merged GS2397 starting date is 29/08/2012, monitoring period

and issuance starts not earlier than 20/09/2014 and 1st crediting period is from 29/08/2012 to 28/08/2019.

Starting date of GS1330 is 01/09/2012 (the starting date on the validated micro scale VPA). There is explicit recognition in the design change memo that registration date of ex-micro-scale VPA 1330 is 15/10/2014 and that the crediting period cannot start earlier than 2 years prior to registration date. Thus, the GS1330 will be credited from 17/10/2012.

GS2444 includes migrated GS613 (issued until 1/10/13) which began its crediting period in 24/11/2008, hence the first crediting period for GS2444 concludes on 23/11/2015 (the start of second crediting period of GS2444 would begin 24/11/2015). In accordance with Annex Z, the project documents have been submitted to GS prior to end of first crediting period (2015-11-23). The start date of the monitoring period for GS2444 is 2/10/13.

Stakeholder consultation have been held in Malawi regarding the PoA's cooking technologies at various levels including government, civil society and private sector, international and local community, beginning in 2008 in Malawi. Thus, that there is not a need to conduct a complementary stakeholder consultation for the renewal of the crediting period. There is no change (i) in 12 Sustainable Development (SD) indicators (ii) the level of risk associated with the 11 Safeguarding Principles of the Do-No Harm Assessment (DNHA). With respect to the baseline, there is no new relevant national and / or sectoral policies. Customers targeted by the project, i.e. low income households and institutions that predominantly used firewood as their main source of energy, mainly used 3 stone fire or other rudimentary cooking technologies, and for those who have not yet been reached by the project, continue to do so.

Reference number of the specific-case VPA included in the PoA as of the end of this monitoring period	Title, identification/ reference number and version number of the generic VPA to which the specific-case VPA applies	Crediting period dates of the specific-case VPA	Approval Date and Reference Number
VPA GS 2397	GS 2397 - African Biomass Energy Conservation PoA – Rwanda Biomass Conservation (Domestic cook stoves Rwanda)	29/08/2012 – 28/08/2019	Review for approval of design change for African Biomass Energy Conservation POA Master Project (GS1265) dated 24/11/2016
VPA GS 1330	GS 1330 – GS 1265 – African Biomass Energy Conservation PoA – Malawi Biomass Conservation (Domestic cook stoves Malawi)	17/10/2012 – 16/10/2019	Review for approval of design change for African Biomass Energy Conservation POA Master Project (GS1265) dated 24/11/2016
VPA GS 2444	GS 2444 – GS 1265 – African Biomass Energy Conservation PoA – Malawi Biomass Conservation (Domestic & Institutional cook stoves Malawi)	24/11/2008 – 23/11/2015 24/11/2015 - 23/11/2022	Review for approval of design change for African Biomass Energy Conservation POA Master Project (GS1265) dated 24/11/2016 Review for approval of Renewal of Crediting Period Review under GS Version 2.2 VER dated 04/08/2017
VPA GS 2445	GS 1330 – GS 1265 – African Biomass Energy Conservation PoA – Malawi	01/03/2013 – 29/02/2020	Review for approval of design change for African Biomass Energy Conservation POA

	Biomass Conservation (Domestic cook stoves Malawi)		Master Project (GS1265) dated 24/11/2016
VPA GS 2446	GS 1330 – GS 1265 – African Biomass Energy Conservation PoA – Malawi Biomass Conservation (Domestic cook stoves Malawi)	01/03/2013 – 29/02/2020	Review for approval of design change for African Biomass Energy Conservation POA Master Project (GS1265) dated 24/11/2016
VPA GS 2447	GS 1330 – GS 1265 – African Biomass Energy Conservation PoA – Malawi Biomass Conservation (Domestic cook stoves Malawi)	01/03/2013 – 29/02/2020	Review for approval of design change for African Biomass Energy Conservation POA Master Project (GS1265) dated 24/11/2016

E.4. Inclusion of a monitoring plan into the specific-case VPA(s) that was not included at registration

Monitoring plan for each specific-case VPA-DD(s) was submitted at the time of the registration of the PoA.

E.5. Permanent changes to the monitoring plan as described in the registered specific-case VPA-DD(s), applied methodology or standardized baseline

The values for non-CO2 emission factor from use of biomass $EF_{b,nonCO2}$ and $EF_{p,nonCO2}$ were calculated based on average of the range of values of CH4 and N2O emission factors of the wood fuel / wood waste as indicated in table 2.9, chapter 2 of Vol. 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories (0.529 tCO2/t wood valid for all VERs from January 01, 2013 onwards and 0.455 tCO2/t wood for all VERs until December 31, 2012). GS has confirmed that the values in table 2.9 can be applied PoA 1265 *(please see Qs to GS re DC 1265 190116.pdf)*.

Actual values of non-CO2 emission factor from use of biomass $EF_{b,nonCO2}$ and $EF_{p,nonCO2}$ used in emission reductions calculations were calculated to ensure consistency with PoA DD in terms of NCV value used and conservativeness of emission reduction calculation. The resulted values are slightly different from the values mentioned in Design Change Memo and referenced above (0.509 tCO2/t wood valid for all VERs from January 01, 2013 onwards and 0.438 tCO2/t wood for all VERs until December 31, 2012).

Design Change approval date 24/11/2016 for:
PoA DD GS1265 Version 13
VPA DD GS 2444 Version 13
VPA DD GS 2397 Version 8
VPA DD GS 1330 Version 10

E.6. Changes to project design of the specific-case VPA(s)

The following changes to the project design of the specific-case VPAs were approved:

- the scale of project activities for all specific-case VPAs included in PoA GS 1265 was changed from micro to small scale changing the limit from 10kVERs p.a. to the small-scale VPA aggregate energy savings limit of 60 GWh per year or 180 GWh thermal per year in fuel input (and VER equivalent), and

- existing SSC project activity GS613 (last issued up until 1/10/13) migrated into VPA GS2444 included in PoA GS1265;

- micro-scale activities GS 2444, GS 2445, GS 2446, GS 2447 (all Malawi) migrated to SSC activity VPA GS1330 included in PoA GS1265;

- micro-scale activities GS 1329, GS 2397, GS 2398, GS 2449, GS 2450 (all Rwanda) migrated to SSC activity VPA GS2397 included in PoA GS1265;

New SSC activities GS 2445, GS 2446, GS 2447, GS 1329, GS 2398, GS 2449, GS 2450 will be included in the PoA.

