




**Verification and certification report form for  
CDM programme of activities  
(version 02.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

**BASIC INFORMATION**

<b>Title and UNFCCC reference number of the programme of activities (PoA)</b>	Biomass Energy Conservation Programme UNFCCC ref.: 10182	
<b>Version number(s) of the PoA-DD(s) to which this report applies</b>	07	
<b>Version number of the verification and certification report</b>	04.0	
<b>Completion date of the verification and certification report</b>	30/04/2019	
<b>Monitoring period number and duration of this monitoring period</b>	Third (3 <sup>rd</sup> ) Monitoring period; Duration: 01/02/2018-31/05/2018	
<b>Number and version number of the monitoring report to which this report applies</b>	Monitoring report number: 1 <sup>st</sup> Version 02.5	
<b>Coordinating/managing entity (CME)</b>	Hestian Innovation Ltd.	
<b>Host Parties</b>	Host Parties of the PoA	Is this a host Party to a CPA covered in this report? (yes/no)
	Malawi Rwanda	Yes No
<b>Applied methodologies and standardized baselines</b>	AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass --- Version 6.0	
<b>Mandatory sectoral scopes linked to the applied methodologies</b>	Sectoral scope 3(Energy Demand)	
<b>Conditional sectoral scopes linked to the applied methodologies, if applicable</b>	NA	
<b>Estimated amount of GHG emission reductions or GHG removals for this monitoring period in the included CPAs covered in this report</b>	104,604tCO <sub>2</sub>	
<b>Certified amount of GHG emission reductions or GHG removals for this monitoring period for the included CPAs covered in this report</b>	100,512 tCO <sub>2</sub>	
<b>Name and UNFCCC reference number of</b>	Earthood Services Private Limited; UNFCCC REF:- E-0066	

the DOE	
<b>Name, position and signature of the approver of the verification and certification report</b>	 Dr. Kaviraj Singh Managing Director

## SECTION A. Executive summary

>>The PoA involves the distribution of highly efficient biomass fired improved Cookstoves (ICS).

The improved cookstoves installed under this programme replaces the in-efficient three stone fired or equivalent stoves. The programme stoves combust wood more efficiently and improve thermal transfer to pots; hence saving fuel and lowering greenhouse gas emissions. Each CPA supports the project goals of reducing fuel consumption, improving health of the people in the country, and reducing deforestation in Malawi. The target areas are all regions of Malawi with traditional biomass stove users.

The fuel type used by improved household cook-stoves is predominantly fire wood. Apart from this, other fuel like biomass agricultural residue (e.g. pigeon pea stalks, maize hobs, etc.) is also used to some extent.

Hestian Innovation Ltd. is the CME for the PoA, which is the project participant providing the framework and incentives for the rest of parties involved to achieve the emission reductions.

The CME keep track of the list of ICS installations concerning to the PoA in the hard copies as well as in electronic form. The ICS users sign a title transfer and carbon transfer document with the CME while purchasing the product.

### Scope of Verification:

The verification is an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the DOE. The verification includes review of implementation and operation of the PoA as set out in the registered PoA-DD & CPA-DDs viz., 10182-0001, 10182-0002, 10182-0003, 10182-0004, 10182-0005, 10182-0006, 10182-0025(CPA-07), 10182-0020(CPA-08) and 10182-0021 (CPA-09) in the monitoring period.

The verification tests the data and assertions set out in the monitoring report prepared for this monitoring period by the CMEs and is based on the following:

- (i) The approved methodology AMS II.G version 06 "Energy efficiency measures in thermal applications of non-renewable biomass", applied in the POA-DD & CPA-DDs
- (ii) The registered PoA-DD & CPA-DD and monitoring plan
- (iii) UNFCCC criteria referred to in the Kyoto Protocol criteria and the CDM modalities and procedures as agreed in the Bonn Agreement and the Marrakech Accords
- (iv) The CDM Validation and Verification Standard (VVS) for PoA, version 1.0
- (v) The CDM Project Standard (PS) and Project Cycle Procedure (PCP) for PoA version 1.0
- (vi) Relevant decisions, guidance and clarifications of the CMP and CDM Executive Board and any other information and references relevant to the project activity's reported emission reductions

The verification has considered both quantitative and qualitative aspects on stated/reported emission reductions. The monitoring report (all versions) and corresponding supporting documentation was assessed in accordance with the rules defined by UNFCCC, as appropriate to the PoA. The verification is not meant to provide any consulting or recommendations to the CME/others. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring activities.

### Verification Process:

The verification process is conducted as per internal CDM Quality Manual, which includes the following steps;

- a) Contract with Hestian Innovation Ltd. and appointment of verification team and technical review team (refer Section B.1 and B.2 of this report)
- b) Completeness check of Monitoring Report
- c) Publication of Monitoring Report at UNFCCC website
- d) Desk review (refer Section D.1 of this report) of Monitoring Report and corresponding ER sheet by verification team and planning of onsite audit (including sampling approach (refer Section C of this report) to be applied)
- e) On site audit (refer Section D.2 of this report) (physical implementation and interview with relevant stakeholders) by verification team consistent of Team Leader and all Technical Experts, as a minimum
- f) Follow up activities e.g., interviews (refer Section D.3 of this report)
- g) Reporting and closure of findings (CARs/CLs/FARs) and preparation of draft verification report (refer Section D.5 of this report)
- h) Independent technical review of the draft verification report and final/revised documentation (e.g., Monitoring Report, corresponding ER sheet and evidences)

- i) Reporting and closure of TR comments/findings (refer Section D.5 of this report) (CARs/CLs/FARs) and final approval for the decision made (refer Section G and H of this report).
- j) Issuance of final verification report to contracted CME (or authorized representatives) and submission of request for issuance, as appropriate.

### Verification Conclusion:

Based on the outcome of the verification process of the registered PoA "Biomass Energy Conservation Programme" and its 09 CPAs (10182-0001, 10182-0002, 10182-0003, 10182-0004, 10182-0005, 10182-0006, 10182-0025, 10182-0020 and 10182-0021) for the monitoring period 01/02/2018 – 31/05/2018 (including both dates) we confirm that the implementation of referenced registered PoA and CPAs is complying with applicable CDM rules and regulations as stated in the Monitoring Report (final) Version 2.5 dated 03/04/2019. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodologies, AMS II.G Version 06 and the monitoring plan contained in the PoA-DD and the CPA DDs.

Earthood Services Private Limited is able to certify that the emission reductions from the registered CDM PoA "Biomass Energy Conservation Programme" in Malawi having UNFCCC reference 10182 during the period 01/02/2018 – 31/05/2018 (including both days) amount to 100,512 tCO<sub>2</sub>e. Therefore, this is being submitted for request for issuance, as per UNFCCC procedures.

## SECTION B. Verification team, technical reviewer and approver

### B.1. Verification team members

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	IR	Mandal	Amit Ranjan	Central Office	Y	Y	Y	Y
2.	Verifier	IR	Mandal	Amit Ranjan	Central Office	Y	Y	Y	Y
3.	Meth Expert (AMS-II.G)	IR	Mandal	Amit Ranjan	Central Office	Y	Y	Y	Y
4.	Technical Expert	IR	Mandal	Amit Ranjan	Central Office	Y	Y	Y	Y
5.	Local Expert	EI	Katundu	Enea	Central office	Y	Y	Y	Y
6.	Trainee (Verifier)	IR	Luthra	Chirag	Central Office	Y	N	N	Y

### B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Mahala	Deepika	Central Office
2.	Technical Expert	IR	Mahala	Deepika	Central Office
3.	Approver	IR	Singh	Kaviraj	Central office

**SECTION C. Application of materiality in conducting the verification****C.1. Consideration of materiality in planning the verification**

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Error in Data Transfer from Digital Records, Hard copy Records to ER Spread sheet for the monitoring parameters and sampling survey results. The errors could result from human errors during the information transfer from the source to emission reduction sheet.	Low	CME enters the data in calculation of ERs as available through survey/sampling. The monitored parameters are used in the calculation of emission reductions.	Since most of the monitoring parameter is confirmed through ex post monitoring survey conducted by CME, the verification team physically checked and verified the 8 households from ex post monitoring survey and project database on sampling basis. The efficiency test result of stoves and sample surveys for other parameters (hard copies) were also checked. PoA-DD, CPA-DD and reference documents are also compared with ER spread sheet to check for any material error during data transfer. Interview were also conducted to the end users to confirm the primary data on sampling basis.
2.	Erroneous consideration of fixed parameters, error in calculation.	Low	The details of the parameters fixed ex-ante are provided in PoA-DD/CPA-DD used for emission reduction calculation.	All parameters are checked from the registered documents (i.e. CPA-DD/PoA/DD). The formula used are also checked from the registered documents.

**C.2. Consideration of materiality in conducting the verification**

&gt;&gt; The prescribed thresholds for materiality,

Prescribed range of ERs/annum	500,000 or more	300,001 to 499,999	300,000 or less	PoAs comprising only small-scale CPAs	PoAs comprising only micro-scale CPAs
Prescribed threshold	0.5%	1.0%	2.0%	5.0%	10.0%

The identified/selected materiality threshold for the PoA under current monitoring period is 5% as PoA is small scale in accordance with para 307 of CDM VVS for PoA, Version 1.0.

	MR Version (Public)	MR Version (Final)
Emission reductions	100,797	100,512
Identified Threshold	5.0%	5.0%

**SECTION D. Means of verification****D.1. Desk/document review**

&gt;&gt;

The desk review involves;

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan, the monitoring methodology including applicable tool(s) and, where applicable, the applied standardized baseline, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions;

The list of documents/evidences reviewed during the verification is provided under Appendix 3 of this report.

**D.2. On-site inspection**

Duration of on-site inspection: 02/08/2018 to 03/08/2018				
No.	Activity performed on-site	Site location	Date	Team member
1.	Opening meeting	Malawi	02/08/2018	Amit Ranjan Mandal
2.	Physical site visit: Households visited (implementation of PoA)	Malawi	02/08/2018	Amit Ranjan Mandal & Enea Katundu
3.	Review of information flows for generating, aggregating and reporting the monitoring parameters	Malawi	02/08/2018	Amit Ranjan Mandal & Enea Katundu
4.	Cross check between information provided in the monitoring report and data from other sources such as test reports, inventories, purchase records or similar data sources;	Malawi	03/08/2018	Amit Ranjan Mandal & Enea Katundu
5.	Documents review, discussion with CME representatives regarding monitoring process, stove distribution process, stove efficiency test and sampling.	Malawi	03/08/2018	Amit Ranjan Mandal & Enea Katundu
6.	Closing meeting and discussion on observed issues.	Malawi	03/08/2018	Amit Ranjan Mandal & Enea Katundu

**D.3. Interviews**

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Stewart	Maya	Hestian/Area55	02/08/2018 & 03/08/2018	Sampling & ER calculation, survey sheet, WBT calculation MR related issues etc.	Amit Ranjan Mandal, Enea Katundu.
2.	Kakona	Gertiude	Hestian/Area55	02/08/2018 & 03/08/2018	Stove distribution process, survey methods, record keeping etc.	Amit Ranjan Mandal, Enea Katundu.
3.	Ngaivale	Josephine	Hestian/Area55	02/08/2018 & 03/08/2018	Stove distribution process, survey methods, record keeping etc.	Amit Ranjan Mandal, Enea Katundu
4.	Botha	Yamungu	Sunfire Limited	02/08/2018	Sampling, survey sheet, Stoves sales & sales database, tracking etc.	Amit Ranjan Mandal, Enea Katundu
5.	Banda	Dadirai	Hestian/Area55	02/08/2018	ICS usage	Amit Ranjan Mandal
6.	Nguluwe	Elizabeth	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
7.	Kalinde	Florence	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
8.	Mawanga	Joanna	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
9.	Chinkuthi	Kened	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
10.	Mwadenje	Patulani	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
11.	Kholowa	Binali	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
12.	Beneti	Lucia	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
13.	Chilongo	January	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
14.	Kampenje	Kelesheni	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu
15.	Mwase	Chipondo	Household	03/08/2018	ICS usage	Amit Ranjan Mandal, Enea Katundu

#### D.4. Sampling approach

##### CME's sampling approach:

A Stratified sampling plan was carried out across all specific case CPAs covered in this monitoring period. The CME has applied Stratified Sampling across a group of CPAs for different monitoring parameters as per validated PoA DD and CPA DDs. 95/10 confidence precision was mainly applied by CME in the sampling, which is better than the 90/10 confidence precision prescribed in sampling tool. The confidence and precision level applied by the CME meets the methodological requirements. The sampling approach undertaken by CME is duly explained under Section B.1 of monitoring report.

##### DOE's sampling approach:

In order to meet the requirements of Standard for Sampling and surveys for CDM project activities and programmes of activities, the verification team applied acceptance sampling in the verification. The verification team selected random samples of CME's sampled records, checked the acceptability (or otherwise) of the data for each such record with CME's sample records, and then based on the number of records where there is agreement, determined if the CME's sample records meet the requirements.

As per para 33 of "Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 7,"/22/ A DOE may select a different sample size than the one indicated in paragraph 31, either by choosing a different value for the consumer risk and producer risk (e.g. 20% for the consumer risk) when applying acceptance sampling or by using another approach, if any of the following conditions apply:

- (a) The estimated volume of annual emission reductions of the project activity or the PoA being verified is equal to or less than 100,000 tCO<sub>2</sub>e;
- (b) The security conditions in the project region prevents inspection of many samples (e.g. conflict zones); or
- (c) The project activity or the PoA is located in a least developed country or a host Party with 10 or fewer registered CDM project activities at the end of the monitoring period being verified.

In case of the current verification, the PoA is located in a least developed country i.e. Malawi, which has been confirmed through UNFCCC website ([http://unfccc.int/cooperation\\_and\\_support/ldc/items/3097.php](http://unfccc.int/cooperation_and_support/ldc/items/3097.php) / [http://unfccc.int/resource/docs/publications/ldc\\_brochure2009.pdf](http://unfccc.int/resource/docs/publications/ldc_brochure2009.pdf) ), thus meeting the requirement of para 31(c). Hence DOE has considered 8 samples from each type of ICS for the current verification.

The verification team determined the sample size for acceptance sampling by evaluating the following, using its own professional judgement and guidance in the Standard 'Sampling and surveys for CDM project activities and programme of activities': /22/

- The proportion of discrepancies between the CME's data and verification team's (field or onsite inspection results) data that can be considered acceptable. This is referred to as the AQL (Acceptable Quality Level): 0.5% was considered in this verification.
- The proportion of discrepancies between the CME's data and verification team's (field or onsite inspection results) data that would be considered unacceptable. This is the UQL (Unacceptable Quality Level): 20% was considered in this verification.
- The producer risk of 10% and consumer risk of 20% was considered.

Considering the above input values, a sample size of 8 was required as per Table 1 in the referred Standard for the monitoring period. The assessment team has used simple random sampling and chosen 8 household for the survey in line with the requirement. Accordingly, Acceptance number (c) thus determined for the sample size is 0 and a sample size of 8 meets the criteria in line with "Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 7,". The assessment team has identified 10 sample considering two additional sample, to meet the minimum required samples in case of unavailability of any end users during onsite Audit. All 10 households were visited by the assessment team during onsite Audit.

For other parameters viz.  $B_{y=1, new, i, survey}$  (Annual quantity of woody biomass used by project devices in tonnes per device of type i) &  $\mu_{y, i} / 365$  (Number of days of utilization of the project device during the year 'y'),  $\eta_{new, i, a}$  (Thermal efficiency of device of type i being deployed as part of the project activity with the age a) the verification team has checked from the document/evidence submitted by the CME.

**D.5. Clarification requests, corrective action requests and forward action requests raised**

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
<b>General</b>			
Compliance of the monitoring report with the monitoring report form	-	-	-
Remaining forward action requests from validation and/or previous verification	-	-	-
CPA(s) considered for verification and covered in this report	-	-	-
<b>Programme of activities</b>			
Compliance of the programme implementation with the registered PoA-DD	-	-	-
Implementation and operation of the management system	-	-	-
Post-registration changes			
<ul style="list-style-type: none"> <li>Temporary deviations from the registered monitoring plan, applied methodology or applied standardized baseline</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Corrections</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Inclusion of a monitoring plan</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Permanent changes to the registered monitoring plan or permanent deviation of monitoring from the applied methodology, standardized baseline or other applied standards or tools</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Changes to the programme design or project design</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Change of coordinating/managing entity</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Changes specific to afforestation and reforestation activities</li> </ul>	-	-	-
<b>Component project activities</b>			
Compliance of the CPA implementation with the included CPA design document	CL#01	CAR#05	-
Post-registration changes			
<ul style="list-style-type: none"> <li>Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Corrections</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Changes to the start date of the crediting period of component project activities</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Inclusion of a monitoring plan</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Permanent changes to the registered monitoring plan or permanent deviation of monitoring from the applied methodology, standardized baseline or other applied standards or tools</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Changes to the programme design of project design</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Changes specific to afforestation and reforestation component project activities</li> </ul>	-	-	-
Compliance of the registered monitoring plan with the methodology including applicable tool(s) and standardized baseline	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	-	-
<ul style="list-style-type: none"> <li>Data and parameters fixed ex ante or at renewal of crediting period</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Data and parameters monitored</li> </ul>	-	CAR#04, CAR#02, CAR#07	FAR#08
<ul style="list-style-type: none"> <li>Implementation of sampling plan</li> </ul>	-	CAR#06	-
Compliance with the calibration frequency requirements for measuring instruments	CL#01	-	-

Assessment of data and calculation of emission reductions or net removals	-	-	-
• Calculation of baseline GHG emissions or baseline net GHG removals by sinks	-	CAR#03	-
• Calculation of project GHG emissions or actual net GHG removals by sinks	-	CAR#02	-
• Calculation of leakage GHG emissions	-	-	-
• Summary of calculation of GHG emission reductions or net GHG removals by sinks	-	-	-
• Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA	-	-	-
• Remarks on difference from estimated value in included CPA	-	-	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
<b>Total</b>	01	06	01

## SECTION E. Verification findings

### E.1. General

#### E.1.1. Compliance of the monitoring report with the monitoring report form

<b>Means of verification</b>	Monitoring report is prepared using the correct template i.e. CDM-PoA-MR-FORM Version 02.0/39/. The verification team confirms that the monitoring report has been appropriately prepared using the latest applicable monitoring report form, and that all sections are completed.
<b>Findings</b>	No findings raised.
<b>Conclusion</b>	Latest version of MR has been used and all the guidelines of the template have been followed by the CME to prepare the Monitoring Report.

#### E.1.2. Remaining forward action requests from validation and/or previous verifications

There was one FAR observed from CPA validation report. The FAR is mentioned in Appendix 4 of this report.

#### E.1.3. CPAs considered for verification and covered in this report

The monitoring periods are consecutive, and CPAs have been included in requests for issuance of CERs in a consecutive manner. The revised crediting period start date for CPA08 and CPA09 fall under the current monitoring period. All other CPAs included under this monitoring period had issuance request during previous monitoring period and are found in line with para 334 of VVS for PoA v1.0. The details are given in the table below:

<b>Title and UNFCCC reference number of the CPA included in the PoA as of the end of this monitoring period</b>	<b>Is the CPA considered for this verification? (yes/no)</b>	<b>The date when the CPA was included</b>	<b>Version of the PoA-DD</b>	<b>Confirmation that a request for issuance including the CPA has been published for the previous monitoring period (Y/N)</b>
Malawi Biomass Energy Conservation Programme CPA 1 - CPA 10182-0001	Yes	13/08/2015	Version 07, dated – 07/07/2015	Yes

Malawi Biomass Energy Conservation Programme CPA 2 - CPA 10182-0002	Yes	15/10/2016	Version 07, dated – 07/07/2015	Yes
Malawi Biomass Energy Conservation Programme CPA 3 - CPA 10182-0003	Yes	15/10/2016	Version 07, dated – 07/07/2015	Yes
Malawi Biomass Energy Conservation Programme CPA 4 - CPA 10182-0004	Yes	15/10/2016	Version 07, dated – 07/07/2015	Yes
Malawi Biomass Energy Conservation Programme CPA 5 - CPA 10182-0005	Yes	15/10/2016	Version 07, dated – 07/07/2015	Yes
Malawi Biomass Energy Conservation Programme CPA 6 - CPA 10182-0006	Yes	15/10/2016	Version 07, dated – 07/07/2015	Yes
Malawi Biomass Energy Conservation Programme CPA 7 - CPA 10182-0025	Yes	11/08/2017	Version 07, dated – 07/07/2015	Yes
Malawi Biomass Energy Conservation Programme CPA 8 - CPA 10182-0020	Yes	11/08/2017	Version 07, dated – 07/07/2015	NA (crediting period start date 06/04/2018)
Malawi Biomass Energy Conservation Programme CPA 9 - CPA 10182-0021	Yes	11/08/2017	Version 07, dated – 07/07/2015	NA (crediting period start date 29/03/2018)
Malawi Biomass Energy Conservation Programme CPA 10 - CPA 10182-0022	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 11 - CPA 10182-0023	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 12 - CPA 10182-0024	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 13 - CPA 10182-0007	No	11/08/2017	Version 07, dated – 07/07/2015	NA

Malawi Biomass Energy Conservation Programme CPA 14 - CPA 10182-0009	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 15 - CPA 10182-0008	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 16 - CPA 10182-0010	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 17 - CPA 10182-0011	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 18 - CPA 10182-0012	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 19 - CPA 10182-0013	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 20 - CPA 10182-0014	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 21 - CPA 10182-0015	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 22 - CPA 10182-0016	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 23 - CPA 10182-0017	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 24 - CPA 10182-0018	No	11/08/2017	Version 07, dated – 07/07/2015	NA
Malawi Biomass Energy Conservation Programme CPA 25 - CPA 10182-0019	No	11/08/2017	Version 07, dated – 07/07/2015	NA

## E.2. Programme of activities

## E.2.1. Compliance of the programme implementation with the registered programme design document

<b>Means of verification</b>	<p>The registered PoA involves the promotion, distribution and sale of improved cook stoves (ICS) in Malawi. CME has implemented the CPAs through coordination with the monitoring team and further with local CPA implementers/distributors. The overall responsibility of implementation and operation is with CME (Hestian Innovation Ltd.), which was also evident during the site visit. This is consistent with PoA DD/1/. This monitoring period includes the implementation and monitoring of 09 CPAs as part of registered PoA.</p> <p>The implementation of all CPAs, as referenced above, are within the geographical boundary of PoA as mentioned in PoA DD/1/.</p> <p>The ICS (Improve Cook Stoves) models deployed under each CPA is verified as following:</p> <p><b>CPA (10182 – 0001):</b></p> <table border="1"> <tr> <td>Cook stove deployed/ Model</td><td>Number</td></tr> <tr> <td>Chitetezo Mbaula ceramic stove</td><td>22,171</td></tr> </table> <p><b>CPA (10182 – 0002):</b></p> <table border="1"> <tr> <td>Cook stove deployed/ Model</td><td>Number</td></tr> <tr> <td>Chitetezo Mbaula ceramic stove</td><td>22,301</td></tr> </table> <p><b>CPA (10182 – 0003):</b></p> <table border="1"> <tr> <td>Cook stove deployed/ Model</td><td>Number</td></tr> <tr> <td>Chitetezo Mbaula ceramic stove</td><td>22,306</td></tr> </table> <p><b>CPA (10182 – 0004):</b></p> <table border="1"> <tr> <td>Cook stove deployed/ Model</td><td>Number</td></tr> <tr> <td>Chitetezo Mbaula ceramic stove</td><td>21,052</td></tr> </table> <p><b>CPA (10182 – 0005):</b></p> <table border="1"> <tr> <td>Cook stove deployed/ Model</td><td>Number</td></tr> <tr> <td>Chitetezo Mbaula ceramic stove</td><td>21,341</td></tr> </table> <p><b>CPA (10182 – 0006):</b></p> <table border="1"> <tr> <td>Cook stove deployed/ Model</td><td>Number</td></tr> <tr> <td>Chitetezo Mbaula ceramic stove</td><td>21,403</td></tr> </table> <p><b>CPA (10182 – 0025(CPA-07)):</b></p> <table border="1"> <tr> <td>Cook stove deployed/ Model</td><td>Number</td></tr> <tr> <td>Chitetezo Mbaula ceramic stove</td><td>21,020</td></tr> </table> <p><b>CPA (10182 – 0020(CPA-08)):</b></p> <table border="1"> <tr> <td>Cook stove deployed/</td><td>Number</td></tr> </table>	Cook stove deployed/ Model	Number	Chitetezo Mbaula ceramic stove	22,171	Cook stove deployed/ Model	Number	Chitetezo Mbaula ceramic stove	22,301	Cook stove deployed/ Model	Number	Chitetezo Mbaula ceramic stove	22,306	Cook stove deployed/ Model	Number	Chitetezo Mbaula ceramic stove	21,052	Cook stove deployed/ Model	Number	Chitetezo Mbaula ceramic stove	21,341	Cook stove deployed/ Model	Number	Chitetezo Mbaula ceramic stove	21,403	Cook stove deployed/ Model	Number	Chitetezo Mbaula ceramic stove	21,020	Cook stove deployed/	Number
Cook stove deployed/ Model	Number																														
Chitetezo Mbaula ceramic stove	22,171																														
Cook stove deployed/ Model	Number																														
Chitetezo Mbaula ceramic stove	22,301																														
Cook stove deployed/ Model	Number																														
Chitetezo Mbaula ceramic stove	22,306																														
Cook stove deployed/ Model	Number																														
Chitetezo Mbaula ceramic stove	21,052																														
Cook stove deployed/ Model	Number																														
Chitetezo Mbaula ceramic stove	21,341																														
Cook stove deployed/ Model	Number																														
Chitetezo Mbaula ceramic stove	21,403																														
Cook stove deployed/ Model	Number																														
Chitetezo Mbaula ceramic stove	21,020																														
Cook stove deployed/	Number																														

	Model																																		
	Chitetezo Mbaula ceramic stove	8,948																																	
	<b>CPA (10182 – 0021(CPA-09)):</b>																																		
	Cook stove deployed/ Model	Number																																	
	Chitetezo Mbaula ceramic stove	19,074																																	
	<p>The verification team is able to confirm that the quantity, specification and target group of the ICSs is consistent with the PoA DD/01/ and respective CPA DDs/3-8/. Further, based on the review of sales database/28/, physical observations and interview conducted during the site visit, the verification team found that:</p> <ul style="list-style-type: none"> <li>• The CPA(s) are implemented within the boundary of the PoA as described in the registered PoA-DD.</li> <li>• The CME is same as that mentioned in the registered PoA-DD</li> <li>• The implementation and operation of the project activity has been conducted in accordance with the description contained in the registered PoA-DD and included CPA-DDs.</li> <li>• All physical features of the CPA proposed in the included CPA-DDs are in place.</li> <li>• The project participants/CPA implementer has operated the CPAs as per the included CPA-DDs.</li> </ul> <p>The verification team has visited the households during site visit; It was observed that each ICS was assigned a unique identification number (serial number), and unique household mobile number. The unique serial number on each ICS visited during onsite assessment, personal information of ICS owners and date of purchase of ICS was checked and cross checked with the information in sales database/28/ available with the CME. The operation of the ICSs was confirmed through interviews of owners/representatives (of ICSs) during the site visit. The emission reductions being claimed during this monitoring period are lesser than the estimated emission reductions in the registered CPA-DDs, as given in the table below:</p>																																		
	<table border="1"> <thead> <tr> <th>CPA UNFCCC reference number</th><th>Amount achieved during this Monitoring period (t CO<sub>2</sub>e)</th><th>Amount estimated ex ante (t CO<sub>2</sub>e)</th></tr> </thead> <tbody> <tr><td>CPA 10182-0001</td><td>13,253</td><td>13,075</td></tr> <tr><td>CPA 10182-0002</td><td>14,741</td><td>13,075</td></tr> <tr><td>CPA 10182-0003</td><td>15,702</td><td>13,075</td></tr> <tr><td>CPA 10182-0004</td><td>13,396</td><td>13,075</td></tr> <tr><td>CPA 10182-0005</td><td>14,975</td><td>13,075</td></tr> <tr><td>CPA 10182-0006</td><td>12,636</td><td>13,075</td></tr> <tr><td>CPA 10182-0025</td><td>10,218</td><td>13,075</td></tr> <tr><td>CPA 10182-0020</td><td>2,610</td><td>6,102</td></tr> <tr><td>CPA 10182-0021</td><td>2,981</td><td>6,974</td></tr> <tr><td><b>Total</b></td><td><b>100,512</b></td><td><b>104,604</b></td></tr> </tbody> </table>		CPA UNFCCC reference number	Amount achieved during this Monitoring period (t CO <sub>2</sub> e)	Amount estimated ex ante (t CO <sub>2</sub> e)	CPA 10182-0001	13,253	13,075	CPA 10182-0002	14,741	13,075	CPA 10182-0003	15,702	13,075	CPA 10182-0004	13,396	13,075	CPA 10182-0005	14,975	13,075	CPA 10182-0006	12,636	13,075	CPA 10182-0025	10,218	13,075	CPA 10182-0020	2,610	6,102	CPA 10182-0021	2,981	6,974	<b>Total</b>	<b>100,512</b>	<b>104,604</b>
	CPA UNFCCC reference number	Amount achieved during this Monitoring period (t CO <sub>2</sub> e)	Amount estimated ex ante (t CO <sub>2</sub> e)																																
	CPA 10182-0001	13,253	13,075																																
	CPA 10182-0002	14,741	13,075																																
CPA 10182-0003	15,702	13,075																																	
CPA 10182-0004	13,396	13,075																																	
CPA 10182-0005	14,975	13,075																																	
CPA 10182-0006	12,636	13,075																																	
CPA 10182-0025	10,218	13,075																																	
CPA 10182-0020	2,610	6,102																																	
CPA 10182-0021	2,981	6,974																																	
<b>Total</b>	<b>100,512</b>	<b>104,604</b>																																	
<p>The information (including data and variables) as mentioned in the MR/15/ is found to be in line with the details provided in the registered PoA-DD/1/.</p> <p>The verification team found the project description contained in the registered PoA-DD/01/ to be complete and accurate. The PoA-DD/01/ complies with the relevant methodology/13/, tools, forms and guidance at the time of PoA submission for registration. The monitoring report was compared and verified against the registered PoA-DD/1/ and was found in line with it.</p>																																			
<b>Findings</b>	CL#01 and CAR#05 was raised and resolved.																																		
<b>Conclusion</b>	<p>The verification team confirms that the physical features (technology/type of ICS) of the implementation were in accordance with the registered PoA-DD/01/.</p> <ul style="list-style-type: none"> <li>• The distribution of ICS is still going on as it hasn't reached the estimated</li> </ul>																																		

	<p>quantity given in the respective specific CPA-DDs/3-8/.</p> <ul style="list-style-type: none"> <li>• The actual operation is in line to the respective CPA-DD, which is further explained under Section E.3 of this report.</li> <li>• The total number of CERs achieved for CPA0001, CPA0002, CPA0003, CPA0004, and CPA0005 are more than the estimated ERs for the same period. The reason for the increase is higher efficiency than expected. The total actual CERs for CPAs (combined) were slightly less for comparable monitoring period. This is due to higher distribution of ICS as estimated. Apart from this, no information with regard to data and variables was identified that may surpass the estimated quantity of ERs in the respective CPA DDs.</li> <li>• The difference in emission reductions achieved for each specific case CPA DD in comparison to the estimated quantity in the registered CPA DD are appropriately justified.</li> </ul>
--	---

## E.2.2. Implementation and operation of the management system

<b>Means of verification</b>	The verification team during the site visit assessed the management systems in place to implement the monitoring of the PoA. This included the roles and responsibilities, data collection, transfer and aggregation procedures, data storage and archiving for the monitoring system through physical inspection. The assessment team has also checked training of the monitoring & data recording personnel, the maintenance schedules/records of the stoves and also cross checked the sales data records /28/. The roles and responsibilities, data collection, transfer and aggregation procedures, data storage and archiving for the monitoring system have been provided in the MR /15/.
<b>Findings</b>	No findings raised.
<b>Conclusion</b>	The verification team confirms that the monitoring management system of the PoA is in place with the responsibilities properly identified and established.

## E.2.3. Post-registration changes

### E.2.3.1. Temporary deviations from the registered monitoring plan, applied methodology or applied standardized baseline

>> There is no deviation observed.

### E.2.3.2. Corrections

>> There were no corrections observed.

### E.2.3.3. Inclusion of a monitoring plan

>> N/A

### E.2.3.4. Permanent changes to the registered monitoring plan or permanent deviation of monitoring from the applied methodology, standardized baseline or other applied standards or tools

>> No permanent changes observed.

### E.2.3.5. Changes to the programme design or project design

>> No changes observed

### E.2.3.6. Change of coordination/managing entity

>> No changes observed.

**E.2.3.7. Changes specific to afforestation and reforestation activities**

&gt;&gt; N/A

**E.3. Component project activities****E.3.1. Compliance of the CPA implementation with the included CPA design document**

Means of verification	<p>The CPAs are grouped together in this section (i.e., Section E.3) for the purpose of verification and reporting as these are of similar nature (technology and type). The CPAs involve the promotion and installation of ICS (portable) in rural areas of Malawi. There are three CPA implementers involved in the PoA: Area 55 (CPA 1, CPA 2, CPA 4, CPA 5, CPA 6, CPA 8), Sunfire (CPA 3 and CPA 7), and Eden by Design (CPA 9, started implementation on 29/03/2018). The same has been confirmed during onsite assessment.</p> <p>The product is disseminated in residential households of the area.</p> <p>It has been checked by the verification team that the CPA is below the threshold of 180 GWh/year (thermal) for Type II. It is also observed during onsite audit that CPA stoves are isolated units and are under 750 kW installed capacity.</p> <p>The current verification which includes verification of 9 CPAs viz. 10182-0001(CPA -01), 10182-0002 (CPA -02), 10182-0003 (CPA -03), 10182-0004 (CPA -04), 10182-0005 (CPA-05), 10182-0006 (CPA-06), 10182-0025 (CPA-07), 10182-0020 (CPA-08) and 10182-0021 (CPA-09). The implementation status of the ICS has been checked during onsite assessment and the stoves have been physically verified on sampling basis. Chitetezo Mbaula type model have been installed by the CME as observed during onsite assessment, which is in line to the PoA DD/01/.</p> <p>Hestian Innovation Ltd. is the CME for the implementation of the CPAs and is also responsible for coordinating and managing the implementation of each element of the monitoring plan. The monitoring period in this monitoring report is from 01/02/2018 to 31/05/2018. The details of each CPA are as follows:</p>				
	CPA Ref.	Inclusion date	Crediting period start date	ICS type	Total ICS sold
	Malawi Biomass Energy Conservation Programme CPA 1 - CPA 10182-0001	13/08/2015	13/08/2015	Chitetezo Mbaula ceramic stove	22,171
	Malawi Biomass Energy Conservation Programme CPA 2 - CPA 10182-0002	15/10/2016	15/10/2016	Chitetezo Mbaula ceramic stove	22,301
	Malawi Biomass Energy Conservation Programme CPA 3 - CPA 10182-0003	15/10/2016	15/10/2016	Chitetezo Mbaula ceramic stove	22,306
	Malawi Biomass Energy Conservation Programme CPA 4 - CPA 10182-0004	15/10/2016	15/10/2016	Chitetezo Mbaula ceramic stove	21,052
	Malawi	15/10/2016	03/05/2017	Chitetezo	21,341

	Biomass Energy Conservation Programme CPA 5 - CPA 10182-0005			Mbaula ceramic stove	
	Malawi Biomass Energy Conservation Programme CPA 6 - CPA 10182-0006	15/10/2016	01/09/2017	Chitetezo Mbaula ceramic stove	21,403
	Malawi Biomass Energy Conservation Programme CPA 7 - CPA 10182-0025	11/08/2017	11/08/2017	Chitetezo Mbaula ceramic stove	21,020
	Malawi Biomass Energy Conservation Programme CPA 8 - CPA 10182-0020	11/08/2017	06/04/2018	Chitetezo Mbaula ceramic stove	8,948
	Malawi Biomass Energy Conservation Programme CPA 9 - CPA 10182-0021	11/08/2017	29/03/2018	Chitetezo Mbaula ceramic stove	19,074
<p>The Reference number, inclusion date of each CPA and crediting period start date of each CPA have been checked and verified from the UN website/40/ and the details are found correct and consistent. The ICS are distributed across Malawi. The location where the ICS were distributed is verified from the onsite visit, PoA-DD/01/ and CPA-DDs/3-8/. The type and number of ICS sold is verified from the sales database/28/.</p> <p>The model of ICS has been verified during the on-site inspection of sample verifications in order to assess that the physical features of the stoves as available in registered CPA-DDs/3-8/. The monitoring procedures are in place and the CME has operated the PoA &amp; CPAs as per the registered PoA-DD/01/ and CPA-DDs/3-8/.</p>					
<b>Findings</b>	CL#01 and CAR#05 was raised and resolved.				
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>The verification team is in opinion that physical features of the CPAs have been implemented in accordance with the registered CPA-DDs/3-8/.</li> <li>No specific monitoring equipment had to be installed according to the monitoring plan.</li> <li>It is also confirmed, through the physical site visit and review of the supporting documentation that physical features of the component CPAs have been implemented in accordance with the CPA-DDs.</li> <li>The CPAs were also found to be completely operational in line with the CPA-DDs/3-8/.</li> <li>The information provided in the relevant sections of the monitoring report appropriately describe the implementation and operational status of the PoA</li> </ul>				

**E.3.2. Post-registration changes****E.3.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

&gt;&gt;No changes observed

**E.3.2.2. Corrections**

&gt;&gt;No changes observed.