All VPAs will then be populated up to the SSC threshold limit.

Design Change approval date 24/11/2016 for:
PoA DD GS1265 Version 13
VPA DD GS 2444 Version 13
VPA DD GS 2397 Version 8
VPA DD GS 1330 Version 10

VPA GS 1329, GS 2398, GS2449 and GS2450 have not yet been started (stoves have not yet been disseminated), and thus they are not discussed in this MR.

E.7. Types of changes specific to afforestation and reforestation specific-case VPA(s)

N/A

SECTION F. Description of the monitoring system of specific-case VPA(s)

(i) A record keeping system for each technology or practice under the PoA,

An electronic record keeping system is operated and maintained by the managing entity for each VPA under the POA, which contains at least the following information per VPA:
- Name and ID of the VPA
- Technology deployed (Name of the device type)
- Name and contact details of the registered distributors/installers for the VPA, date of registration of the distributor
- Serial numbers (e.g. Stove-ID) of the device belonging to the VPA and corresponding information required for monitoring
- Start of VPA crediting period

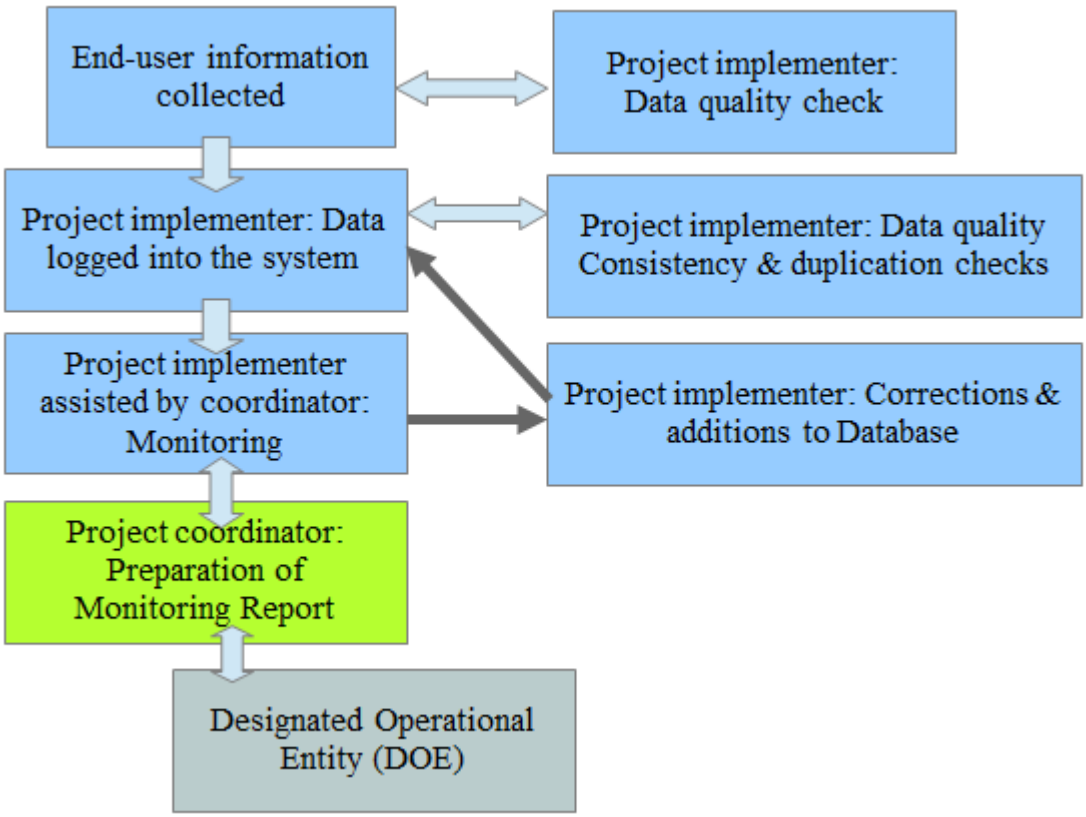
The record keeping system is updated as per the progress of the VPA. Data will be kept for the whole crediting period of the VPA and an additional two years.

(ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new VPA that has been already registered either as a project activity with GS or any other standard or as a VPA of another PoA,

In each VPA-DD it will be stated that the VPA has not been and will not be registered either as a single project activity or as a VPA under another POA. The serial numbers allocated to each device under the POA allow unique identification and tracking of the devices. Based on the serial numbers, a device can only count in one VPA.

(iii) The provisions to ensure that those operating the VPA are aware of and have agreed that their activity is being subscribed to the PoA;

It is ensured that all parties involved in implementing a VPA are aware and agree that the VPAs are subscribed to the POA.



The Project Coordinator assists the project implementing and monitoring bodies (project implementers), such as Area 55 Consulting and Concern Universal (CU), and the specific project managers to maintain and make available accurate records. The Project Coordinator collates a composite electronic Total Sales Record and project implementers keep back-up paper records. The existing accounting and records system accurately tracks sales, inventories and supply and purchases. Project implementers maintain a full electronic sales database of all household sales that take place, listed according to the sales mechanism, date, device, type etc. Sales databases are cross-checked with production records and other data to ensure consistency and accuracy.

Area 55, who is the only project implementer currently promoting institutional stoves, implements a 2 year limited warranty system for the institutional cook stoves. There is no formal overarching warranty system in place for household cookstoves, from any of the project implementers. Replacement within areas less than 10km away from promoter and production group may be done if stove breaks within first few weeks of use at the discretion of the stove promoter and production group[6]. Further than this it is too difficult to assess for simple ceramic stove if stove broke during transport or recklessness or fault of user.

End user information is collected through direct sales to end-users by retailers or agents of the project and is contained in warranty and/or emission reduction contract. This information is collated into an electronic database from which project monitoring can be conducted. The database and Excel records are backed up and sent to the project coordinator for checking prior to using them as the basis for monitoring activities. Hard copies of ER contracts and warranty are filed as additional backup and for verification purposes. One of the main project implementers Area 55 Consulting also began scanning these paper records to prevent any losses in case of emergencies such as fire/theft.

Direct sales to end-users information is collected by implementers' agents who are issued with contract forms in advance and submit the forms to the relevant project managers. The customers in the sales record for which phone numbers or addresses are available are used for survey sampling to support the periodic monitoring activities.