**E.3.2.3. Changes to the start date of the crediting period of component project activities**

&gt;&gt;There are changes to the start date of crediting period for following CPAs:

Reference number	CPA title	The new crediting start date of the CPA
CPA 10182-0005	Malawi Biomass Energy Conservation Programme CPA 5	03/05/2017
CPA 10182-0006	Malawi Biomass Energy Conservation Programme CPA 6	01/09/2017
CPA 10182-0020	Malawi Biomass Energy Conservation Programme CPA 8	06/04/2018
CPA 10182-0021	Malawi Biomass Energy Conservation Programme CPA 9	29/03/2018
10182-0012	Malawi Biomass Energy Conservation Programme CPA 18	01/09/2018 (refer to details of CPA18 in UN webpage)
10182-0014	Malawi Biomass Energy Conservation Programme CPA 20	01/10/2018 (refer to details of CPA20 in UN webpage)
10182-0015	Malawi Biomass Energy Conservation Programme CPA 21	01/11/2018 (refer to details of CPA21 in UN webpage)
10182-0016	Malawi Biomass Energy Conservation Programme CPA 22	01/01/2019 (refer to details of CPA22 in UN webpage)
10182-0017	Malawi Biomass Energy Conservation Programme CPA 23	01/01/2019 (refer to details of CPA23 in UN webpage)
10182-0018	Malawi Biomass Energy Conservation Programme CPA 24	01/02/2019 (refer to details of CPA24 in UN webpage)
10182-0019	Malawi Biomass Energy Conservation Programme CPA 25	01/02/2019 (refer to details of CPA25 in UN webpage)

The details of the changes have been checked from UNFCCC project webpage and found correct.

#### E.3.2.4. Inclusion of a monitoring plan

>>Not applicable

#### E.3.2.5. Permanent changes to the registered monitoring plan or permanent deviation of monitoring from the applied methodology, standardized baseline, or other applied standards or tools

>>No changes observed

#### E.3.2.6. Changes to the programme design or project design

>>No changes observed

#### E.3.2.7. Changes specific to afforestation and reforestation component project activities

>>N/A

#### E.3.3. Compliance of the registered monitoring plan with the methodology including applicable tool(s) and standardized baseline

<b>Means of verification</b>	The monitoring plan as contained in respective CPA DDs/3-8/ were reviewed against the monitoring requirements of the applied methodology AMS-II.G version 06 /13/ as well as PoA DD/01/ with reference to the technology involved. Based on this review it was found that the monitoring plan contained in the CPA DDs/3-8/ includes all the required parameters to be monitored in the context of the CPA design and description and allows proper determination of emission reductions in accordance with PoA DD/01/ and applied methodology AMS-II.G version 06/13/.
<b>Findings</b>	No findings raised.
<b>Conclusion</b>	The monitoring plan is concordant to the approved methodology AMS-II,G version 06 /13/, that is included in each respective CPA DD/3-8/.

#### E.3.4. Compliance of monitoring activities with the registered monitoring plan

##### E.3.4.1. Data and parameters fixed ex ante or at renewal of crediting period

**Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass, %,  $f_{NRB,y}$**

<b>Means of verification</b>	<p>This is a default value of fraction of non-renewable biomass approved by CDM EB and accepted by the host country DNA as available on the UNFCCC website/40/. The value for Malawi is 0.81.</p> <p>The value of this parameter is mentioned below. This was checked with the registered PoA-DD/1/ and included CPA-DDs/3-8/.</p>		
	CPA ref no.	Value applied	Consistency checked with
	CPA -01	0.81	Page 11 of CPA-DD/03/
	CPA -02	0.81	Page 12 of CPA-DD/04/
	CPA -03	0.81	Page 12 of CPA-DD/05/
	CPA -04	0.81	Page 12 of CPA-DD/05/
	CPA -05	0.81	Page 12 of CPA-DD/05/
	CPA -06	0.81	Page 12 of CPA-

			DD/05/	
	CPA -07	0.81	Page 13 of CPA-DD/06/	
	CPA-08	0.81	Page 13 of CPA-DD/07/	
	CPA-09	0.81	Page 13 of CPA-DD/08/	
<b>Findings</b>	No finding was raised.			
<b>Conclusion</b>	The value in the monitoring report and corresponding emission reduction calculations spreadsheet/17/ are consistent with the registered PoA-DD/1/ & CPA DDs/3-8/. The applied value is correct and justified.			

### Net calorific value of the non-renewable biomass that is substituted, TJ/t, NCV, <sub>biomass</sub>

<b>Means of verification</b>	The value of this parameter is considered as mentioned below as per CPA DDs. This was checked with the regd. PoA-DD/1/ and included CPA-DDs/3-8/.		
	CPA ref no.	Value applied	Consistency checked with
	CPA -01	0.015	Page 11 of CPA-DD/03/
	CPA -02	0.015	Page 12 of CPA-DD/04/
	CPA -03	0.015	Page 12 of CPA-DD/05/
	CPA -04	0.015	Page 12 of CPA-DD/05/
	CPA -05	0.015	Page 12 of CPA-DD/05/
	CPA -06	0.015	Page 10 of CPA-DD/05/
	CPA -07	0.015	Page 13 of CPA-DD/06/
	CPA-08	0.015	Page 13 of CPA-DD/07/
	CPA-09	0.015	Page 13 of CPA-DD/08/
<b>Findings</b>	CAR#04 was raised and resolved.		
<b>Conclusion</b>	The value in the monitoring report and corresponding emission reduction calculations spreadsheet/17/ are consistent with the registered PoA-DD/1/ & CPA DDs/3-8/. The applied value is correct and justified.		

### Emission factor for the substitution of non-renewable biomass by similar consumers, tCO<sub>2</sub> /TJ, EF <sub>projected\_fossilfuel</sub>

<b>Means of verification</b>	The value of this parameter is mentioned below as per CPA DDs. This was checked with the regd. PoA-DD/1/ and included CPA-DDs/3-8/.		
	CPA ref no.	Value applied	Consistency checked with
	CPA -01	81.6	Page 12 of CPA-DD/03/
	CPA -02	81.6	Page 11 of CPA-DD/04/
	CPA -03	81.6	Page 11 of CPA-DD/05/
	CPA -04	81.6	Page 12 of CPA-DD/05/
	CPA -05	81.6	Page 12 of CPA-DD/05/

	CPA -06	81.6	Page 12 of CPA-DD/05/
	CPA -07	81.6	Page 13 of CPA-DD/06/
	CPA-08	81.6	Page 13 of CPA-DD/07/
	CPA-09	81.6	Page 13 of CPA-DD/08/
<b>Findings</b>	No findings were raised.		
<b>Conclusion</b>	The value in the monitoring report and corresponding emission reduction calculations spreadsheet/17/ are consistent with the registered PoA-DD/1/ & CPA DDs/3-8/. The applied value is correct and justified.		

**Efficiency of the system being replaced, % ,  $\eta_{old}$** 

<b>Means of verification</b>	The value of the parameter considered is mentioned below as per CPA-DDs and PoA-DD. This was checked with the registered PoA-DD/1/ and included CPA-DDs/3-8/		
	CPA ref no.	Value applied	Consistency checked with
	CPA -01	10	Page 3 of CPA-DD/03/
	CPA -02	10	Page 3 of CPA-DD/04/
	CPA -03	10	Page 3 of CPA-DD/05/
	CPA -04	10	Page 3 of CPA-DD/05/
	CPA -05	10	Page 3 of CPA-DD/05/
	CPA -06	10	Page 3 of CPA-DD/05/
	CPA -07	10	Page 2 of CPA-DD/06/
	CPA-08	10	Page 2 of CPA-DD/07/
	CPA-09	10	Page 2 of CPA-DD/08/
<b>Findings</b>	No findings were raised.		
<b>Conclusion</b>	The value in the monitoring report and corresponding ER spreadsheet/17/ are in concordance with the registered PoA-DD/1/ and CPA-DDs/3-8/. The applied value is correct and justified.		

**Leakage adjustment factor for period y, Fraction,  $L_y$** 

<b>Means of verification</b>	The value of this parameter considered is mentioned below as per CPA DDs. This was checked with the registered PoA-DD/1/ and included CPA-DDs/3-8/.		
	CPA ref no.	Value applied	Consistency checked with
	CPA -01	0.95	Page 12 of CPA-DD/03/
	CPA -02	0.95	Page 13 of CPA-DD/04/
	CPA -03	0.95	Page 13 of CPA-DD/05/
	CPA -04	0.95	Page 13 of CPA-DD/05/
	CPA -05	0.95	Page 13 of CPA-DD/05/
	CPA -06	0.95	Page 13 of CPA-DD/05/
	CPA -07	0.95	Page 13 of CPA-DD/06/
	CPA-08	0.95	Page 13 of CPA-DD/07/
	CPA-09	0.95	Page 13 of CPA-DD/08/

<b>Findings</b>	No findings were raised.
<b>Conclusion</b>	The value in the monitoring report and corresponding ER spreadsheet/17/ are in concordance with the registered PoA-DD/1/ and CPA-DDs/3-8/. The applied value is correct and justified.

#### E.3.4.2. Data and parameters monitored

**Annual quantity of woody biomass used by project devices in tonnes per device of type I, t/HH/yr, ( $B_{y=1, new, i, survey}$ )**

Means of verification	Criteria/Requirements	Assessment / Observation
	Measuring /Reading /Recording frequency	Measured. Monitored in the first year of introduction of the devices (e.g. during the first year of the crediting period, $y=1$ ).
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency are in accordance to the registered PoA-DD/01/ and applied methodology/13/
	Monitoring equipment	The source of data is Sample surveys – Kitchen performance tests/33/. Digital high precision weighing scale and moisture meter are used.
	Calibration frequency /interval:	The calibration frequency for the monitoring equipment's are not defined in the registered PoA-DD/01/ and CPA-DDs/3-8/, so considering the SSC guideline EB 61, annex 21/43/ para17(c), the frequency is once in 3years. All the monitoring equipment are duly calibrated
	Is(are) calibration(s) valid for the whole reporting period?	Yes, the calibration is valid for whole reporting period. The calibration details are provided in section E.3.4.4
	How were the values in the monitoring report verified?	<p>The parameter is measured by number of bundles of wood used in the project scenario is estimated via usage and monitoring survey of sampled households using an appropriate local metric (e.g. Bundles of wood) for an easily understood period (e.g. per week). The average weight of a bundle of wood is calculated based on the measurement of a sample of at least 30 different bundles adjusted for moisture content.</p> <p>Stratified random sampling technique is applied in the survey conducted to determine the amount of fuel used in the project activity by project devices. Survey sheets/27/ administered to a sample of end users elicit the quantification of wood used by the household user.</p> <p>The value of the parameter for all the CPAs i.e. CPA-01, CPA-02, CPA-03, CPA-04, CPA-05, CPA-06, CPA-07, CPA-08 and CPA-09 is 1.881 tonnes/household/ year which is verified by the review of survey sheets/27/ and KPT data/33/.</p> <p>It is noteworthy that PP has done sampling across</p>

		<p>the CPA due to the similar nature of the technology employed in the PoA.</p> <p>A discount factor is used in the calculation of Emission Reduction in case any household has more than one stove. This factor is determined based on monitoring survey done by CME. Discount factor to account for households with more than 1 stove installed has been used to discount usage rate for each age group monitored. According to the usage and monitoring survey results conducted in February 2018, the discount factor for more than 1 stove installed was 3.64%. The assessment team has checked the details of the monitoring survey results and it is found that the factor used is correctly calculated and considered correct by the assessment team.</p>
	If applicable, has the reported data been cross-checked with other available data?	The survey results/27/, assumptions and sales records were assessed by the verification team and were found accurate and acceptable. The results are reproducible in the ER sheet/17/ of the final monitoring report/15/. The assessment team has reviewed the KPT data/33/ and found the value correct.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
<b>Findings</b>	CAR#04 and CAR#07 was raised and resolved. Refer Appendix-4 for further details.	
<b>Conclusion</b>	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/13/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.	

**Number of project devices of type i and age a that are operating in year y, Number of items, ( $N_{y,i,a}$ )**

Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Measured continuously and aggregated annually.
	Is measuring and reporting frequency in accordance with the monitoring plan and	Yes. The monitoring is conducted on an annual basis which is in compliance with the information provided in Monitoring frequency section. The measuring and reporting frequency are in line to

	monitoring methodology? (Yes / No)	registered CDM PoA DD/1/ and applied methodology/13/.
	Monitoring equipment	Not applicable
	Calibration frequency /interval:	Not applicable
	How were the values in the monitoring report verified?	<p>The values in the MR/15/ have been verified from the sales database/28/.</p> <p>The value of the parameter for all the CPAs i.e.</p> <p>CPA 1 – 22,171</p> <p>CPA 2 – 22,301</p> <p>CPA 3 – 22,306</p> <p>CPA 4 – 21,052</p> <p>CPA 5 – 21,341</p> <p>CPA 6 – 21,403</p> <p>CPA 7 – 21,020</p> <p>CPA 8 – 8,948</p> <p>CPA 9 – 19,074</p> <p>The total number of stoves in each CPA have been indicated above, the PP has segregated the stoves into four age groups. The age group has been identified based on the days of operation of the stove in the monitoring period. The four age groups covered under the current monitoring period are:</p> <ol style="list-style-type: none"> <li>Age 1: Stoves operating for less than 365 days</li> <li>Age 2: Stoves operating for 365-729 days.</li> <li>Age-3: Stoves operating for 730-1094 days.</li> <li>Age-4: Stoves operating for 1095-1417 days.</li> </ol> <p>The reference for the calculation of days of operation has been taken as the end date of the monitoring period which was found acceptable by the assessment team.</p> <p>The detailed calculation of the of the number of age of stoves can be referred from the ER calculation sheet/17/.</p> <p>Additionally, the number of stoves used for emission reduction calculation has been multiplied with discounted usage rate to arrive at the number of operational stoves of each age group. The approach is checked by the assessment team and is found correct and conservative.</p> <p>The discounted usage rate for each age group can be found in detail in 'Usage and Monitoring survey' sheet/25/ and sales database/28/. The approach followed by the PP was found acceptable including the sampling technique which was found representative.</p>
	If applicable, has the reported data been cross-checked with other available data?	<p>The sales records/28/ of randomly selected stoves were checked by the verification team and were found acceptable. The results are reproducible in the corresponding ER sheet/17/ of final Monitoring Report/15/.</p> <p>The verification team randomly selected 10 samples for DOE's field survey and via on-site interview found out that all the ICS which are picked up for sampling are installed at the household and are in</p>

		working condition, and the details of the stoves were consistent with the CME's sample survey result/26/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The QA/QC procedure are in place, internal checks have been done by the CPA implementer and established during the onsite assessment. During the site visit, the assessment team has duly verified the CME's QA/QC procedures in which the data transfer from hard copies to excel sheets are randomly cross checked by the senior management either from the hard copies/sales receipts/,28, 30/ telephonic calls to ascertain the reliability and correctness of the entered data in the excel sheet.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
<b>Findings</b>	CAR#04 and CAR#07 were raised and resolved. Refer Appendix-4 for further details.	
<b>Conclusion</b>	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/13/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/01/.	

### Number of days of utilization of the project device during the year 'y', %, ( $\mu_{y,i} / 365$ )

Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Calculated biennially
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency are in line to registered CDM PoA DD/1/ and applied methodology/13/.
	Monitoring equipment	Not applicable
	Calibration frequency /interval:	Not applicable
	How were the values in the monitoring report verified?	The values have been verified from the Usage and monitoring survey conducted by CME/25/. Use of other types of stoves is taken into account during the calculation of the Number of days of utilization of the project device during the year 'y' ( $\mu_{y,i} / 365$ ). The assessment team has checked the usage survey sheet /25/ and found it correct. The value of the parameter for all the CPAs i.e. CPA1, CPA 2, CPA 3, CPA 4, CPA 5, CPA 6, CPA 7, CPA 8 and CPA 9 are

		<p><u><math>\mu_{y,i}</math></u></p> <p>CPA 1 – 331 CPA 2 – 331 CPA 3 – 331 CPA 4 – 331 CPA 5 – 331 CPA 6 – 331 CPA 7 – 331 CPA 8 – 331 CPA 9 – 331</p> <p><u><math>\mu_{y,i} / 365</math></u></p> <p>CPA 1 – 0.907 CPA 2 – 0.907 CPA 3 – 0.907 CPA 4 – 0.907 CPA 5 – 0.907 CPA 6 – 0.907 CPA 7 – 0.907 CPA 8 – 0.907 CPA 9 – 0.907</p>
	If applicable, has the reported data been cross-checked with other available data?	<p>The survey results/25/, assumptions and sales records/28/ were checked by the verification team and were found acceptable. The results are reproducible in the corresponding ER sheet/17/ of final Monitoring Report.</p> <p>The verification team randomly selected 10 samples for DOE's field survey and via on-site interview found out the usage of the installed ICS which was consistent with the CME's sample survey result/25/.</p>
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	<p>Yes. The QA/QC procedure are in place, internal checks have been done by the CPA implementer and established during the onsite assessment. During the site visit, the assessment team has duly verified the CME's QA/QC procedures in which the data transfer from hard copies (field survey reports etc.) to excel sheets are randomly cross checked by the senior management either from the hard copies/ sales receipts/27-29/ telephonic calls to ascertain the reliability and correctness of the entered data in the excel sheet.</p>
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	<p>No such issues</p>
<b>Findings</b>	CAR#04 was raised and resolved.	
<b>Conclusion</b>	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/01/ (as per measurement methods and procedures to be applied)	

and applied methodology/13/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/01/.

**Factor to consider the efficiency loss of the project device type i due to its aging at the year y, %, ( $\Delta\eta_{y,i,a}$ )**

Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Measured. Water Boiling Tests is conducted in the first batch of stoves; thereafter the efficiency loss of this population is used to correct the initial efficiency of the population of devices installed later on.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency are in line to registered CDM PoA DD/1/ and applied methodology/13/.
	Monitoring equipment	Scales, thermometer, timer, wood moisture meter are used as the monitoring equipment.
	Calibration frequency /interval:	Since the calibration frequency for the monitoring equipment's are not defined in the registered PoA DD/CPA DDs, so considering the SSC guideline EB 61, Annex 21/43/, para 17(c), the frequency is once in 3 years. All the monitoring equipment's are duly calibrated/35/.
	How were the values in the monitoring report verified?	<p>The WBT results/26/ are checked with the WBT raw data copies/31/ and found to be correct. Also, people involved with the WBT were interviewed to understand the procedures followed for WBT. CME has applied WBT protocol version 4.2.3/36/ The assessment team has checked the calculation provided from the WBT results and found the value correct.</p> <p>The Factor to consider the efficiency loss of the project device type i due to its aging at the year y for the CPAs are –</p> <p>CPA 1 – 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3;</p> <p>CPA 2 – 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3;</p> <p>CPA 3 – 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3;</p> <p>CPA 4 – 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3;</p> <p>CPA 5 – 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3;</p> <p>CPA 6 – 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3;</p> <p>CPA 7– 86.31 for age group 1, 83.76 for age group</p>

		2, 86.34 for age group 3;  CPA 8– 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3;  CPA 9– 86.31 for age group 1, 83.76 for age group 2, 86.34 for age group 3
	If applicable, has the reported data been cross-checked with other available data?	N/A
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The QA/QC procedure are in place, internal checks have been done by the CPA implementer and established during the onsite assessment. During the site visit, the assessment team has duly verified the CME's QA/QC procedures in which the data transfer from hard copies to excel sheets are randomly cross checked by the senior management either from the hard copies, survey report/30,31/ to ascertain the reliability and correctness of the entered data in the excel sheet.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
<b>Findings</b>	CL#01 and CAR#04 were raised and resolved. Refer Appendix-4 for further details.	
<b>Conclusion</b>	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/01/ (as per measurement methods and procedures to be applied) and applied methodology/13/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/01/.	

**Thermal efficiency of device of type i being deployed as part of the project activity with the age a, %,(  $\eta_{new,i,a}$  )**

Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Annually.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency are in line to registered CDM PoA DD/1/ and applied methodology/13/.
	Monitoring equipment	Scales, thermometer, timer, wood moisture meter are used as the monitoring equipment. Please refer section E.3.4.4 for details.
	Calibration frequency /interval:	Since the calibration frequency for the monitoring equipment's are not defined in the registered PoA DD/CPA DDs/01,3-8/, so considering the SSC guideline EB 61, Annex 21/43/, para 17(c), the frequency is once in 3 years. All the monitoring

		equipment's are duly calibrated as checked from the calibration certificates/35/. The calibration is conducted by a capable person with thorough understanding of internationally recognised WBT protocols, updated by the Partnership for Clean Indoor Air and the Global Alliance for Clean Cookstoves. Use of calibrated measurement equipment. The relative precision achieved is 3.7% at confidence level of 95%. Thus, the required precision level of 5% has been met.
	How were the values in the monitoring report verified?	<p>CPA 1 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 2 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 3 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 4 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 5 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 6 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 7 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 8 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>CPA 9 – 26.41% for age 1, 25.63% for age 2, 26.42% for age 3.</p> <p>The efficiency of each group has been calculated as an average of efficiency of each tested stove. Actual efficiency based on the WBTs conducted within monitoring activities in 2018 was in the range of 25.63% - 26.42%/26/. (comparing to the laboratory test efficiency of 30.6%). The efficiency for Age 3 stoves was 3.1% higher than for age 2 and 0.04% higher than for age 1. According to WBTs results the absolute precision of the results is 0.96% and the relative precision is 3.7%. The assessment team has checked the WBT results /26/ are checked as well as the WBT analysis sheet/30,31/ and also interviewed the persons involved in the WBT and found that the WBT was carried out appropriately and correctly and in accordance with the WBT protocol version 4.2.3/36/.</p>
	If applicable, has the reported data been cross-checked with other available data?	The hard copies of the WBT records /31/ are checked as well as the WBT analysis sheet/30/.

	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The QA/QC procedure are in place, internal checks have been done by the CPA implementer and established during the onsite assessment. During the site visit, the assessment team has duly verified the CME's QA/QC procedures in which the data transfer from hard copies to excel sheets/28,26/ are randomly cross checked by the senior management either from the hard copies/31/, telephonic calls to ascertain the reliability and correctness of the entered data in the excel sheet
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
<b>Findings</b>	CL#01 and CAR#04 was raised and resolved.	
<b>Conclusion</b>	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/01/ (as per measurement methods and procedures to be applied) and applied methodology/13/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/01/.	

### E.3.4.3. Implementation of sampling plan

<b>Means of verification</b>	<p>The assessment of CME's sampling is discussed below:</p> <p>The assessment team has reviewed the registered PoA-DD for the details of sampling plan. The description of the monitoring plan of the registered PoA-DD states that user details (name, address and telephone if available) will be collected for the <b>majority of customers</b> (page 35 of PoA-DD). The assessment team has checked the PoA-DD and it is mentioned that "Although it is difficult to track 100% of households that will eventually use the stove(s) promoted by the PoA, the CME will encourage project implementers to track as many as possible and definitely more than half" (footnote 44 at page 35 of PoA-DD). As observed during onsite assessment and review of documents, CME has followed the sampling approach as mentioned in the registered PoA-DD and collected such details for the vast majority of end users as observed based on document review during onsite assessment. There are different levels of details provided for the purchasers of stoves in the total sales records database. The analysis of the database revealed that for 78% of households in the total sales database (139,889 entries in the database) there is a contact information such as phone number or village or GVH administrative unit, which allows the possibility to track the stove user for usage and monitoring survey which is significantly higher than "more than half" as defined in the registered PoA-DD. Thus, selected samples are considered representative of the population as the end users data are available for more than 50% of the population in line with the registered PoA-DD.</p> <p><b>Target Population-</b> As per page 10 of registered PoA-DD/01/ the target population for all the parameters are those ICS that are found in operation under the current CPA's. As per PoA-DD "the population will be divided into primary sampling units (PSU) by same country and fuel consumption cluster, ICS type, ICS vintage and CPA implementer". Thus, the strata were defined by the PP in the MR which has been found to be correct and acceptable. Once the PSUs are defined, ICS will be randomly selected based on the relative size of the strata. To ensure a random</p>
------------------------------	--

selection of ICS, random number generator has been used.

**Sample Frame-** ICSs distributed in 4 districts randomly sampled taking into account the population size of each district, i.e. considering probability proportional to the size on the primary unit (Therefore giving higher chances of selections for more populous areas.)

**Sampling Method-** The method used in sampling was Stratified random sampling in order to determine the sample size for monitoring the parameters viz  $B_{y=1, new, i, survey}$  (Annual quantity of woody biomass used by project devices in tonnes per device of type  $i$ ; determined only once at the time of initial distribution of stoves),  $N_{y, i, a}$  ( $n_{y, j}$  as per PoA-DD (Proportion of ICS still in operation)),  $\mu_{y, i} / 365$  (Number of days of utilization of the project device during the year ' $y$ '), &  $\eta_{new, i, a}$  (Thermal efficiency of device of type  $i$  being deployed as part of the project activity with the age  $a$ ). The stoves were selected by randomly assigning, in corresponding stratum. The monitoring surveys and WBTs were conducted in February 2018.

For the monitoring parameters, PP has used following formulas used in the sampling:

- overall proportion and overall variance for proportional parameters were calculated based on equations (5) and (6); overall mean and overall variance for mean parameters were calculated based on equations (22) and (23) of CDM Guideline "Sampling and surveys for CDM project activities and programmes of activities"/23/.
- the minimum sample size required is calculated based on equation (4) for proportional parameters and equation (21) for mean parameters of CDM Guideline "Sampling and surveys for CDM project activities and programmes of activities" version 3.0/23/.

The assessment team has checked and found that the formula used by PP is inline with the CDM guidelines "Sampling and surveys for CDM project activities and programmes of activities"/23/.

There is only one country to be sampled, only one fuel consumption cluster (i.e. only firewood-fuelled stoves), there is only one ICS type, there are 3 ICS vintages, and there are 3 CPA implementers.

So, there are 5 primary sampling units:

- CPA Implementer Area 55 implementing 1 year old stoves,
- CPA Implementer Sunfire implementing 1 year old stoves,
- CPA Implementer Area 55 implementing 2 years old stoves,
- CPA Implementer Sunfire implementing 2 years old stoves,
- CPA Implementer Area 55 implementing 3 years old stoves.

The CPA DDs/3-8/ mention a reliability level of 95/10 which was followed by in the CPA which is evident as per the sampling calculations in the ER sheet/17/.

The expected parameter values (mean, standard deviation and proportion) have been determined based on PP's knowledge and experience as per para 12(b) and 12(c) of the "Standard: Sampling and surveys for CDM project activities and programmes of activities"/22/, which is acceptable to the assessment team as per the guidance.

The stoves distributed after conduction of monitoring surveys in February 2018 are of the same design and characteristics as the stoves distributed earlier. The proportion of stoves that are still in operation is expected to be very high for the stoves distributed after the end of previous monitoring period, while the efficiency loss on the contrary is expected to be very low (as at the end of the current monitoring period these stoves were operated for less than 4 months). Therefore, the outcome of the sampling survey done in Feb 2018 is considered representative for cookstoves that are newly included (for CPA08 and CPA09) into this monitoring period and allows conservative estimation of emission reductions.

Parameter  $N_{y, i, a}$  (Number of project devices of type  $i$  and age  $a$  that are operating in year) is monitored continuously using total sales records databases and most

recent data were used (survey done in February 2018) in calculation of emission reductions during the current monitoring period (01/02/2018 to 31/05/2018). According to "General guidelines for SSC CDM methodologies" simplified requirements for monitoring surveys could be applied for component project activities (CPAs) solely comprising distributed units to estimate parameter values required by the methodologies. In line with the simplified requirements on monitoring of distributed units, CPAs may apply the result of the surveys for monitoring period up to 12 months after the date of the survey. The survey results may be used for the period 12 months after the survey date, on top of using the results for the period prior to the survey date, resulting in up to 24 months period to which the survey results may be applied to, irrespective of when the monitoring reports are uploaded on the UNFCCC CDM website (footnote-4). In order to apply the survey results for the monitoring period after the survey date, the requirements of biennial sampling should be met i.e. survey results show the confidence/precision of 95/10 (or 95/5 if specified in the applied methodology). The survey conducted for  $\mu_{y,i}$  shows 95/10 (confidence/precision) and the precision achieved is 4.6% which is less than 5%. The monitoring results are typically applicable for 2 years period. Thus, assessment team has accepted the monitoring results of the parameter  $\mu_{y,i}$  for the current monitoring period 01/02/2018 to 31/05/2018) and the gap between the monitoring survey and the last date of the current monitoring period is less than 5 months.

Though, the registered monitoring plan does not include the biennial monitoring option for the parameter  $\Delta\eta_{y,i,a}$  (Factor to consider the efficiency loss of the project device type i due to its aging at the yearly), the gap between the date of the survey and end date of the monitoring period is less than 5 months. Further, the precision achieved under the confidence level of 95% for the parameter is 3.7%. Thus, the precision achieved is less than 5%, which is typically considered acceptable for the biennial monitoring. Therefore, though the PoA follows the annual monitoring frequency, the monitoring surveys were designed to achieve the precision required for biennial monitoring to allow the use of the monitoring results for any additional monitoring periods between the two rounds of monitoring activities. The assessment team has reviewed the survey details in line with the requirements of the standards and the methodology and found it accepted. Thus, the survey results are considered applicable for the current monitoring period (01/02/2018 to 31/05/2018) and are considered accepted.

Parameter	Sample size calculated (required)	Whether minimum sample size achieved	Recommended Sample size	Actual Sample Size	Precision	Condition met
$\mu_{y,i}/365$	80	Yes	100	127	4.6%	Y
Retention use of ICS- $\mu_{y,i,a}$	113	Yes	145	127	3.6%	Y
$\eta_{new,i,a}$	10	No, Student t-distribution is applied	15	16	3.7%	Y

Kitchen Performance Test was conducted during the first verification to estimate the annual quantity of woody biomass used by project devices in tonnes per device and the value is 1.881. There is a discounting correction factor used in the calculation of Emission Reduction in case any household has more than one stove. This factor is determined based on monitoring survey done by CME. Discount factor to account for households with more than 1 stove installed has been used to discount usage rate for each age group monitored. According to the usage and monitoring survey

	results conducted in February 2018, the discount factor for more than 1 stove installed was 3.64%. The assessment team has checked the details of the monitoring survey results and considered the approach correct.
<b>Findings</b>	CL#01, CAR#02 and CAR#07 was raised and resolved.
<b>Conclusion</b>	The verification team confirmed that the sampling plan and the parameter values are in accordance with the monitoring plan provided in PoA DD /01/.

#### E.3.4.4. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	The monitoring plan (included in CPA DDs/3-8/ and registered PoA DD/01/) does not state the calibration requirements for any of the parameter. However, the verification team has checked if the monitoring equipment used during WBT test (mass balance, moisture meter and thermometer) were duly calibrated. As a result, following information was verified from the calibration certificate/35/ of the equipments used for efficiency test;			
	Equipment	Sr. No.	Type	measuring range - accuracy
	Thermometer	080506150, 060300261	Voltcraft K 101	200°C to +1370°C (reversible °C/°F); -200°C to +200°C accuracy of 0.3% of the display, +1 °C
	Mass Balance	--	MyWeigh KD- 8000	8 kg capacity accurate to 1 g
	Moisture Meter	12117541, 12117617	Voltcraft FM-300	measuring range 6% to 99.9%, ±1% (in moisture range 6% ~ 40%).
	Calibration details –			
	Equipment	Brand	Date of calibration	Expiry date
	Thermometer	Voltcraft K 101	23/01/2018	22/01/2019
	Mass Balance	MyWeigh KD-8000 (Sr#04)	23/01/2018	N.A.
	Mass Balance	MyWeigh KD- 8000 (Sr#01)	23/01/2018	N.A.
	Moisture Meter	Voltcraft FM-300	29/01/2018	28/01/2019
The monitoring survey/WBT was done during the month of February 2018. Thus, the calibration is valid during the monitoring survey. It is noteworthy that in the registered PoA DD/01/ as well as CPA DDs/3-8/, there is no calibration frequency mentioned for the monitoring equipment's that will be used during the verification. However, CME has done the calibration of monitoring equipment's from a reputed agency, even though the equipment are newly purchased and are under guaranty from the manufacturer. WBT is conducted by a capable person with thorough understanding of internationally recognised WBT protocols, updated by the Partnership for Clean Indoor Air and the Global Alliance for Clean Cook-stoves. Use of calibrated measurement equipment. The relative precision achieved is 3.7% at confidence level of 95%. Thus, the required precision level of 5% has been met. Since neither the calibration agency nor the equipment				

	manufacturer mentioned any specific validity of the calibration, thus CME has followed the guidelines as per "General Guidelines to SSC CDM methodologies" EB 61, Annex 21/43/, para 17 (c): "Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years". Hence, the monitoring equipment will be calibrated before completion of three years from the date of last calibrations of the respective equipment.
<b>Findings</b>	CL#01 was raised and resolved.
<b>Conclusion</b>	The verification team confirm that CME applied good practices (as per manufacturer recommendation) while using the monitoring equipment and these were under the state of calibration. There is no specific requirement prescribed in this regard in the registered monitoring plan/01/ and in monitoring methodology/13/. Therefore, the approach presented by PP was accepted.