Monitoring tasks, such as monitoring surveys, assessment of leakage and other such tasks are managed by the project managers who are best capable of collecting this data because they know the technology and the end-users best, with the support of the project coordinator.

It is important to note that monitoring surveys are not used directly in ER calculations, but instead serve to inform whether new clusters are required (which could in turn effect ER calculations) and monitor certain Gold Standard sustainability indicators. Surveys and tests are organised by project implementer staff with guidance from the project coordinator, and enumerators are trained prior to conducting surveys and tests. Survey and test results are filed in paper at Area 55's office and are analysed using Excel to compile reports. The integrity of data is constantly cross-checked with other variables to ensure consistency and avoid mistakes.

The agenda of the trainings conducted within the PoA implementation included:

- conducting kitchen performance household survey and water boiling tests to monitor and to measure stove usage and performance (January, 2017);
- Human Resource Policy, Gender Policy, Asset Management Policy, Whistle Blowing Policy, HIV Policy (January, 2017);
- clay site management inspection (December, 2016);
- Cleaner Cooking Camp, where issues around biomass use and Malawi's stand towards 2 million cookstoves were discussed and a road map was developed (March, 2016), etc.

[6] The approach is an informal agreement between producers, promoters and customers. The complementary replacement stove promotes customer loyalty and helps to market the stoves locally.

SECTION G. Data and parameters

G.1. Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period

Data / Parameter:	fNRB,i,y
Data unit:	Fraction of non-renewability
Description:	Non-renewability status of woody biomass fuel in scenario I during year y
Source of data:	Default values of fraction of non-renewable biomass approved by CDM EB and accepted by DNA as indicated at UNFCCC website[7]
Value(s) applied	**Country** / **Default Values fNRB**: Malawi 81%; Rwanda 98%
Choice of data or Measurement methods and procedures:	Fixed by baseline study for a given crediting period, updated if necessary as specified in section III.1 of the methodology. No equipment used.
Purpose of data	Calculation of baseline and project emissions
Additional comment:	As applicable NRB assessment may be used for multiple scenarios. Default country specific value. The parameter value is fixed ex ante, and is to be re-assessed and fixed at the beginning of each crediting period.

Data / Parameter:	$NCV_{,biomass}$
Data unit:	TJ/t
Description:	Net calorific value of the non-renewable biomass that is substituted
Source of data:	Default value based on 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter I: Introduction, Table 1.2
Value(s) applied	0.015
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of baseline and project emissions
Additional comment:	

Data / Parameter:	$EF_{b, CO2}$ and $EF_{p, CO2}$
Data unit:	tCO_2 / t wood
Description:	CO_2 emission factor arising from use of fuels in baseline and project scenarios
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter I: Introduction, Table 1.2 and Table 1.4
Value(s) applied:	1.680 tCO2/t wood (=112.0 tCO2/TJ * 0.015 TJ/ t)
Choice of data or Measurement methods and procedures:	Default IPCC values for wood / wood waste and default NCV of the wood fuel are applied for calculation of emission factors required to calculate CO_2 emission reductions
Purpose of data	Calculation of baseline and project emissions

[7] https://cdm.unfccc.int/DNA/fNRB/index.html

Additional comment:	EF's in baseline and project have the same value as the project reduces use of the same fuel. PoA DD contains two values of NCV for biomass: rounded value 0.015 in the description of the parameter NCV,biomass and 0.0156 in the description of CO2 emission factor. To ensure consistency with PoA DD in terms of NCV value used and conservativeness of emission reduction calculation 0.015 was used for the calculation of non-CO2 emission factor. This resulted in inconsistency with PoA DD for the value of non-CO2 emission factor.

Data / Parameter:	$EF_{b, nonCO2}$ and $EF_{p, nonCO2}$
Data unit:	tCO_2 / t wood
Description:	Non-CO_2 emission factor arising from use of fuels in baseline and project scenarios
Source of data:	Average of default value range, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter II: Stationary Combustion, Table 2.9
Value(s) applied:	Values effective till 31.12.2012 0.438 tCO2/t wood Values effective from 01.01.2013: 0.509 tCO2/t wood
Choice of data or Measurement methods and procedures:	Average of default IPCC values range for CH4 and N20 emissions factor of the wood / wood waste and are applied to calculate non-CO2 emission factor of the wood fuel / wood waste. Global warming potentials according to Fourth Assessment Report of the IPCC, Table 2.14 were used to convert non-CO2 emission factors to CO2 emissions. The following GWP100 are applied: 21 for CH4, 310 for N2O effective till 31.12.2012; 25 for CH4, 298 for N20 effective from 01.01.2013. Default net calorific value of the wood fuel was used to convert non-CO2 emission factor of the wood fuel / wood waste from tonnes CO2 / TJ to tonnes CO2 per tonne of wood.
Purpose of data:	Calculation of baseline emissions and project emissions
Additional comment:	Both defaults are within a range and the mean of the range is taken as the default. Technical references are from studies in developing country contexts and are more up-to-date than other default values. EF in baseline and project have the same value as the project reduces use of the same fuel. The values have changed from the values indicated in the registered PoA DD and VPA DD due to the following reason. PoA DD contains two values of NCV for biomass: rounded value 0.015 in the description of the parameter NCV,biomass and 0.0156 in the description of CO2 emission factor. To ensure consistency with PoA DD in terms of NCV value used and conservativeness of emission reduction calculation 0.015 was used for the calculation of non-CO2 emission factor. This resulted in inconsistency with PoA DD for the value of non-CO2 emission factor.