### E.3.5. Assessment of data and calculation of emission reductions or net removals

#### E.3.5.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

<b>Means of verification</b>	<p>The verification team verified that</p> <p>a) A complete set of data for the monitoring period was available for the monitoring period and the verification of each monitoring parameter is elaborated under Section E.3.4.2 of this report. The complete monitoring data is also presented in the corresponding ER calculations sheet /17/ of final Monitoring Report /15/.</p> <p>b) The information provided in the monitoring report was cross checked with other sources, wherever appropriate and available, and such information is also included under Section E.3.4.2 of this report.</p> <p>c) The calculations of baseline emissions as presented in the corresponding ER calculations sheet of final Monitoring Report/17/ were checked and found to be consistent with the formulae and methods described in the registered monitoring plan of each relevant CPA DD/3-8/, PoA DD/01/ and the applied methodology/13/.</p> <p>d) All assumptions used in the emission calculations were found appropriate and therefore justified</p> <p>e) Appropriate emission factors, IPCC default factors/21/ and other reference values have been correctly applied. This has also been elaborated under Section E.3.4.1 of this report.</p> <p>f) No standardized baseline was prescribed in the PoA DD/01/ and therefore it has not been applied.</p> <p>g) There is no pro-rata approach was applied in the current monitoring period as entire monitoring period falls into period that is after the end of first commitment period of Kyoto Protocol.</p> <p>The following equations were used to determine the baseline emissions as provided in the monitoring report/15/ and applied in the corresponding ER calculations sheets/17/. The expressions used were found consistent with the registered PoA DD/01/, CPA DDs/3-8/ and the applied methodology AMS-II.G, version 06/13/:</p> <p>Total ER reductions achieved in the current monitoring period by all types of ICS distributed in the relevant CPA is calculated using the following expressions:</p> <p>Emission reductions are calculated as follows:</p> $ER_{y,i} = \sum_{a=1}^{a=y} B_{y,savings,i,a} \times N_{y,i,a} \times \left(\frac{\mu}{365}\right) \times F_{NRB,y} \times NCV_{biomass} \times EF_{projectedfossilfuel} - LE_y$ <p>Where:</p> <p><b>ER<sub>y</sub></b> – emission reductions, t CO<sub>2</sub>e,</p> <p><b>'a'</b> – the indices for the age (in years) of the cook stoves that are operating in the year y of the crediting period.</p> <p><b>B<sub>y, savings, i, a</sub></b> – annual quantity of woody biomass that is saved in tonnes per cook stove device of type i and age a in year y</p>
------------------------------	---

$N_{y,i,a}$  – number of project devices of type  $i$  and age  $a$  that are operating in year  $y$   
 $\mu_{y,i}$  – number of days of utilization of the project device during the year  $y$   
 $f_{NRB,y}$  – fraction of woody biomass saved by the project activity in year  $y$  that can be established as non-renewable biomass  
 $NCV_{biomass}$  – net calorific value of the non-renewable biomass that is substituted  
 $EF_{projected\_fossilfuel}$  – emission factor for the substitution of non-renewable biomass by similar consumers  
 $LE_y$  – Leakage adjustment factor for period  $y$

CPAs	10182-0001	10182-0002	10182-0003	10182-0004	10182-0005	10182-0006	10182-0025	10182-0020	10182-0021	MOV
<b>ER<sub>y</sub></b>	13,253	14,741	15,702	13,396	14,975	12,636	10,218	2,610	2,981	Calculation checked in ER sheet/17/
<b>f<sub>NRB,y</sub></b>	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	Checked from PoA DD/01/ and CPA DDs/3-8/.
<b>NCV<sub>biomass</sub></b>	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	Checked from PoA DD/01/ and CPA DDs/3-8/.
<b>EF<sub>projected_fossil fuel</sub></b>	81.6	81.6	81.6	81.6	81.6	81.6	81.6	81.6	81.6	Checked from PoA DD/01/ and CPA DDs/3-8/.
<b>L<sub>y</sub></b>	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	Checked from PoA DD/01/ and CPA DDs/3-8/.
<b>N<sub>y,i,a</sub></b>	The number of project devices have been calculated for each year for each age groups (for all CPAs)									Sales database /28/
<b><math>\mu_{y,i} / 365</math></b>	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	Calculation checked in ER sheet/17/
<b>B<sub>y, savings, i, a</sub></b>	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	3.087 for age 1, a=1; 2.940 for age 2, a=2; 3.089 for age 3, a=3	Calculation checked in ER sheet/17/

$B_{y, savings, i, a}$  is calculated using Equation 6 of the methodology AMS-II.G Version 6.0:

$$B_{y, savings, i, a} = B_{y=1, new, i, survey} \times ( (\eta_{new, i, a=1} \times \Delta \eta_{y, i, a} / \eta_{old}) - 1 )$$

and

$$\Delta \eta_{y,i,a} = ( \eta_{new,i,a} / \eta_{new,i,a=1} )$$

Where

**B<sub>y=1, new, i, survey</sub>** – annual quantity of woody biomass used by project devices in tonnes per device of type I

**$\eta_{new,i,a}$**  – the thermal efficiency of the device 'i' at age 'a' determined using the water boiling test

**$\eta_{new,i,a=1}$**  – the thermal efficiency of the device at its first year of operation

**$\Delta \eta_{y,i,a}$**  – factor to consider the efficiency loss of the project device type i due to its aging at the year y

**$\eta_{old}$**  – efficiency of the device being replaced

Parameter	Description	Value applied	Means of Verification
<b>B<sub>y=1,new,i,survey</sub></b>	annual quantity of woody biomass used by project devices in tonnes per device of type I	CPA1: 1.881 CPA2: 1.881 CPA3: 1.881 CPA4: 1.881 CPA5: 1.881 CPA6: 1.881 CPA7: 1.881 CPA8: 1.881 CPA9: 1.881	Verified from survey records/27,28/.
<b><math>\Delta \eta_{y,i,a}</math></b>	Factor to consider the efficiency loss of the project device type i due to its aging at the year y	CPA 1 – 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.  CPA 2 – 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.  CPA 3 – 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.  CPA 4 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.  CPA 5- 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.  CPA 6- 86.31 for age group 1; 83.76 for age group 2; 86.34 for age	Calculation checked in ER sheet/17/

			<p>group 3.</p> <p>CPA 7- 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.</p> <p>CPA 8- 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.</p> <p>CPA 9- 86.31 for age group 1; 83.76 for age group 2; 86.34 for age group 3.</p>		
	$\eta_{new,i,a}$	Thermal efficiency of device of type i being deployed as part of the project activity with the age a	<p>CPA 1 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.</p> <p>CPA 2 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.</p> <p>CPA 3 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.</p> <p>CPA 4 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.</p> <p>CPA 5 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.</p> <p>CPA 6 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.</p> <p>CPA 7 – 26.41%</p>	Checked from WBT records/26,30/.	

			for age group-1, 25.63% for age group-2 and 26.42% for age group-3.  CPA 8 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.  CPA 9 – 26.41% for age group-1, 25.63% for age group-2 and 26.42% for age group-3.		
	$\eta_{\text{new, i, a=1}}$	the thermal efficiency of the device at its first year of operation	CPA 1 – 30.6% CPA 2 – 30.6% CPA 3 – 30.6% CPA 4 – 30.6% CPA 5 – 30.6% CPA 6 – 30.6% CPA 7 – 30.6% CPA 8 – 30.6% CPA 9 – 30.6%	Checked from PoA DD/01/ and CPA DDs/3-8/.	
	$\eta_{\text{old}}$	efficiency of the device being replaced	10%	Checked from PoA DD/01/ and CPA DDs/3-8/.	
	Detailed assessment of all the parameters used to calculate emission reductions is provided under section E.3.4.2.				
<b>Findings</b>	CAR#02, CAR#03 and CAR#06 was raised and resolved.				
<b>Conclusion</b>	<p>The verification team confirms that</p> <p>a) The complete data was available and is duly reported;</p> <p>b) As indicated above, the description with regard to cross-check of reported data is included under respective parameter (refer Section E.3.4.2 of this report);</p> <p>c) Appropriate methods and formulae for calculating baseline GHG emissions or baseline net GHG removals were followed;</p> <p>d) Appropriate emission factors, IPCC default factors and other reference values were correctly applied.</p> <p>e) There is no pro-rate approach was applied in the current monitoring period as entire monitoring period falls into period that is after the end of first commitment period of Kyoto Protocol.</p>				

### E.3.5.2. Calculation of project GHG emissions or actual net GHG removals by sinks

<b>Means of verification</b>	The PoA-DD/01/, CPA DDs/3-8/ and applied monitoring methodology/13/ do not prescribe any project emission to be considered.
<b>Findings</b>	No findings raised.
<b>Conclusion</b>	No project emissions were required to be calculated, however, PP has calculated the project emission in ER sheet/17/ for illustrative purpose and the approach used is found to be correct.

### E.3.5.3. Calculation of leakage GHG emissions

<b>Means of verification</b>	The PoA DD/01/, CPA DDs/3-8/ and applied monitoring methodology/13/ do not prescribe any leakage emissions to be considered. However, the leakage adjustment factor that is required to adjust the baseline emissions has been duly accounted in emission reduction calculations.
------------------------------	---

<b>Findings</b>	No findings raised.
<b>Conclusion</b>	No additional leakage emissions (other than what is already considered in baseline calculations) were required in accordance with the methodology AMS-II G, version 06/13/.

#### E.3.5.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

<b>Means of verification</b>	As elaborated above, the entire emission reductions from the PoA were based on the emission reduction calculation formulae prescribed by the applied methodology/13/, the PP has followed same approach for calculation. The calculations presented in this regard in the final monitoring report/15/ and corresponding ER calculations sheet/17/ were found in compliance with the provisions mentioned in the MR/15/ of respective CPA-DDs/3-8/, PoA-DD/01/ and applied methodology/13/. The verification team affirms that an audit trail that contains the evidence and records that validated the stated figures were checked and found legitimate.
<b>Findings</b>	CAR#03 was raised and resolved.
<b>Conclusion</b>	The verification team confirms that: a) The complete data was available and is duly reported; b) As indicated above, the description with regard to cross-check of reported data is included under respective parameter (refer Section E.3.4.2 of this report); c) Appropriate methods and formulae for calculating baseline GHG emissions or baseline net GHG removals, project emissions and leakage emissions were followed; d) Appropriate emission factors, IPCC default factors and other reference values were correctly applied. e) There is no pro-rate approach was applied in the current monitoring period as entire monitoring period falls into period that is after the end of first commitment period of Kyoto Protocol.  The total number of ERs achieved during the current monitoring period is 100,512 tCO <sub>2</sub> e.

Title and UNFCCC reference number of the CPA	Baseline emissions or baseline net GHG removals by sinks (tCO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (tCO <sub>2</sub> e)	Leakage (tCO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (tCO <sub>2</sub> e)		
				Amount achieved before 1 January 2013	Amount achieved from 1 January 2013	Amount achieved in the entire monitoring period
Malawi Biomass Energy Conservation Programme CPA 1 - CPA 10182-0001	--	00	00	00	13,253	13,253
Malawi Biomass Energy Conservation Programme CPA 2 - CPA 10182-0002	--	00	00	00	14,741	14,741

Malawi Biomass Energy Conservation Programme CPA 3 - CPA 10182-0003	--	00	00	00	15,702	15,702
Malawi Biomass Energy Conservation Programme CPA 4 - CPA 10182-0004	--	00	00	00	13,396	13,396
Malawi Biomass Energy Conservation Programme CPA 5 - CPA 10182-0005	--	00	00	00	14,975	14,975
Malawi Biomass Energy Conservation Programme CPA 6 - CPA 10182-0006	--	00	00	00	12,636	12,636
Malawi Biomass Energy Conservation Programme CPA 7 - CPA 10182-0025	--	00	00	00	10,218	10,218
Malawi Biomass Energy Conservation Programme CPA 8 - CPA 10182-0020	--	00	00	00	2,610	2,610

Malawi Biomass Energy Conservation Programme CPA 9 - CPA 10182-0021	--	00	00	00	2,981	2,981
<b>Total</b>	--	00	00	00	<b>100,512</b>	<b>100,512</b>

#### E.3.5.5. Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA

<b>Means of verification</b>	As verified and evident from the final Monitoring Report/15/ and corresponding ER calculations sheet/17/, the actual emission reductions achieved by CPAs (except CPA0001, CPA002, CPA003, CPA004, CPA005) that is included in the current monitoring period were found less than the estimated quantity in the respective CPA DDs/3-8/ for the comparable period since the due to gradual introduction of project technology (improved portable clay stoves). CPA0001 to CPA 0005 achieved higher emission reduction than estimated for the same period due to slightly higher monitored efficiency as estimated for fixed ex-ante. However, the total emission reduction achieved during the monitoring period is less than the estimated emission reduction for the same period. The assessment team has checked the details regarding the efficiency and found it correct.
<b>Findings</b>	No findings raised.
<b>Conclusion</b>	The actual emission reductions achieved in monitoring period is less than the estimated quantity of ERs for the same period. Accordingly, it was accepted by the verification team.

Title and UNFCCC reference number of the CPA	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the CPAs during this monitoring period
Malawi Biomass Energy Conservation Programme CPA 1 - CPA 10182-0001	13,075	13,253
Malawi Biomass Energy Conservation Programme CPA 2 - CPA 10182-0002	13,075	14,741
Malawi Biomass Energy Conservation Programme CPA 3 - CPA 10182-0003	13,075	15,702
Malawi Biomass Energy Conservation Programme CPA 4 - CPA 10182-0004	13,075	13,396
Malawi Biomass Energy Conservation Programme CPA 5 - CPA 10182-0005	13,075	14,975
Malawi Biomass Energy Conservation Programme CPA 6 - CPA 10182-0006	13,075	12,636
Malawi Biomass Energy Conservation Programme CPA 7 - CPA 10182-0025	13,075	10,218
Malawi Biomass Energy Conservation Programme CPA 8 - CPA 10182-0020	6,102	2,610

<b>Malawi Biomass Energy Conservation Programme CPA 9 - CPA 10182-0021</b>	6,974	2,981
<b>Total</b>	104,604	100,512

**E.3.5.6. Remarks on difference from estimated value in included CPA**

<b>Means of verification</b>	As verified and evident from the final Monitoring Report/15/ and corresponding ER sheet/17/, the total actual emission reductions achieved by ICS for all 9 CPAs that is included in the current monitoring period were found less than the estimated quantity for the comparable period. The actual emission reductions achieved by CPAs (except CPA0001, CPA0002, CPA0003, CPA0004, CPA0005) that is included in the current monitoring period were found less than the estimated quantity in the respective CPA DDs/3-8/ for the comparable period since the due to gradual introduction of project technology (improved portable clay stoves). CPA0001 to CPA0005 achieved more ERs than estimated for the equivalent monitoring period due to slightly higher monitored efficiency as estimated for fixed ex-ante.
<b>Findings</b>	No findings raised.
<b>Conclusion</b>	The actual emission reduction is less than the estimated ERs for the monitoring period. The total actual emission reductions achieved for all CPAs (except CPA0001-CPA0005) during the crediting period is less than the estimated quantity of ERs for the same period.

**E.3.6. Assessment of reported sustainable development co-benefits**

<b>Means of verification</b>	Not applicable.
<b>Findings</b>	Not applicable
<b>Conclusion</b>	Not Applicable

**E.3.7. Global stakeholder consultation**

<b>Means of verification</b>	Not Applicable
<b>Findings</b>	Not Applicable
<b>Conclusion</b>	Not Applicable

**SECTION F. Internal quality control**

A draft verification report prepared by verification team is reviewed by an independent technical review team (one or more members) to confirm whether all the internal procedures established and implemented by ESPL were duly complied with and such opinion/conclusion were reached in an objective manner that complies with the applicable CDM rules/requirements. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the verification team.

During the technical review process additional findings may be identified or the closed-out findings may be opened, which needs to be satisfactorily resolved before the request for issuance is submitted to UNFCCC. The independent technical reviewer may either approve the report as such or reject/return the same in such case providing the comments/findings/issues that needs to be resolved by the verification team. The decision taken by the Technical Reviewer is final and is authorized by the Managing Director on behalf of Earthood Services Private Limited.

**SECTION G. Verification opinion**

Earthood Services Private Limited (ESPL), contracted by Hestian Innovation Ltd. (the CME for the PoA), has performed the second independent verification of the emission reductions for the registered CDM PoA 10182 “Biomass Energy Conservation Programme” in Malawi for the monitoring period 01/02/2018-31/05/2018 (both days included) as reported in the Monitoring Report (public) Version 1.0 dated 26/06/2018. The CME is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

This verification report is for the CPAs (10182-0001, 10182-0002, 10182-0003, 10182-0004, 10182-0005, 10182-0006, 10182-0025, 10182-0020 and 10182-0021) which were included at the UNFCCC webpage at the end of the current monitoring period. A single monitoring report has been prepared by the CME for the same in which implementation of all referred CPAs along with monitoring results is included.

ESPL confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. This verification report has been prepared using the latest available template specified by UNFCCC and complies with the instructions to follow as per CDM VVS for PoA Version 1.

The verification activities were conducted in accordance with ESPL’s CDM Quality Manual System as per the steps indicated under Section A of this report. The verification process has resulted in conclusion that the included CPAs confirm to the registered PoA DD as well as comply with applicable CDM rules and regulations and in accordance with applied monitoring methodology, AMS II.G Version 06.