Data / Parameter:	$\eta_{baseline,}$ PCS Malawi,y
Data unit:	%
Description:	Thermal efficiency of the various baseline technologies i in year y
Source of data used:	GS methodology default, footnote 24 on page 18 of the methodology
Value applied:	10%
Choice of data or Measurement methods and procedures:	10% thermal efficiency for primitive stoves (those without chimney and grate).
Purpose of data	Calculation of baseline emissions
Additional	This parameter is included for *suppressed demand* calculations.

comment:	

Data / Parameter:	$B_{b,i,y}$
Data unit:	Kg/household day
Description:	Quantity of fuel that is consumed in baseline scenario b during year y for technology i
Source of data:	Default quantity of fuel derived using formula [$Fuel_{baseline} = \eta_{project} / \eta_{baseline}$ x $Fuel_{project}$] specified in GS methodology of *Technologies and Practices to Displace Decentralised Thermal Energy Consumption (11/04/2011)* page 18 footnote 24.
Value(s) applied:	In Malawi 14.16 kgs / HH / day (equivalent to 5.169 tonnes of wood / HH / year)
Choice of data Measurement methods and procedures:	In line with the VPA DDs. In the VPA DD there is an typo error in the result of calculation using the formula $Fuel_{baseline} = \eta_{project} / \eta_{baseline}$ x $Fuel_{project.}$ In section D.6.2 of the VPA DD the result stated is 14.9 kgs / HH / day (equivalent to 5.4 tonnes of wood / HH / year). $Fuel_{baseline}$ = 1.690 * (30.6/10) = 5.169 The figures presented in section D.6.3 of the VPA DD proves that the result should be 5.169. The value for Malawi is based on the initial baseline for PCS users conducted in Balaka District in 2009, which was reassessed for use in suppressed demand calculations. The methodology allows for the use of a default value, provided that the monitoring plan ensures that the baseline technology is not in use anymore or that KPTs in the project situation are conducted to determine fuel consumed by retained baseline stoves.
Purpose of data:	Calculation of baseline and project emissions.
Additional comment:	A single baseline fuel consumption parameter is weighed to be representative of baseline technologies being compared for project crediting. The single sample test approach avoids penalising people who are malnourished, under cooking, or using unfavourable fuels due to poverty, as per Annex 2 in the methodology on suppressed demand. Baseline efficiency assumed to be 3-stone fire or similar to be verified through monitoring surveys before verification. Project efficiency to be checked before verification.

G.2. Data and parameters monitored

Data / Parameter:	$U_{P,y}$
Data unit:	Percentage
Description:	Usage rate in project scenario p during year y
Source of data:	Annual usage survey
Value(s) applied:	Single Weighted Usage Parameter for PCS age 0-4 and FIS age 0-4. Based on cumulative usage rate for technologies in project scenario PCS and FIS. Usage of stoves over time to determine project fuel consumption for PCS and FIS users. VPA 2446 $U_{P, 0-1}$ = 86.29% (after 6 months) $U_{P, 1-2}$ = 80.46% (after 18 months) $U_{P, 2-3}$ = 71.73% (after 30 months)

	$U_{P, 3-4}$ = 63.01% (after 42 months)
Measurement methods and procedures:	Usage of stoves over time to determine project fuel consumption for stove users. No equipment used. Usage rates for PCS of each age group taken as percentage of stoves in use with 90 % confidence intervals. A normal linear regression model was fitted to the data to determine the trend. Single weighted usage parameter is the sum of products of usage rates and % of total technology days for PCS of each age group: = (% of technology days age 0-1 * XX%) + (% of technology days age 1-2 * YY%) + (% of technology days age 2-3 * ZZ%) + (% of technology days age 3-4 * WW%)
Monitoring frequency	Annual usage survey and in all cases on time for any request of issuance.
QA/QC procedures:	Transparent data analysis and reporting.
Purpose of data:	Calculation of baseline and project emissions.
Additional comment:	A single usage parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario

Data / Parameter:	$N_{p,y}$
Data unit:	Project technology-days in project database for project scenario p through year y
Description:	Technologies in the project database for project scenario p through year y
Source of data:	Calculated based on Total sales records
Value(s) of data:	VPA 2446 Total number of stoves distributed: 25,053 $N_{p,0-1}$ - 0 $N_{p,1-2}$ - 0 $N_{p,2-3}$ – 19,356,138 $N_{p,3-4}$ - 0
Measurement methods and procedures:	No equipment used.
Monitoring frequency:	Continuous
QA/QC procedures:	Transparent data analysis and reporting.
Purpose of data:	Calculation of baseline and project emissions.
Additional comment:	For each year of the monitoring period the number of technology-days for the group of stoves sold at a specific date is calculated by multiplying the number of stoves sold on this date (based on total sales record database) and stoves operation days during the monitoring period. Stoves operation days during the monitoring period for each year of the monitoring period is defined as the number of days between either the start date of stove operation (for the first year of operation) or the beginning the year (for the following years) and either the end of stoves operation lifetime or the end of the year (end of the monitoring period for the year 2017). Total number of technology-days is calculated as the sum of the numbers of technology-days for all groups of stoves sold at a specific date. Total number of technology-days for each age group is calculated as the sum of the numbers of technology-days for the groups of stoves sold at a specific date meeting the age group conditions (age group 1 – stove operation from the date of installation is 1-365 days, age group 2 – stove

	operation from the date of installation is 366-730 days, age group 3 – stove operation from the date of installation is 731-1095 days, age group 4 – stove operation from the date of installation is 1096-1417 days), Assumed stove operation lifetime is limited to 1417 days.

Data / Parameter:	$LE_{p,y}$
Data unit:	tCO_2eq / year
Description:	Leakage in project scenario PCS Malawi during year y
Source of data:	Baseline and monitoring surveys
Value(s) of data:	% to be discounted VPA 2446 – 21.88%
Measurement methods and procedures:	Potential sources of leakage investigated at least every two years as described in section 6 of the methodology. No equipment used.
Monitoring frequency:	Every 2 years. The CME has chosen to monitor it more frequently to provide more reliable data for ER calculation. For VPAs in Malawi the leackage rate was estimated for 2013, 2014 and 2015. For the years 2016 and 2017, the most conservative value among the estimated in 2013-2015 was used.
QA/QC procedures:	Transparent data analysis and reporting.
Purpose of data:	Calculation of leakage.
Additional comment:	Aggregate leakage can be assessed for multiple project scenarios, if appropriate. For single sample performance tests and efficiency ratio multiplier potential leakage is not subsumed.

Data / Parameter:	$B_{p,i,y}$
Data unit:	Kg/household day or Kg/adult equivalent meal
Description:	Quantity of fuel that is consumed in project scenario p during year y for technology i
Source of data:	Total Sales record, Project Field Tests, project FT updates, and any applicable adjustment factors. If charcoal is a fuel in the project scenario, wood to charcoal conversion rates may be estimated from project specific monitoring or alternatively by researching a conservative wood to charcoal production ratio.
Value(s) of data:	4.63 kgs / HH / day (equivalent to 1.690 tonnes of wood / HH / year) for Malawi Values adjusted for efficiency age wise: $B_{p,i,y\ 0\text{-}1}$ – 2.016 tonnes of wood / HH / year $B_{p,i,y\ 1\text{-}2}$ – 2.023 tonnes of wood / HH / year $B_{p,i,y\ 2\text{-}3}$ – 2.064 tonnes of wood / HH / year $B_{p,i,y\ 3\text{-}4}$ - 2.107 tonnes of wood / HH / year
Measurement methods and procedures	Weights: Digital high precision scale - MyWeigh KD- 8000, type - 8 kg capacity digital weighing scale, accuracy - accurate to 1 g; Calibration date – 13/01/2017, expiry date – not applicable. Certificates of calibration # TM2017031301 and # TM2017031302 issued by Malawi Bureau of Standards.

	Moisture meters: Wood humidity measuring device - Voltcraft FM-300, type - moisture measuring range 6% to 99.9%, accuracy- ±1% (in moisture range 6% ~ 40%). Calibration date – 13/01/2017, expiry date – 12/01/2018. Certificates of calibration # GK201704005002 (moisture meter with serial number 12117541) and # GK201704005001 (moisture meter with serial number 12117617) issued by Malawi Bureau of Standards. Monitoring equipment has been also checked by monitoring facilitators as per the equipments' operating instructions, prior to conducting tests.
Monitoring frequency:	Domestic cook stoves in VPAs using V.01 of TPDDTEC establish baseline fuel consumption through project fuel consumption and baseline/ project fuel efficiencies without applying the cap 0.5t/capita/year. The baseline fuel consumption will be fixed for the entire crediting period. A project KPT will be carried out prior to first issuance. The project fuel consumption will be updated for efficiency degradation through annual WBTs as explained in the GS TAC rule update from December 2015. For institutional stoves KPTs are conducted every 2 years.
QA/QC procedures:	Follow KPT guidelines in Annex 4 of methodology. Large capacity spring scale most appropriate (0.1 – 0.5 kg accuracy); Moisture Metre. For Institutional Stoves, to normalise different types of meals into person-meals or adult equivalent meals, adjustment factors are presented in person meal parameter presented in data and parameters fixed ex-ante above.
Purpose of data:	Calculation of baseline and project emissions.
Additional comment:	A single baseline fuel consumption parameter is weighed to be representative of project technologies being compared for project crediting.

Data / Parameter:	$\eta_{projecti,y}$
Data unit:	%
Description:	Thermal efficiency of project technology i in year y
Source of data:	Water Boiling Test Report
Value(s) of data:	Assess change in performance, measured in thermal efficiency, over time. VPA 2446 $\eta_{projecti,0\text{-}1}$ – 25.64% $\eta_{projecti,1\text{-}2}$ – 25.56% $\eta_{projecti,2\text{-}3}$ – 25.04% $\eta_{projecti,3\text{-}4}$ – 24.53%
Measurement methods and procedures:	Stoves of different ages to be tested for efficiency to measure performance of technology as it ages using water boiling test using protocol as at http://www.pciaonline.org/node/1048 Scales: Digital high precision scale - My Weigh KD- 8000, type - 8 kg capacity digital weighing scale, accuracy - accurate to 1 g; Calibration date – 13/01/2017, expiry date – not applicable. Certificates of calibration # TM2017031301 and # TM2017031302 issued by Malawi Bureau of Standards.

	Thermometers: Digital hand thermometer - Voltcraft K 101 thermometer, type - measuring range - 200°C to +1370°C (reversible °C/°F); accuracy - -200°C to +200°C accuracy of 0.3% of the display, +1 °C; Calibration date – 13/01/2017, expiry date – not applicable. Certificates of calibration #TM2017031303 (thermometer with serial number 080506150) and #TM2017031305 (thermometer with serial number 060300261) issued by Malawi Bureau of Standards. Digital hand thermometer - TFA LT-101 Lab thermometer; type - measuring range - 40 to +200 (reversible °C/°F); accuracy- accuracy of ± 0.5 °C. Calibration date – 13/01/2017, expiry date – not applicable. Certificate of calibration #TM2017031304 issued by Malawi Bureau of Standards. Moisture meter: Wood humidity measuring device - Voltcraft FM-300, type moisture measuring range 6% to 99.9%, accuracy - ±1% (in moisture range 6% ~ 40%). Calibration date – 13/01/2017, expiry date – 12/01/2018. Certificates of calibration # GK201704005002 (moisture meter with serial number 12117541) and # GK201704005001 (moisture meter with serial number 12117617) issued by Malawi Bureau of Standards. Digital phones were used as timers. Monitoring equipment is checked by monitoring facilitators as per the equipments' operating instructions, prior to conducting tests. Equipment also has factory calibration and does not usually require recalibration during warranty period.
Monitoring frequency:	Annual
QA/QC procedures:	Calibration of measuring equipment performed before project field tests. The minimum sample size of each age group shall comply with the 90/10 rule.
Purpose of data:	Calculation of baseline and project emissions.
Additional comment:	Accuracy of equipment will depend on the equipment that is locally available or procurable within reason.

G.3. Implementation of specific-case VPA level sampling plan

Please see Section B.2 above.

SECTION H. Calculation of GHG emission reductions or net GHG removals by sinks

H.1. Calculation of baseline emissions or baseline net GHG removals by sinks

The baseline scenario is defined as households that consume firewood for domestic cooking and heating on three stove fires or other inefficient stoves such as traditional self-made wood stove, and whose basic energy needs are not being met.

The baseline fuel consumption (calculated back through project fuel consumption and baseline/project fuel efficiencies) shall be fixed for the entire crediting period.

The baseline fuel and the project fuel are the same (i.e. woody biomass), thus the baseline and project emission factors are also the same.

Description	Units	VPA GS 2446	
		Values effective till 31.12.2012	Values effective from 01.01.2013
Global warming potential for CH4	Factor	21	25
Global warming potential for N2O	Factor	310	298
Non-CO2 emission factor of the wood fuel / wood waste	tonne CO2 / TJ	29	34
Non-CO2 emission factor from use of biomass	tonnes CO2 per tonne	0.438	0.509
Non Renewable Biomass Factor	Fraction	0.81	
Emission factor of baseline and project fuels (effective till 31.12.2012)	tonnes CO2 per tonne	1.799	
Emission factor of baseline and project fuels (effective from 01.01.2013)	tonnes CO2 per tonne	1.870	

The project applies the suppressed demand approach, with the suppressed demand adjusted baseline consumption of 5.169 tonnes_wood / HH p.a. for Malawi. Baseline wood consumption is calculated based on thermal efficiency of primitive stoves (10%) and improved stoves (30.6%) and the fuel consumption of the project situation. The baseline fuel consumption shall be fixed for the entire crediting period. Project fuel consumption will be updated by annual WBTs as explained in the GS TAC rule update from 12/2015.