As a result, it is confirmed that the emission reductions from the CDM PoA 10182 “Biomass Energy Conservation Programme” are correctly reported in the Monitoring Report (final) Version 2.5 dated 03/04/2019 and corresponding ER sheets for the monitoring period 01/02/2018-31/05/2018 (including both days) amount as 100,512 tCO<sub>2</sub>e. Therefore, this will be submitted as part of request for issuance as per CDM PCP for PoA, Version 1.

**SECTION H. Certification statement**

Earthood Services Private Limited (ESPL), contracted by Hestian Innovation Ltd. (the CME for the PoA), has performed the second independent verification of the emission reductions for the registered CDM PoA 10182 "Biomass Energy Conservation Programme" in Malawi for the monitoring period 01/02/2018-31/05/2018 (both days included) as reported in the Monitoring Report (public) Version 1.0 dated 26/06/2018.

The verification is based on the registered PoA-DD, CPA--DDs and the monitoring report for this project. Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive Board.

The management of the Hestian Innovation Ltd. is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Final Monitoring Report Version 2.5 dated 03/04/2019. The calculation and determination of GHG emission reductions from the project is the responsibility of the management of the Bureau of Energy Efficiency. The development and maintenance of records and reporting procedures are in accordance with the Monitoring Report Version 2.5 dated 03/04/2019.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the monitoring period 01/02/2018 up to 31/05/2018 (including both dates) based on the reported emission reductions in the Final Monitoring Report Version 2.5 dated 03/04/2019 for the same period.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, ESPL planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

ESPL confirms the following;

**Reporting period:** From 01/02/2018 up to 31/05/2018 (including both dates)

**Verified and certified emission in the above reporting period:**

	Amount	Unit
Certified emission reductions (CERs)	100,512	tCO <sub>2</sub> e

## Appendix 1. Abbreviations

Abbreviations	Full texts
AQL	Acceptable Quality Level
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
CER	Certified Emission Reduction
CL	Clarification Request
CME	Coordinating or Managing Entity
CPA	Component Project Activity
CP	Crediting period
DOE	Designated Operational Entity
DNA	Designated National Authority
EB	Executive Board
ESPL	Earthood Services Private Limited
FAR	Forward action request
GHG	Green House Gases
GS	Gold standard
ICS	Improve Cook Stoves
IPCC	Intergovernmental Panel on Climate change
KPT	Kitchen Performance Test
MIS	Management Information System
POA	Programme Of Activity
PO	Partner Organization
PSU	Primary Sampling Unit.
TA	Technical Area
TR	Technical Reviewer
VVS	Validation and Verification Standard
UNFCCC	United Nation Framework convention on Climate change
WBT	Water Boiling Test
GACC	Global Alliance for Clean Cookstoves

## Appendix 2. Competence of team members and technical reviewers

Competence Statement			
<b>Name</b>	Amit Ranjan Mandal		
<b>Country</b>	India		
<b>Education</b>	Master of Science (Energy Management)		
<b>Experience</b>	9.5 yrs		
<b>Field</b>	Environmental, Energy, CDM		
Approved Roles			
<b>Team Leader</b>	YES		
<b>Validator</b>	YES		
<b>Verifier</b>	YES		
<b>Methodology Expert</b>	ACM0002, AMS.I.D, AMS.II.G		
<b>Local expert</b>	YES (India)		
<b>Financial Expert</b>	NO		
<b>Technical Reviewer</b>	YES		
<b>TA Expert</b>	YES (TA 1.2, TA 3.1)		
<b>Reviewed by</b>	Abhishek Mahawar	<b>Date</b>	01/03/2018
<b>Approved by</b>	Ashok Kumar Gautam	<b>Date</b>	01/03/2018

Competence Statement			
<b>Name</b>	Enea Katundu		
<b>Country</b>	Malawi		
<b>Education</b>	Master of Science		
<b>Experience</b>	3 Yrs +		
<b>Field</b>	Research and Social Empowerment		
Approved Roles			
<b>Team Leader</b>	NO		
<b>Validator</b>	NO		
<b>Verifier</b>	NO		
<b>Methodology Expert</b>	NO		
<b>Local expert</b>	YES (Malawi)		
<b>Financial Expert</b>	NO		
<b>Technical Reviewer</b>	NO		
<b>TA Expert</b>	NO		
<b>Reviewed by</b>	Abhishek Mahawar	<b>Date</b>	01/03/2018
<b>Approved by</b>	Ashok Kumar Gautam	<b>Date</b>	01/03/2018

Competence Statement	
<b>Name</b>	Chirag Luthra
<b>Education</b>	B.Tech in Environmental Engineering, Delhi Technological University
<b>Experience</b>	Few months
<b>Field</b>	Environment Engineering

Approved Roles			
Team Leader	NO		
Validator	NO		
Verifier	NO		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee	Validator/ Verifier		
Reviewed by	Shreya Garg (Quality Manager)	Date	01/07/2018
Approved by	Anshika Gupta (Technical Manager)	Date	01/07/2018

Competence Statement			
Name	Deepika Mahala		
Country	India		
Education	M. Sc. (Environmental Mgmt), GGSIP University B.Sc. Honours (Chemistry), Sri Venkateshwar College, DU		
Experience	2 Years +		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	ACM0002, AMS.I.D., AMS.I.A, AMS.III.AV, AMS.II.G		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (TA 1.2 & TA 3.1)		
Reviewed by	Shreya Garg	Date	14/09/2018
Approved by	Anshika Gupta	Date	14/09/2018

### Appendix 3. Documents reviewed or referenced

N o.	Author	Title	References to the document	Provider
1.	CME	Registered PoA DD	Version 07, dated – 07/07/2015	Others
2.	TUV NORD	Validation report	Version 8000449119 – 14/021, dated – 23/07/2015	Others
3.	CME	CPA DD – 1	Version 05, dated – 07/07/2015	Others
4.	CME	CPA DD – 2	Version 04, dated – 19/09/2016	Others
5.	CME	CPA DD for CPA 3, 4, 5, 6	Version 04, dated - 19/09/2016 respectively.	Others
6.	CME	CPA DD for CPA 7	Version 2.1, dated - 12/07/2017	Others
7.	CME	CPA DD for CPA 8	Version 2.1 dated 12/07/2017	Others
8.	CME	CPA DD for CPA 9	Version 2.1 dated 12/07/2017	Others
9.	TUV NORD	CPA #1 validation report	Version 8000449119 – 14/021-CPA-001, dated – 23/07/2015	Others
10.	TUV NORD	CPA #2 validation report	Version 1.0, dated - 21/09/2016	Others
11.	TUV NORD	CPA #3 validation report	Version 1.0, dated - 21/09/2016	Others
12.	TUV NORD	CPA #4 validation report	Version 1.0, dated - 21/09/2016	Others
13.	UNFCCC	Methodology AMS II G- Energy efficiency measures in thermal applications of non-renewable biomass.	Version – 06	Others
14.	CME	Monitoring report (Publication)	Version 1.0 dated - 26/06/2018	CME
15.	CME	Monitoring report (Final version)	Version 2.5 dated 03/04/2019	CME
16.	CME	ER calculation sheet (Initial)	Corresponding to MR Version 1	CME
17.	CME	ER calculation sheet (Final)	Corresponding to MR Version 2.5.	CME

**CDM-PoA-VCR-FORM**

18.	UNFCCC	CDM PoA VVS	Version 01.0	Others
19.	UNFCCC	CDM PoA PS	Version 01.0	Others
20.	UNFCCC	CDM PoA PCP	Version 01.0	Others
21.	IPCC	IPCC Defaults	-	Others
22.	UNFCCC	Standard: Sampling and surveys for CDM project activities and programme of activities	Version 07	Others
23.	UNFCCC	Guideline: Sampling and surveys for CDM project activities and programme of activities	Version 03 and version 04	Others
24.	CME	Sampling calculation sheet	-	CME
25.	CME	U & M survey sheet	-	CME
26.	CME	WBT result sheet	Various	CME
27.	CME	By=1,new, survey sheet	Various	CME
28.	CME	Total sales records database	-	CME
29.	CME	U&M Surveys copies	Various	CME
30.	CME	Survey report for WBT	Various	CME
31.	CME	WBT raw data copies	Various	CME
32.	CME	Technical specification of cook stove	-	CME
33.	CME	KPT raw data copies	-	CME
34.	CME	Emission Reduction Transfer Contract	-	CME
35.	Malawi Bureau of Standards.	Calibration certificates of the monitoring equipment	Various	CME
36.	GACC	Water Boiling Test protocol document	Version 4.2.3	CME
37.	CME	Training of monitoring personnel related documents	Various	CME
38.	CREEC	Stove efficiency test by CREEC at the regional stove testing centre	-	CME
39.	UNFCCC	CDM PoA MR form template	Version 02	Others
40.	UNFCCC	Project web page <a href="http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/4A2PCYSNBWVG81Z3L5FUH9RMJKQDV6/view">http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/4A2PCYSNBWVG81Z3L5FUH9RMJKQDV6/view</a>	-	Others
41.	TUV-NORD	Inclusion report form for CPA- 2,3,4,5,6	Dated 13/10/2016	Others
42.	Bureau Veritas	Validation report for CPA-007, CPA008 and CPA009.	Version 2.1 dated 20/07/2017	Others
43.	UNFCCC	"General Guidelines to SSC CDM methodologies" EB 61, Annex 21	EB 61, Annex 21.	Others

## Appendix 4. Clarification requests, corrective action requests and forward action requests

**Table 1. Remaining FAR from validation and/or previous verification**

<b>FAR ID</b>	01	<b>Section no.</b>		<b>Date</b> : 08/08/2018
<b>Description of FAR</b>				
<i>Refer to CL#01 for the start date of CPAs.</i>				
<b>Project participant response</b>				<b>Date</b> : DD/MM/YYYY
-				
<b>Documentation provided by project participant</b>				
-				
<b>DOE assessment</b>				<b>Date</b> : DD/MM/YYYY
-				

**Table 2. CL from this verification**

<b>CL ID</b>	01	<b>Section no.</b>	E.3.1, E.3.4, E.2.1	<b>Date</b> : 08/08/2018
<b>Description of CL</b>				
PP is requested to provide the following documents:				
<ol style="list-style-type: none"> <li>1. Evidence for training and QA/QC for data management</li> <li>2. Technical specifications of ICS</li> <li>3. KPT survey details and documents.</li> <li>4. The calibration certificates of all equipment used for the monitoring parameters covering this monitoring period.</li> <li>5. <b>Evidence for start date of CPAs that are included in this monitoring period.( FAR from previous CPA inclusion)</b></li> <li>6. Carbon transfer certificates of 10 surveyed households (surveyed by the DOE assessment team during onsite assessment).</li> </ol>				
<b>Project participant response</b>				<b>Date</b> : 15/08/2018
<ol style="list-style-type: none"> <li>1. Evidences for training and QA/QC for data management have been provided.</li> <li>2. Technical specifications of ICS have been provided.</li> <li>3. KPT survey details and documents have been provided.</li> <li>4. The calibration certificates of all equipment used for the monitoring parameters covering this monitoring period have been provided.</li> <li>5. Evidences for the start date of CPAs have been provided.</li> <li>6. Carbon transfer certificates of 10 surveyed households have been provided.</li> </ol>				
<b>Documentation provided by project participant</b>				
<ol style="list-style-type: none"> <li>1. Information about Cleaner Cooking Camp 2016; Area 55 Staff Trainings August 2015-March 2017</li> <li>2. Technical specifications for ICS: Quality control for Chitetezo Mbaula, How to make Chitetezo Mbaula using a paddle mould, How to fire Chitetezo Mbaula using a fuel efficient kiln.</li> <li>3. KPT survey details and documents (CDM 10182 - By=1,new, survey .xlsx, KPT01to20.pdf, KPT21to40.pdf)</li> <li>4. Calibration certificates for scales (Scale1.pdf, Scale2.pdf), calibration certificates for thermometers (Thermometer 1.pdf, Thermometer 2.pdf), evidence of moisture meters calibration (IMG_4666.jpg)</li> <li>5. Evidences for the start date of CPAs (ER 03062016 - evidence of the start date for CPA2.jpg, Sunfire Bulk ER No 57 - evidence of the start date for CPA3.pdf, Delivery notes - evidence of the start date for CPA4.pdf, ER 03052017 - evidence of the start date for CPA 5.jpg, Delivery note - evidence of the start date for CPA6.jpg, Bulk ER 1189 - evidence of the start date for CPA7.pdf, CPA 8 start date – 06042018.jpg, CPA 9 start date – 29032018.pdf).</li> <li>6. Carbon transfer certificates of 10 surveyed households (1. Elizabeth Nguluwe ER.jpg, 2. Florence Kalinde + 10. Chipondo Mwase.pdf, 3. Osten Chimutu.jpg, 4. Kened Chinkuthi.jpg, 5. Patulani Mwandenje+ 6. Binali Kholowa.pdf, 7. Lucia Beneti.jpg, 8. January Chilongo.jpg, 9. Kelesheni Kampenje.jpg)</li> </ol>				
<b>DOE assessment</b>				<b>Date</b> : 29/08/2018

1. The training related documents have been provided by PP. The assessment team has checked the training documents, list of participants, training agenda etc. and found correct. The assessment team has also confirmed this during onsite assessment and considered to be correct. Hence, the point is closed.
2. Technical specification document as provided by the PP has been checked by the assessment team. The technical specification as provided in MR are found consistent with the document. Hence, the issue is closed.
3. KPT survey details has been provided by the PP. The assessment team has checked and reviewed the details and found correct.
4. The calibration certificate for scales, thermometers and moisture meter has been checked by the assessment team. The calibration is valid for the entire monitoring period for all monitoring equipments. However, the calibration certificate numbers are not correct in the MR.
5. Evidence of start date of CPA has been checked and found correct and consistent with the details in MR. Hence, the issue is closed.
6. Carbon transfer certificate has been submitted by PP. The assessment team has checked the documents and found correct. Hence, accepted and closed out.
Since all issues are not closed; CL#01 remains open.
<b>Project participant response</b>
<b>Date : 30/08/2018</b>
4. Corrected
<b>Documentation provided by project participant</b>
Updated monitoring report, version 2.2
<b>DOE assessment</b>
<b>Date: 14/09/2018</b>
PP has corrected the MR and the details are now provided correctly.
CL#01 is closed.

Table 3. CAR from this verification

<b>CAR ID</b>	02	<b>Section no.</b>	E.4.3, E.3.4.3, E.3.5	<b>Date : 08/08/2018</b>
<b>Description of CAR</b>				
1. The sample size calculations details are not included in the MR as well as ER sheet. 2. The ER sheets includes calculation of Project emission, however the MR states that there is no project emission. PP to clarify the discrepancy.				
<b>Project participant response</b>				<b>Date : 15/08/2018</b>
1. The sampling size calculation has been provided. Please, refer to CDM 10182 Sampling - sample size.xlsx  2. Calculation of Project emissions has been deleted from the ER excel file. The methodology does not foresee the calculation of project emissions.				
<b>Documentation provided by project participant</b>				
<b>DOE assessment</b>				<b>Date: 29/08/2018</b>
The sample size calculation sheet has been provided by the PP. The assessment team has checked and reviewed the sheet and found correct. The details in MR is also found consistent of with sampling calculation sheet.  Project emission details are now removed from the ER calculation sheet as there is no project emission in the project activity.  CAR#02 is closed.				

<b>CAR ID</b>	03	<b>Section no.</b>	E.3.5.1	<b>Date : 08/08/2018</b>
<b>Description of CAR</b>				
1. In ER sheet provided by the PP, the monitored cookstoves data contains a number of repeated serial numbers. PP is requested to clarify the discrepancy. 2. PP is requested to clarify whether the date of sale is considered as the date of installation of the cookstoves.				
<b>Project participant response</b>				<b>Date : 15/08/2018</b>

1. Total sales records database has been reviewed and duplicated serial numbers have been corrected. Due to lack of reliable informational and communication infrastructure it is not possible to ensure real-time input of information into centralized database during stove distribution in the villages. Manual input of serial numbers by different promoters on paper leads to errors and use of the repeated serial numbers. Capacity will continue to be built on data management. Systems have been put in place to cross-check consistency of serial numbers on clients' stoves and in the database. Monitoring protocol has been developed to ensure consistent monitoring procedures among all CPA implementers.

2. In the case of direct sales, it is assumed that the stove is first used on the next date after the date of sale. This is taken into account during the estimation of the date of the Beginning of stoves' operation within monitoring period. In the case of bulk sales, it is assumed that the stove is first used on the last day of the month next to the month, when the stove is delivered to the shop. Assumed commissioning date referenced on the Bulk Sales sheet takes into account this conservative assumption.

#### Documentation provided by project participant

#### DOE assessment

Date: 29/08/2018

1. The duplicate entries have been corrected by the PP in ER sheet. However, in TSR Area55 sheets, there are persons with more than one stove. The point remains open.
2. PP has considered the date of installation conservatively for both the cases i.e direct and indirect sales. The assessment team has checked the ER sheet with sales date found it correct. Hence, the issue is closed.  
CAR#03 remains open.

#### Project participant response

Date : 30/08/2018

There could be cases of households with more than one stove installed. Usage and monitoring surveys have been designed in a way to estimate the share of households with more than one stoves. This figure is used to adjust the usage rate. As indicated in Section E.2. of the monitoring report, a discount factor to account for households with more than 1 stove installed has been used to discount usage rate for each age group monitored. Please, also refer to the cells B10-B14 of the Results worksheet of CDM 10182 Usage and Monitoring Surveys results.xlsx and the relevant data on the worksheet "Monitoring Data" of the ER calculation file (cells D7-G7). Also, there could be some specific cases, when a person purchases several stoves in a shop for his/her own use and for his/her neighbor / relative, but only one name is entered at the point of sale.