The baseline emission calculations are conducted as follows:

$$BE_{b,y} = B_{b,y} * ((f_{NRB,y} * EF_{b,fuel,CO2}) + EF_{b,fuel,nonCO2}) * NCV_{b,fuel}$$

Where:

$BE_{b,y}$ Emissions for baseline scenario b during the year y in tCO_2e

$B_{b,y}$ Quantity of fuel consumed in baseline scenario b during year y, in tons, as per by-default factors (cases with project performance field test only)

$f_{NRB, y}$ Fraction of biomass used during year y for the considered scenario that can be established as non-renewable biomass (drop this term from the equation when using a fossil fuel baseline scenario)

$EF_{b,fuel,CO2}$ CO2 emission factor of the fuel that is substituted or reduced. 112 tCO_2/TJ for Wood/ Wood Waste, or the IPCC default value of other relevant fuel

$EF_{b,fuel,NON-CO2}$ Non-CO2 emission factor of the fuel that is substituted or reduced

$NCV_{b,fuel}$ Net calorific value of the fuel that is substituted or reduced (IPCC default for wood fuel, 0.015 TJ/ton)

And:

$B_{b,y}$ Quantity of fuel consumed in baseline scenario p during year y, in tons, and as derived from the statistical analysis conducted on the data collected during the project performance field tests

$B_{b,y}$ is calculated using the efficiencies of the baseline ($\eta_{b,i,y}$) and project ($\eta_{p,i,y}$) technologies and the quantity of fuel consumed in the project scenario p during year y, in tons and as derived from the statistical analysis conducted on the data collected during the project performance field tests (cases when no baseline performance field test are performed, e.g. by-default baseline factors), $B_{p,y:}$

$B_{b,y} = (\eta_b / \eta_p) * B_{p,y}$

Based on the formula provided above baseline emissions are calculated in tonnes CO_2 per household per year.

For example, quantity of fuel consumed in baseline scenario p during year is calculated as follows:

for VPA 2446:

$B_{b,y}$ = (30.6%/10.0%) * 1.690 = 5.169 tonnes

For example, baseline emissions in tonnes CO_2 are calculated as follows:

for VPA 2446 for the year 2013 onwards:
$BE_{b,y}$ = 5.169 * ((0.81 * 112) + 34) * 0.015 = 9.666 tonnes CO2 per HH per year

Baseline emissions in tonnes CO_2 per household per year are than adjusted for each VPA and for each age group of stoves by taking into account monitoring data on actual efficiency of stoves by year of use and single weighted usage parameter. Single weighted usage parameter reflects usage rate of stoves from different age groups taking into account the share of each age group in total number of technology days for each VPA.

For example, for VPA 2446, adjusted baseline emissions per year (per household) are calculated as follows:

9.666 tonnes CO2 per HH per year * 71.73 % (Single weighted usage parameter) = 6.934 tonnes CO2 per HH per year

Adjusted baseline emissions in tonnes CO_2 per household per year are converted to baseline emissions in tonnes CO_2 per household per day.

For example, for VPA 2446, adjusted baseline emissions per day (per household) are calculated as follows:

6.934 tonnes CO2 per HH per year / 365 = 0.01900 tonnes CO2 per HH per day

This value is than used to calculate total baseline emisssion based on the number of technology days in each year.

These values were used to calculate total baseline emissions for each year of the monitoring period for each VPA based on the amount of technology days (number of days between start of operation within monitoring period and end of operation within monitoring period) for the respective year in each VPA.

Cross-reference of 1,389 stoves delivered in batch from April 15 – December 29, 2013, against the implementer's total sales records up to September 2014 revealed that contracts were signed (this is done by purchaser of stove) on average 25.25 days after date of bulk delivery. This value was used to calculate the start date of stove operation in case of bulk sales.

The results of baseline emissions calculation are presented in the table below.

VPA	2012	2013	2014	2015	2016	2017	Total
VPA GS 2446	0	0	32,951	166,361	140,085	28,323	367,720
Total	0	0	32,951	166,361	140,085	28,323	367,720

H.2. Calculation of project emissions or actual net GHG removals by sinks

Project emission calculations are conducted as follows:

$PE_{p,y} = B_{p,y} * ((f_{NRB,y} * EF_{p,fuel,CO2}) + EF_{p,fuel,nonCO2}) * NCV_{p,fuel}$

Where:

$PE_{p,y}$ Emissions for project scenario p during year y in tCO2e

$B_{p,y}$ Quantity of fuel consumed in project scenario p during year y, in tons, and as derived from the statistical analysis conducted on the data collected during the project performance field tests (cases when no baseline performance field test are performed, e.g. by-default baseline factors)

$f_{NRB, y}$ Fraction of biomass used during year y that can be established as non-renewable biomass (drop this term from the equation when using a fossil fuel baseline scenario)

$EF_{p,fuel,CO2}$ CO2 emission factor of the project fuel. This is equal to the baseline fuel EF in projects which use the same fuel, 112 tCO2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel

$EF_{p,fuel,nonCO2}$ Non-CO2 emission factor of the project fuel. This is equal to the baseline fuel EF in projects which use the same fuel.

$NCV_{p,fuel}$ Net calorific value of the project fuel (IPCC default for wood fuel, 0.015 TJ/ton). This is equal to the baseline fuel NCV in projects which use the same fuel.

Quantity of fuel consumed in project scenario p is estimated based on KPT:

for VPAs 2446 the average value based on Kitchen Test Quantitative survey of Portable Clay Stove customers – 2009 and Usage Survey & Aging Stove KT Report

Based on the formula provided above project emissions are calculated in tonnes CO_2 per household per year.

For example, baseline emissions in tonnes CO_2 are calculated as follows:

for VPAs 2446 for the year 2013 onwards:
$PE_{p,y}$ = 1.690 * ((0.81 * 112) + 34) * 0.015 = 3.160 tonnes CO2 per HH per year

Project emissions in tonnes CO_2 per household per year are than adjusted for each VPA and for each age group of stoves by taking into account monitoring data on actual efficiency of stoves by year of use and single weighted usage parameter. Single weighted usage parameter reflects usage rate of stoves from different age groups taking into account the share of each age group in total number of technology days for each VPA.

For example, for VPA 2446, adjusted project emissions per year (per household) for stoves of age group 4 are calculated as follows:
3.160 tonnes CO2 per HH per year * 71.73% (Single weighted usage parameter) (30.6 % (assumed projec efficiency) / 24.53 % (actual efficiency of stoves of age group 4)) = 2.827 tonnes CO2 per HH per year

Adjusted project emissions in tonnes CO_2 per household per year are converted to project emissions in tonnes CO_2 per household per day. This value is used to calculate total project emissions for each year of the monitoring period for each VPA based on the amount of technology days for the respective year in each VPA.

For example, for VPA 2446, adjusted project emissions per day (per household) for stoves of age group 4 are calculated as follows:
2.827 tonnes CO2 per HH per year / 365 = 0.00775 tonnes CO2 per HH per day

The results of project emissions calculation are presented in the table below.

VPA	2012	2013	2014	2015	2016	2017	Total
VPA GS 2446	0	0	13,161	66,442	55,948	11,312	146,863
Total	0	0	13,161	66,442	55,948	11,312	146,863

H.3. Calculation of leakage

Continuation of use of the displaced baseline technology (e.g. three stone fire) in parallel with project technology (improved efficiency portable clay stove) was identified as a source of leakages. Leakages were assessed based on the monitoring surveys results using assumed leakage rate (percentage of households, which continue use baseline technology in parallel with project technology). Leakage is calculated as a percentage of total emission reductions and calculations of emission reductions were adjusted accordingly.

In addition, emission reduction were also adjusted to account for households using several improved efficiency portable clay stoves (project technology). The continued use of baseline stoves together with the project stove was identified by specifically asking how often the baseline stove is used (never, seldom or often), with “seldom” defined as once a week on average, and “often” being defined as at least once every 2 days. Deduction for households with more than 1 stove installed was calculated as a percentage of total emission reductions and calculations of emission reductions were adjusted accordingly.

Other potential source of leakages occurs in cases, when improved stove users compensate for loss of the space heating effect of inefficient cook-stoves by adopting some other form of heating, such as open fires, or by retaining some use of inefficient stoves. During monitoring surveys none of the users claimed space heating to be a main use for the stove(s). In the baseline scenario conducted in March 2009 none of the respondents claimed space heating was a use of the three stone fire. Thus, this source of leakages was not accounted for.

The results of leakages calculation are presented in the table below.

VPA	2012	2013	2014	2015	2016	2017	Total
VPA GS 2446	0	0	4,330	21,859	18,407	3,722	48,318
Total	0	0	4,330	21,859	18,407	3,722	48,318

All potential sources of leakages will continue to be monitored in annual Monitoring and Usage Surveys, and Project Field Performance Tests.

It should be considered that the basic energy needs are not being met in the baseline scenarios and savings are used to bridge this gap and are unlikely to be wasted or lost through leakages.

H.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

Equation to be used in calculating emission reductions:

$ER_y = BE_y - PE_y - LE_y$

The information on the emission reduction achieved in each year by each VPA is provided below.

VPA	2012	2013	2014	2015	2016	2017	Total
VPA GS 2446	0	0	15,460	78,060	65,730	13,289	172,539
Total	0	0	15,460	78,060	65,730	13,289	172,539

Specific-case VPA reference number	Baseline emissions or baseline net GHG removals by sinks(tCO2e)	Project emissions or actual net GHG removals by sinks (tCO2e)	Leakage (tCO2e)	GHG emission reductions or net GHG removals by sinks (tCO2e) achieved in the monitoring period		
				Up to 31/12/2012	**From 01/01/2013**	**Total amount**
VPA GS 2446	**367,720**	**146,863**	**48,318**	**0**	**172,539**	**172,539**
Total	**367,720**	**146,863**	**48,318**	**0**	**172,539**	**172,539**

H.5. Comparison of GHG emission reductions or net GHG removals by sinks with estimates in the included VPA-DD(s)

Estimated amount of annual average GHG emission reductions according to the latest version of VPA-DD has been compared to actual values of annual average emission reductions achieved by specific-case VPA during this monitoring period. Actual values of annual average emission reductions were calculated by dividing total amount of emissions reduction achieved by specific-case VPA by the duration of monitoring period reported for each specific-case VPA and multiplying by 365.

Specific-case VPA reference number	Value estimated in ex ante calculation in the included VPA-DD(s)	Actual values achieved by the specific-case VPA(s) during this monitoring period
VPA GS 2446	**173,824**	**172,539**
Total	**173,824**	**172,539**

H.6. Remarks on difference from the estimated value in the included VPA-DD(s)

Actual values achieved by the specific-case VPA(s) during the monitoring periods were on average 1% lower than values estimated in ex ante calculation in the included VPA-DD(s).

Only as many devices as necessary to meet the small scale limit have be included in each VPA.

Appendix 1. Contact information of coordinating/managing entity and/or responsible persons/entities

Coordinating/managing entity and/or responsible person/entity	☒ Coordinating/managing entity ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Hestian Innovation Ltd.
Street/P.O. Box	
Building	Cragmuir Chambers
City	Road Town, Tortola
State/Region	British Virgin Islands
Postcode	N/A
Country	British Virgin Islands
Telephone	+442071934710
Fax	N/A
E-mail	info@hestian.com
Website	www.hestian.com
Contact person	John O'Connnor
Title	Mr.
Salutation	
Last name	O'Connor
Middle name	
First name	John
Department	
Mobile	+442071934710
Direct fax	
Direct tel.	+442071934710
Personal e-mail	John.oconnor@hestian.com