#### Documentation provided by project participant

#### DOE assessment

Date: 21/09/2018

1. PP has clarified the query and the use of more than one stove is factored in the calculation of Emission reduction. The assessment team has checked the calculation sheet and found correct, hence accepted.

CAR#03 is open in view of TR comments:

1. Discount factor in usage survey sheet considers time on other type of stoves (charcoal, Kerosene, electric etc.) as time for project ICS (B21, results, Usage survey sheet)
2. Total ICS disseminated in the project are 180095, whereas the population size for the sample size calculation is 128,451.

#### Project participant response

Date : 24/09/2018

1. Use of other types of stoves is taken into account during the calculation of the Number of days of utilization of the project device during the year 'y' ( $\mu y_i / 365$ ). Please, refer to cell B23 of the Results worksheet, Usage survey sheet.

2. At the time of monitoring report preparation the total number of improved cook-stoves disseminated within the PoA reached 180,095; monitoring is, however, performed on an annual basis and target population at the time of sample size estimation (January, 2018) was 128,451 ICS

#### Documentation provided by project participant

#### DOE assessment

Date: 25/09/2018

1. The use of other types of stove is taken into account for the calculation of number of days of utilization of the project device. The calculation is checked and found correct and accepted.
2. PP/CME has clarified that the number 128,451 as provided is available at the time of sample size estimation. The assessment team has also checked the values from previous verified monitoring report and found the number same. Hence, the issue is closed out.

CAR#03 is closed.

<b>CAR ID</b>	04	<b>Section no.</b>	E.3.4.1, E.3.4.2	<b>Date :</b> 08/08/2018
<b>Description of CAR</b>				
The value of monitored parameters for CPA8 and CPA9 are not provided in table under section E.2 in MR.				
<b>Project participant response</b>				<b>Date :</b> 15/08/2018
Information has been added				
<b>Documentation provided by project participant</b>				
Updated version of the monitoring report, version 2.1 dated 15/08/2018				
<b>DOE assessment</b>				<b>Date:</b> 21/09/2018
The information for CPA8 and CPA9 has been now discussed in revised MR. The assessment team has checked the MR and found correct.				
CAR#04 is open in view of TR comments:				
<ol style="list-style-type: none"> <li>For parameter By=1,new,i,survey; please justify how the value of 1.881 is applicable to CPA8, CPA9 considering that this is their first monitoring period.</li> <li>Efficiency for Age 3 stoves are higher than age 2 and age 1. Please describe the pattern for efficiency.</li> <li>CPA 8 and CPA9 started disseminating their first stoves after the end date of the survey. Please justify how is the monitoring result applicable to these CPAs.</li> <li>CPA DDs for CPA 7,8,9 do not list NCV, EFprojected_FF, nold, Ly under data and parameter fixed.</li> </ol>				
CAR#04 is open.				
<b>Project participant response</b>				<b>Date :</b> 24/09/2018
<ol style="list-style-type: none"> <li>According to the PoA DD monitoring and sampling activities are conducted on a PoA level. Annual quantity of woody biomass used by project devices in tonnes per device of type i, determined in the first year of the introduction of the devices. All CPAs disseminate the same type of stoves among the rural and peri-urban population of Malawi. Thus, the first year of the introduction of the devices is 2015/2016 and the results of the monitoring activities are assumed to be applicable for all CPAs within the PoA.</li> <li>The efficiency is expected to be slightly decreasing with aging of the stoves, however the monitoring results demonstrate that the decrease in efficiency is minimal and is not always statistically significant. Actual efficiency based on the WBTs conducted within monitoring activities in 2018 was in the range of 25.63% - 26.42%. (comparing to the laboratory test efficiency of 30.6%). The efficiency for Age 3 stoves was 3.1% higher than for age 2 and only 0.04% higher than for age 1. According to WBTs results the absolute precision of the results is 0.96% and the relative precision is 3.7%.</li> <li>According to the PoA DD monitoring and sampling activities are conducted on a PoA level on an annual basis. All CPAs disseminate the same type of stoves among the rural and peri-urban population of Malawi. Thus, the results of the monitoring activities are assumed to be applicable for all CPAs within the PoA. Next round of monitoring activities will be performed in January-February, 2019.</li> <li>The values are not listed in CPA DDs as these are the default values provided in the methodology.</li> </ol>				
<b>Documentation provided by project participant</b>				
<b>DOE assessment</b>				<b>Date:</b> 10/12/2018

1. As per registered PoA-DD, monitoring and sampling survey are conducted on a PoA level. It is also mentioned that parameter  $By=1, \text{new}, i, \text{survey}$  will be determined in the first year of the introduction of the devices. All CPAs disseminate the same type of stoves. The assessment team has checked the stoves during onsite assessment and found that all the stoves distributed are of same type as discussed in MR. Thus, the survey is found in line with the approved documents and applied methodology. Hence, the issue is considered correct and closed.
2. The efficiency of the stoves are based on the WBTs result as explained by CME. The assessment team has checked the WBT result and found that efficiency values arrived are correct. It is also observed that there is variation in efficiency values and efficiency of age 3 stoves are higher than the efficiency of age 2 and age 1 stoves. Since, the values arrived is based on the WBTs result, thus the efficiency values are considered to be correct.
3. As mentioned in PoA DD, monitoring and sampling activities are conducted on a PoA level on an annual basis. All CPAs disseminate the same type of stoves among the rural and peri-urban population of Malawi. The same has been checked during onsite assessment. Thus, monitoring results are applicable to all CPAs covered under this monitoring period.
4. The values are not listed in CPA DDs for CPA07, CPA08 and CPA09 as these are the default values provided in the methodology. The assessment team has also checked the CPA-DD for the above CPAs which also mentions that the "default values specified in the methodology AMS-II.G Small-scale Methodology: Energy efficiency measures in thermal applications of non-renewable biomass (Version 06.0) are not included in the compilation".

CAR#04 is re-open in view of UN comments:

As per page 32-33 of registered PoA-DD, the monitoring frequency for parameter  $Ny, i, a$  (Number of project devices of type  $i$  and age  $a$  that are operating in year) and parameter  $\Delta \eta_{y, i, a}$  (Factor to consider the efficiency loss of the project device type  $i$  due to its aging at the year  $y$ ) are annual. As per previous verified monitoring reports, two sampling survey had been conducted on Jan 2017 and Feb 2018 for 1st and 2nd monitoring period respectively. The sampling survey done in Feb 2018 has been used to calculate the emission reduction for the 2nd monitoring period from 01/02/2017 to 31/01/2018. This is the 3rd monitoring period covering 01/02/2018 to 31/05/2018, however, the outcome of the sampling survey done in Feb 2018 for 2nd monitoring period has been applied for this monitoring period.

PP is requested to clarify the followings:

1. The applicability of the monitoring of  $Ny, i, a$  (Number of project devices of type  $i$  and age  $a$  that are operating in year) and parameter  $\Delta \eta_{y, i, a}$  (Factor to consider the efficiency loss of the project device type  $i$  due to its aging at the year  $y$ ) as per the monitoring plan for the current monitoring period (01/02/2018 to 31/05/2018).
2. The outcome of the sampling survey done in Feb 2018 for 2nd monitoring period is considered representative for cookstoves that are newly included from existing and new CPAs and new CPA implementer (for CPA09) into this monitoring period.

CAR#04 is open.

**Project participant response**

**Date : 07/01/2019**

1. As per page 32-33 of registered PoA-DD, the monitoring frequency for parameter  $N_{y,i,a}$  (Number of project devices of type  $i$  and age  $a$  that are operating in year) and parameter  $\Delta \eta_{y,i,a}$  (Factor to consider the efficiency loss of the project device type  $i$  due to its aging at the yearly) are annual. The methodology also allows biennial monitoring of the parameter  $N_{y,i,a}$  (Number of project devices of type  $i$  and age  $a$  that are operating in year). Parameter  $N_{y,i,a}$  (Number of project devices of type  $i$  and age  $a$  that are operating in year) is monitored continuously using total sales records databases and most recent data were used in calculation of emission reductions during the current monitoring period (01/02/2018 to 31/05/2018). The numbers are adjusted taking into account Proportion of stoves that are still in operation and Retention use of ICS based on the latest available monitoring data. The first round of monitoring activities was performed in January 2017, the second round of monitoring activities was performed in February 2018, and the third round is planned to be performed in January-February 2019. Thus, the schedule of monitoring activities follows the requirements of the PoA DD (i.e., monitoring is performed on an annual basis). The latest available data were used for the current monitoring period (01/02/2018 to 31/05/2018). Monitoring data based on monitoring activities conducted in January-February 2019 will be used for the next monitoring period (01/06/2018 – 31/01/2019).

According to “General guidelines for SSC CDM methodologies” simplified requirements for monitoring surveys could be applied for component project activities (CPAs) solely comprising distributed units to estimate parameter values required by the methodologies. According to the simplified requirements on monitoring of distributed units, CPAs may apply the result of the surveys for monitoring period up to 12 months after the date of the survey. The survey results may be used for the period 12 months after the survey date, on top of using the results for the period prior to the survey date, resulting in up to 24 months period to which the survey results may be applied to, irrespective of when the monitoring reports are uploaded on the UNFCCC CDM website. In order to apply the survey results for the monitoring period after the survey date, the requirements of biennial sampling should be met i.e. survey results show the confidence/precision of 95/10 (or 95/5 if specified in the applied methodology).

Though, the methodology does not include the biennial monitoring option for the parameter  $\Delta \eta_{y,i,a}$  (Factor to consider the efficiency loss of the project device type  $i$  due to its aging at the yearly), the gap between the date of the survey and end date of the monitoring period is less than 5 months.

According to the information presented at page 7 of the monitoring report, the precision achieved under the confidence level of 95% for different monitoring parameters is between 3.6% and 4.6%. Thus, the precision achieved is less than 5%, which is typically considered acceptable for the biennial monitoring. Therefore, though the PoA follows the annual monitoring frequency, the monitoring surveys were designed to achieve the precision required for biennial monitoring to allow the use of the monitoring results for any additional monitoring periods between the two rounds of monitoring activities. Thus, the survey results are considered applicable for the current monitoring period (01/02/2018 to 31/05/2018).

2. Sampling surveys are conducted on an annual basis in line with the monitoring plan of the registered PoA DD. The third round of surveys is planned to be performed in January-February 2019 following the annual frequency requirements and will take into account the total number of improved cook-stoves disseminated within the PoA. The most recent data available are used for the preparation of the monitoring report. The stoves distributed after conduction of monitoring surveys in February 2018 are of the same design and characteristics as the stoves distributed earlier. The proportion of stoves that are still in operation is expected to be very high for the stoves distributed after the end of previous monitoring period, while the efficiency loss on the contrary is expected to be very low (as at the end of the current monitoring period these stoves were operated for only 4 months). Therefore, the outcome of the sampling survey done in Feb 2018 is considered representative for cookstoves that are newly included into this monitoring period and allows conservative estimation of emission reductions.

**Documentation provided by project participant**

**MR version 2.4**

**DOE assessment**

**Date:** 07/01/2019

1. As per page 32-33 of registered PoA-DD, the monitoring frequency for parameter **Ny,i,a** (Number of project devices of type i and age a that are operating in year) and parameter  **$\Delta\eta_{y,i,a}$**  (Factor to consider the efficiency loss of the project device type i due to its aging at the yearly) are annual.

Page-31 of PoA-DD for parameter **Ny,i,a** also mentions that (in table for Ny,i,a under measurement methods and procedure) monitoring shall consist of checking all devices or a representative sample thereof, at least once every two years (biennially) to determine the operation status..

Parameter **Ny,i,a** (Number of project devices of type i and age a that are operating in year) is monitored continuously based on total sales records databases and most recent data are used (survey done in February 2018) in calculation of emission reductions during the current monitoring period (01/02/2018 to 31/05/2018). According to "General guidelines for SSC CDM methodologies" simplified requirements for monitoring surveys could be applied for component project activities (CPAs) solely comprising distributed units to estimate parameter values required by the methodologies. In line with the simplified requirements on monitoring of distributed units, CPAs may apply the result of the surveys for monitoring period up to 12 months after the date of the survey. The survey results may be used for the period 12 months after the survey date, on top of using the results for the period prior to the survey date, resulting in up to 24 months period to which the survey results may be applied to, irrespective of when the monitoring reports are uploaded on the UNFCCC CDM website (footnote-4). In order to apply the survey results for the monitoring period after the survey date, the requirements of biennial sampling should be met i.e. survey results show the confidence/precision of 95/10 (or 95/5 if specified in the applied methodology). The survey conducted for **Ny,i,a** shows 95/10 (confidence/precision) and the precision achieved is 4.6% which is less than 5%. Thus, the monitoring results can be considered applicable for 2 years period. Thus, assessment team has accepted the monitoring results of the parameter Ny,i,a for the current monitoring period 01/02/2018 to 31/05/2018) and the gap between the monitoring survey and the last date of the current monitoring period is less than 5 months.

Further, the registered monitoring plan does not include the biennial monitoring option for the parameter  **$\Delta\eta_{y,i,a}$**  (Factor to consider the efficiency loss of the project device type i due to its aging at the yearly), the gap between the date of the survey and end date of the monitoring period is less than 5 months. Based on further assessment it is also found that the precision achieved under the confidence level of 95% for the parameter is 3.7%. Thus, the precision achieved is less than 5%, which is typically considered acceptable for the biennial monitoring. Therefore, though the PoA follows the annual monitoring frequency, the monitoring surveys were designed to achieve the precision required for biennial monitoring to allow the use of the monitoring results for any additional monitoring periods between the two rounds of monitoring activities. The assessment team has reviewed the survey details in line with the requirements of the standards and the methodology and found it accepted. Thus, the survey results are considered applicable for the current monitoring period (01/02/2018 to 31/05/2018) and are considered accepted.

2. The assessment team has checked the survey details for all periods and it is confirmed that, sampling surveys are conducted on an annual basis in line with the monitoring plan of the registered PoA-DD. The survey frequency is maintained by the CME. The next surveys is planned to be performed in January-February 2019 as confirmed by the CME following the annual frequency requirements and will take into account the total number of improved cook-stoves disseminated within the PoA. The stoves distributed after the monitoring surveys in February 2018 are of the same design and characteristics as the stoves distributed earlier. It is also evident that the proportion of stoves that are still in operation is expected to be higher for the stoves distributed after the end of previous monitoring period, while the efficiency loss on the contrary is expected to be very low (as at the end of the current monitoring period these stoves were operated for only 4 months). Thus, the value used is found to be conservative. Therefore, the outcome of the sampling survey done in Feb 2018 is considered representative for cookstoves that are newly included into this monitoring period which also allows conservative estimation of emission reductions.

CAR#04 is closed.

<b>CAR ID</b>	05	<b>Section no.</b>	E.2, E.3.1	<b>Date</b>	08/08/2018
<b>Description of CAR</b>					
The crediting period start date for CPA 8 and CPA 9 falls in previous monitoring period. PP is requested to confirm whether a request for issuance of CERs for the CPA 8 and CPA 9 for the previous monitoring period has been published.					
<b>Project participant response</b>					<b>Date</b>
Beginning of household stoves (ICS) distribution under the CPA is 06/04/2018. Beginning of household stoves (ICS) distribution under the CPA is 29/03/2018. Both dates are after the start of the current monitoring period. There were no stoves distributed before the start date of the current monitoring period under CPA 8 and CPA 9 and thus, no requests for issuance of CERs for the CPA 8 and CPA 9 for the previous monitoring period have been published.					
<b>Documentation provided by project participant</b>					
<b>DOE assessment</b>					<b>Date</b>
CPA 8 and CPA 9 were not considered for request for issuance for previous monitoring period. CPAs should have been included in requests for issuance of CERs in a consecutive manner, that is, when a CPA has been included in a request for issuance of CERs for a monitoring period, it shall be considered for a request for issuance of CERs for the previous monitoring period that included the particular CPA has been published. (para 334 of VVS for PoA v1.0). CAR#05 remains open.					
<b>Project participant response</b>					<b>Date</b>
The start dates of the crediting period has been amended based on the notification submitted to the UNFCCC. Please, refer to <a href="https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/6T5L1JF4IMQEYUZONWASV2980XRK3D/view">https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/6T5L1JF4IMQEYUZONWASV2980XRK3D/view</a> and <a href="https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/YIJRLVZNO8A9E5HSQB41WK6FCPTGMX/view">https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/YIJRLVZNO8A9E5HSQB41WK6FCPTGMX/view</a>					
<b>Documentation provided by project participant</b>					
<b>DOE assessment</b>					<b>Date</b>
The start date of crediting period for CPA08 and CPA09 is updated and is falls under the current monitoring period. The assessment team has checked the UNFCCC webpage and found the details correct. Hence, CAR#05 is closed.					

<b>CAR ID</b>	06	<b>Section no.</b>	E.3.5	<b>Date</b>	08/08/2018
<b>Description of CAR</b>					
During onsite assessment, it is observed that serial number of stove of user <i>January Chilongo</i> is not consistent with the survey sheet details done by CME. PP/CME is requested to clarify the same. Further, it is also observed that in few stoves the Unique ID (serial number) is not visible. PP is requested to clarify how the non-repetition of unique ID (serial number) in stoves has been ensured.					
<b>Project participant response</b>					<b>Date</b>
After further investigation January Chilongo's stove may have been interchanged with a neighbor at a neighborhood wedding in the area where a number of households cooked together, which is not unusual for village weddings or funerals.					
Regarding stoves without number, it has been observed that some serial numbers fade with use. We thus have recently undertaken re-mentorship to all participating production groups on the importance of unique ID and etching the serial number onto the stove prior to drying, and prior to curing of the stoves.					
<b>Documentation provided by project participant</b>					
<b>DOE assessment</b>					<b>Date</b>
PP is requested to confirm and provide the details of replaced stove. Further, carbon transfer certificate also not allows the replacement of stoves.					
The justification provided by the PP is found accepted as the same is also confirmed by the assessment team during onsite visit by interviewing the production group.					
CAR#06 remains open.					
<b>Project participant response</b>					<b>Date</b>

The initial stove bought by January Chilongo has serial number MAEVE/2015/2267 (ER has been provided). The current stove that January Chilongo owns has a serial number of LL/DWN/30415. The owner of the replaced stove is not recorded in the database as it was a part of bulk sales. Carbon transfer certificate prohibit to sell or give away the Chitetezo Mbaula or any replacement thereof. In case of January Chilongo the stove was not sold or given away, but incidentally interchanged.