Appendix 2. Monitoring Results for Gold Standard Sustainability Indicators

Indicator	Data type	Data variable	Data unit	Value	Source
Air quality	Survey and/or PM concentrations	Smoke - Reduced CO and particulate matter emissions	Survey observations and /or indoor air pollution	Qualitative: The number of survey respondents stated that there is less smoke from devices promoted by the project are the following: 100% of 144 respondents – in 2013 Kitchen Survey for PCS in Malawi conducted in November, 2013 98% of 177 respondents – in 2014 Kitchen Survey for PCS in Malawi conducted in September – October, 2014 84% of 136 respondents – in 2015 Kitchen Survey for PCS in Malawi conducted in June – September, 2015 90% of 122 respondents – in 2016 Usage and Monitoring Survey for PCS in Malawi conducted in August – September, 2016 63% of 114 respondents – in 2017 Usage and Monitoring Survey for PCS in Malawi conducted in January-February, 2017 (14% of respondents did not provided answers to the question on the smoke level). Quantitative: Air quality tests carried out in 2009 reveal an average reduction of 41% in PM concentrations for PCS users. According to recent study conducted in Malawi the use of Chitetezo Mbaula allows CO emissions reductions of 41% and PM 2.5 emission reductions of 50%. 25 053 households using improved Cook Stoves reduce wood consumption	The impact on indoor air quality was monitored within usage and monitoring surveys. The results are provided in the following documents: Usage & Monitoring Survey Report Portable Clay Stoves (PCS) – 2013-2017 Monitoring of sales records to establish dissemination levels. Jagger, P., J. Pedit, A. Bittner, L. Hamrick and T. Phwandaphwanda. 2017. Fuel efficiency and emissions of wood-burning improved cookstoves in Malawi: Implications for scaling-up cookstove programs. Chapel Hill, NC: FUEL Lab, Carolina Population Center.

Soil condition	Survey	Soil quality at a community level - Soil condition enhanced due to reduced soil erosion. Soil erosion due to forest degradation	Clay collection for use as an input into stove production.	Sources of clay for all PCS production centres monitored. All end-users are using improved devices properly and are generating wood fuel savings. It is assumed that wood savings translate into reduced tree felling or a reduction in the increase of tree felling associated with current trends in deforestation and increased pressure on natural resources. 25 053 households using improved Cook Stoves reduce wood consumption According to the calculations based on the number of stoves distributed and the difference in efficiency between baseline and project stoves, the use of PCS during the reported period generated emission reductions corresponding to saving of 92 263 tonnes of wood in Malawi . Reduced wood harvests and associated reduction in deforestation, which is the norm, are likely not to deteriorate soil quality. Environmental management activities at clay source sites include reforestation every growing season and monitoring.	Wood savings are estimated based on emission factor for biomass fuel and the amount of emission reduction generated within each VPA. Wood savings are reported in emission reduction excel calculation file. Clay monitoring excel.
Quality of employment	Policies	Employment conditions	Project staff with health insurance.	All staff employed directly by the project are covered with health insurance. The project is generating income for 288 people. Programme staff receives variious trainings during PoA implementation. Clear training and instruction manuals for production is available for each production group (Documents “How to make Chitetezo Mbaula using a bucket mould. Revised edition” and “How to fire Chitetezo Mbaula using a fuel efficient kiln”). The manuals have been produced both in English and local language. At a a national level, Cleaner Cooking Camps have been organised since 2012 to build local capacity. During Cleaner Cooking	General Policies and Procedures of project activities implementers Cleaner cooking camps reports (2012-2015)

				Camps local stakeholders are brought together for intensive learning facilitated by experienced biomass to energy professionals. Local authorities also collaborate with the Malawi Bureau of Standards to build capacity for conducting monitoring procedures. Trainings are also conducted before each round of monitoring activities and the relevant records are included in monitoring activities reports.	
Livelihood of the poor	Survey	Financial impact (Note: savings estimated are only economic estimation of wood savings and not real monetary saving for households since the wood is mostly collected and not purchased).	MK (Malawi Kwacha) saved per year	From the devices disseminated by the project to date and assuming the wood cost of 5 308 MK per tonne as well as assuming that half of the wood volumes is purchased while the other half if collected the estimated economic value of the savings is MK 245 million per monitoring period for Malawi .	Financial savings were calculated using estimated wood savings. Wood savings are reported in emission reduction excel calculation file
Access to affordable and clean energy services	Monitoring of sales	Access to improved technologies	Number of stoves sold.	25 053 households in Malawi have accessed affordable and appropriate PCS	Total sales records database PCS Sales Records (from March 17, 2009 to December 31, 2015),
Human and Institutional capacity	Survey	Skills and education. Programme staff will receive varied training.	Trainees, employees with new skills	288 people trained in various new skills – stove production, promotion, sales, environmental education, business, database management, geographic information systems, data collection and project monitoring. 77% of all direct employment are female.	Employment and skills development excel.
Balance of payments & investment	VER sales and stove sales to establish dissemination levels	Programme investing foreign private funds in multiple regions of the target countries and in improved technologies.	New businesses. New production groups.	The PP makes direct foreign investment for project implementation. 361 739 VERs have been issued from the VPAs, which are currently included in the PoA GS 1265 25 053 efficient portable clay stoves (PCS) in Malawi	Total sales records database PCS Sales Records (from March 17, 2009 to December 31, 2015) Verification reports for VPAs, which are currently included in the PoA GS 1265

Technology transfer & technological self-reliance	Total sales records	Dissemination record on appropriate technology transfer	Number of stoves sold.	25 053 efficient portable clay stoves (PCS) in Malawi There are 254 production centers for portable improved household stoves in Malawi. Clear training and instruction manuals for production is available for each production group (Documents "How to make Chitetezo Mbaula using a bucket mould. Revised edition" and "How to fire Chitetezo Mbaula using a fuel efficient kiln"). The manuals have been produced both in English and local language. At a a national level, Cleaner Cooking Camps have been organised since 2012 to build local capacity. During Cleaner Cooking Camps local stakeholders are brought together for intensive learning facilitated by experienced biomass to energy professionals. Local authorities also collaborate with the Malawi Bureau of Standards to build capacity for conducting monitoring procedures. There were 4 Cleaner cooking camps conducted in 2012-2015 with the following number of participants: • 2012 - 47 participants from 21 organisations joined a team of 5 biomass energy professionals from Germany, Malawi, South Africa and Uganda (Lilongwe, 20-23 March, 2012) • 2013 – 40 participants and a team of biomass energy professionals from Germany, Malawi, South Africa and Uganda (Lilongwe, 5-8 March, 2013) closed by open day, which saw about 80 stakeholders from government, private sector, civil society and international community; • 2014 - 40 participants (Lilongwe, 11-14 March, 2014) • 2015 - 40 participants (Lilongwe, 10-13 March, 2015)	Total sales records database PCS Sales Records (from March 17, 2009 to December 31, 2015), Malawi's cookstove activities database https://energypedia.info/wiki/Malawi_cookstoves_DB_District_Overview Cleaner cooking camps reports (2012-2015)