**Documentation provided by project participant**
**DOE assessment**
**Date:** 14/09/2018

PP/CME has provided the details of the replaced stove. The assessment team has checked the details to identify any double counting of the stoves and it is found that there is no double counting of the stove for ER calculation.

Hence, CAR#06 is closed.

<b>CAR ID</b>	07	<b>Section no.</b>	-	<b>Date :</b> 07/03/2019
---------------	----	--------------------	---	--------------------------

**Description of CAR**

1. It is observed that the monitoring frequency as mentioned in table in registered PoA-DD (page-32) for parameter  $N_{y,i,a}$  (Number of project devices of type I and age a that are operating in year) is annual while the other section (measurement methods and procedures) of same table of the PoA-DD (Page-31) states that the monitoring of  $N_{y,i,a}$  shall be done at least once every two years. PP is requested to clarify the inconsistency in monitoring frequency defined in the monitoring plan in registered PoA-DD.
2. PP is also requested to clarify if there are any deviations from the registered monitoring plan for the monitoring of parameter  $N_{y,i,a}$  (Number of project devices of type I and age a that are operating in year) .
3. It is observed from the spreadsheet of 'CDM 10182 PoA - ER Calculation - VP3 - 19082018.xlsx' that some purchasers have more than one stove. PP is requested to clarify the appropriateness of applying the values 1.881Tonne/year/stove in determining the emission reductions considering that there are households which have more than one stove.
4. It is also observed that the spreadsheet of 'CDM 10182 PoA - ER Calculation - VP3 - 19082018.xlsx' indicates that it does not contain any location/contact information for many purchasers. PP is requested to clarify how the samples selected for monitoring survey are representative of the population as the spreadsheet does not list actual end user information including location/contact.

**Project participant response**
**Date :** 26/04/2019

1. Both PoA DD and CPA DDs cite the provision of the methodology in the "Measurement methods and procedures" section of the table for parameter  $N_{y,i,a}$ . Please, refer to the paragraph 33 of the methodology, which states that "Monitoring shall consist of checking all devices or a representative sample thereof, at least once every two years (biennially) to determine if they are still operating". The monitoring frequency is indicated in a proper section of the table for parameter  $N_{y,i,a}$ . The monitoring frequency is established as annual. The two statements do not contradict each other as annual monitoring is in line with the requirements of the methodology to perform monitoring at least once every two years (biennially). The monitoring is conducted on an annual basis in full compliance with the information provided in Monitoring frequency section. The correction of the text of the PoA DD will be made within the next verification to avoid misinterpretation and inconsistency.

2. No, there were no deviations from the registered monitoring plan. The parameter  $N_{y,i,a}$  - Number of project devices of type i and age a that are operating in year y is being monitored on an annual basis in line with the registered monitoring plan.

3. The value of 1.881 Tonne/year/stove for the parameter  $B_{y=1,new,i,survey}$  (Annual quantity of woody biomass used by project devices in tonnes per device of type I) has been determined in the first year of introduction of the devices (e.g. during the first year of the crediting period,  $y=1$ ) in line with the registered monitoring plan. Kitchen Performance Tests (KPTs) were conducted in between 24/01/2017 and 26/02/2017 for 40 stoves (the minimum sample size required was 35 stoves). The minimum sample size required for the KPTs was calculated based on equation (21) of CDM Guideline "Sampling and surveys for CDM project activities and programmes of activities", Version 03.0 (equation used for mean parameters). The minimum sample size was determined to achieve 95% confidence level and a 10% margin of error. Actual precision achieved for 95% confidence level was 9.9%.

Therefore, the value of 1.881 tonne/year/stove is defined based on the requirements of the PoA DD and in line with the CDM Guideline “Sampling and surveys for CDM project activities and programmes of activities”, and thus is considered applicable for determining the emission reductions for the whole population of the distributed stoves. From the project’s earliest stages the CME understood that some households will have more than one stove and discounted accordingly. Discounting factor to account for households with more than one stove was included in POA10182 on voluntary basis in pursuit of self-imposed conservativeness. According to the registered PoA DD (please, refer to page 20), CPA implementers are to share information on how households can use broken stoves as fixed stoves and households are encouraged to have more than one stove. Moreover, under market conditions, ‘permission’ to sell multiple stoves to households is not controllable by PoA DD and it would be morally reprehensible to suspend sales to a household suspected of buying or having more than 1 stove per house.

The fact that there are households, which have more than one stove, is taken into account during monitoring activities. Through annual usage surveys the number of stoves per household is monitored and recorded and the usage rate used in calculation of emission reduction is discounted.

Discount factor to account for households with more than 1 stove installed has been used to discount usage rate for each age group monitored. According to the usage and monitoring survey results conducted in February 2018, the discount factor for more than 1 stove installed was 3.64%.

The applied approach of using an adjusted formula is similar to the approach proposed by the methodology for the estimation of the Quantity of woody biomass that is saved in tonnes per oven or drier of type *i* in year *y* using kitchen performance test option. In particular, paragraph 16 of the methodology states that “Considering the KPT is used to estimate the consumption per household, an adjusted formula shall be used in the PDD in case more than one device is used in a household”.

The following adjustment had been applied in the emission reduction calculations and the monitoring report:

- the usage rates determined via the usage and monitoring surveys were the following: Age 1 – 88.24%, Age 2 – 80.00%, Age 3 – 71.43%;
- the adjusted usage rates used in emission reduction calculations were the following: Age 1 - 85.03% Age 2 – 77.09%, Age 3 – 68.83% (discounted taking into account the percentage of households using more than 1 stove (e.g. for age 1 the usage rate used in the calculation of emission reduction is defined as  $88.24\% * (1 - 3.64\%) = 85.03\%$ ;
- discounted usage factor is then used for the estimation of the Number of project devices of type *i* and age *a* operating in year *y*.

The latest usage and monitoring surveys results conducted in February 2019 demonstrate both a very significant increase in technology penetration levels in Malawi during the preceding 12 months as well as an increase in the percentage of households with more than one stove up to almost 17% (with consequent discounting in the resultant draft monitoring report – as will be shown in the monitoring data that will be submitted with the next Issuance Request). As penetration levels increase so too does the likelihood of more households purchasing and using more than one stove.

The proposed approach is explicitly documented in the Monitoring Reports under data parameter  $N_{y,i,a}$  under the calculation method section, which states: “The number of stoves were adjusted by percentage of stoves still in operation and percentage of households using more than 1 stoves as determined by usage and monitoring surveys” (please, refer to page 16 of the Monitoring Report).

#### **Summary of Conservativeness Measures to avoid Over issuance in POA10182**

Overall, the design of the PoA ensures several additional conservative approaches to avoid the over issuance of emission reductions:

- (i) the Project introduced discounting for households with more than one stove ab initio on an unforced voluntary basis. This discounting is over and above additional discounting measures mentioned below.
- (ii) the Number of project devices of type *i* and age *a* that are operating in year *y* is estimated based on the number of technology days for each year (number of technology days divided by 365);
- (iii)- the usage rate is defined for each age group separately, which allows taking into account lower usage due to the aging of the stoves and the resulted usage rates (discounted for the use of more than one stove as described above) are used to arrive the number of project devices generating emission reductions; - the operational lifetime of the stoves is limited to 47 months (see page 4 of the PoA DD) or 1417 days as reflected in the emission calculation excel file (Fixed Data worksheet); no emission reductions are claimed after the expiration of this operational lifetime for the stoves included in the PoA, while CME’s experience in conducting usage and monitoring surveys demonstrate that about **50% of stoves** are still operational at age 4, and some *Chitetezo Mbaula* stoves disseminated in 2009 were still working and being used in March 2018 (i.e. at age 9).
- (iv) PoA 10182 started in August 2015 but the CME has disseminated stoves in the same areas since 2009. Usage surveys for PoA 10182 that identify more than 1 stove in a household are noted and fuel savings and emissions reductions are discounted accordingly across the PoA, even if the earlier stove has

already stopped generating emissions reductions in our system. Hence the emissions reductions are over-discounted.

The aggregation of these measures further reduces any overall risk of over issuance.

4. In relation to traceability and avoiding over issuance, as noted CME can trace the vast majority of all project stoves. While the vast majority of Malawians do not have any formal "address" we are able to trace 88% of the project stoves (127 households from the random sample of 145 households were reached and surveyed in during the annual monitoring activities conducted in 2018) **and each and every project stove** possesses the **most conservative measure possible** to prevent double-counting, namely a unique serial number etched onto it.

#### **End user information in the database**

The description of the monitoring plan of the registered PoA DD clearly states that user details (name, address and telephone if available) will be collected for the **majority of customers** (please, refer to page 35). As per the PoA DD "Although it is difficult to track 100% of households that will eventually use the stove(s) promoted by the PoA, the CME will encourage project implementers to **track as many as possible and definitely more than half**" (see footnote 44 at page 35).

In reality, CME has collected such details for the vast majority of end users.

There are different levels of details provided for the purchasers of stoves in the total sales records database. The analysis of the database revealed that for 78% of households in the total sales database (139,889 entries in the database) there is a contact information such as phone number or village or GVH administrative unit, which allows the possibility to track the stove user for usage and monitoring survey. Even assuming the 88% response rate achieved during the usage and monitoring surveys, this allows to track 69% ( $78\% \times 88\% = 69\%$ ) of households, which is significantly higher than "more than half" as defined in the registered PoA DD. Therefore, missing end user information for some households (including 553 households mentioned in the UN's comments) do not undermine the representativeness of the monitoring activities as prescribed by the registered PoA DD. The database was additionally reviewed for entry errors and 149 entries without the names of stoves' purchasers were removed.

The CME will ensure that maximum available end user information is entered in the total sales database for the majority of households to safeguard the conservative approach for the representativeness of the sample.

The CPA implementers tend to have a promoter for each village or set of villages who knows the customers and could help tracking the users without complete end user details. In cases where there is no promoter the village chief tends to be the anchor in the village for the CPA.

Absolute 100% traceability is not a *sine qua non* for avoiding over issuance in the CDM. Methodology AMS-III.AR (LED lights) specifically permits the non-collection of **any** end user names, locations or serial numbers **whatsoever** and has the option of relying entirely on usage surveys to establish usage levels and avoid over issuance. To require the 100% traceability of highly-distributed affordable energy saving devices in zones where the vast majority of the population do not have any formal address of any kind would be to unnecessarily introduce a prohibitive layer of additional expense that achieves little and would ultimately be harmful to overall impact of such a project. It would not be appropriate in an LLDC context and would be an arbitrary and harmful hurdle to introduce in an already severely challenged region. As with many other Registered projects/CPAs in the UNFCCC database, the cookstove model in use in POA10182 is a small portable cookstove. In the case of POA10182 the population affected by the project has now reached approximately two and a half-a-million people across almost half-a-million households. It is not currently possible in Malawi (by any measure) to keep track - on a moment-to- moment basis - of the precise location of that quantum of people/portable stoves – users regularly die, move to other villages, migrate for work or become displaced due to severe weather events and natural disasters (such as the floods currently devastating Malawi- <https://news.un.org/en/story/2019/03/1034451>). The only viable way to calculate usage is by way of sampling – as is inherent in both the AMS II.G and the *Standard for Sampling and surveys*. 100%-traceability of small portable stoves is impossible and POA 10182' total traceable population (69%) is more than sufficiently large to allow for statistically appropriate sampling taking into account the homogeneity of targeted rural and peri-urban population in Malawi. Even if 100%-traceability could be achieved, it would not change the requisite sampling procedures or the minimum sample sizes required (i.e. the surveyors would not be required to survey the entire population of 472,000+, but only about 100 households or 0.02% from the total population).

#### **Households buying multiple stoves**

In some cases, customers buy multiple stoves (e.g. 3 to 10 stoves) for resale or distribution amongst relatives and/or neighbours which facilitates greater access but makes traceability difficult. In such cases various stoves may be allotted to the same individual in the total sales records database. Some purchasers keep 2 or even 3 stoves for own needs due to large family or household sizes. Thus, recording of several stoves per one household in the total sales database reflects the distribution and usage practices in the region of PoA implementation.

The 330 (260 noted in the UN's email and additional 70 entries revealed after database review) entries for Mr. Lonjezo Phiri have been removed from the database. Mr. Phiri indeed purchased 330 stoves (for local resale). These entries date back to the very early stages of PoA implementation in 2015. The practice of selling stoves to individuals in large volume for resale was discontinued at a very early stage.

Even the stoves from users who received their stoves via onward gift or sale from the purchasers of multiple stoves have serial numbers and therefore have the equal probability to be randomly sampled (i.e. that person's serial number is as likely to be selected as any other serial number) and could be tracked via the initial purchaser. The traceability level for all of the approx. 180k project stoves in the sales database per usage survey conducted in February 2018 is 88%. This constitutes an enormous population to sample from. If the stove with the sampled serial number could not be tracked, it is reported as not being in use and therefore reduces the usage rate used for the calculation of emission reductions. Therefore, the purchasers of multiple stoves are not statistically different from single stove purchasers named in the database. Further, even though said stove may well still be in use, it is treated as not being in use - this reflects across the entire database - this is yet a further conservativeness measure to avoid over-issuance.

### Recent Clarification

The UNFCCC Methodologies Panel recently (WG meeting: 26 Feb – 1 Mar 2019 / MP 78) clarified the acceptability-in-principle of using a procedure that draws a representative sample of the end-users in absence of a database containing information on all end-users. Please see Final Response to SSC\_746 (<https://cdm.unfccc.int/methodologies/SSCmethodologies/clarifications/14785>).

The Final Response in that case ruled that:

"The project proponent did not submit the procedure to be used in order to draw a representative sample of the end-users in the absence of a database containing information on all end-users."

This clearly shows that if the project proponent in that case had submitted such a procedure (and such procedure was effective for its purpose), then a database containing information on all end-users would not have been required (i.e. the absence of a database containing information on all end-users is not in itself preclusive).

In the case of POA10182, the "procedure to be used in order to draw a representative sample of the end-users in the absence of a database containing information on all end-users" was included from the beginning in section B.3 (please, refer to sub-sections on Sampling Plan – Design, Target Population, Sampling Method and Sampling Size on page 10) and is reflected in details in the latest version of the monitoring report (please, refer to sub-section Procedure to draw a representative sample on page 24-25).

The Final Response in that case also ruled that:

"The Meth Panel considers that listing/recording of information of all end-users is important to meet the requirements above."

The Meth Panel specifically uses the phrase "important to meet". It does not use the phrase "necessary to meet" (or equivalent) i.e. 100% end-user information is not a pre-requisite to meeting the 'requirements'. The 'requirements' referred to are paragraphs 5(a), 23(b), 24(b) of the standard for sampling and surveys (v 07.0) (on ensuring that that samples are randomly selected and are representative of the population) and paragraph 120(b) the PS-PoA (v 01.0) (on conditions to avoid double-counting). Paragraph 5 (a), in particular, defines a "sample" as a subset of a "population". The population could be, **for example**, all households included in a CDM project activity or PoA, or in a group of project activities or PoAs; the sample is a subset of these households. The definition clearly states that all households included in a CDM is **an example of population** from which the sample could be drawn. Registered PoA DD (page 10) states that for PoA 10182 the target population for the parameter "Proportion of stoves that are still in operation" are the users contained in the CPA databases (not all households included in the PoA).

As shown in detail above, section B.3 of the PoA DD and section E.3 of the monitoring report the requirements of paragraphs 5(a), 23(b), 24(b) have been met by POA10182. As shown in detail above the requirements of paragraph 120(b) have been met by POA10182 via the most conservative measure possible to prevent double-counting (namely the etching of a unique serial number onto each and every project

stove).

### Representativeness of the sampling

A representative sampling has been undertaken in line with the requirements of AMS II.G v6.0 and the CDM Guideline "Sampling and surveys for CDM project activities and programmes of activities", Version 03.0.

According to the information provided in the monitoring report, the stratified random sampling method was applied in line with the provisions of CDM Guideline "Sampling and surveys for CDM project activities and programmes of activities", Version 03.0. To optimize logistics and costs of the monitoring procedures first the 4 districts were randomly sampled, namely: Lilongwe, Dowa, Mzimba South, Balaka. Such approach ensures cost effectiveness and does not impact the quality of monitoring data as ICS and cooking practices does not differ among districts. The four districts sampled covered 46% of the total stoves population size at the time of monitoring activities.

On the second stage individual households were randomly sampled from the households in 4 sampled districts for data collection, taking into account defined primary sampling units based on CPA Implementer and stove vintage. The sample size for each primary sampling unit was calculated using proportional allocation, where the proportions of units from the different PSU in the sample is the same as the proportions in the population. The sample size determined for usage and monitoring surveys was 145 households. The sample was determined assuming 80% response rate. Out from 145 households, the enumerators were able to identify, and survey 127 households based on the information provided in total sales records (88%). Therefore, the random sampling demonstrates that possibility to identify most of the purchasers based on the information provided in the total sales records, even if not full contact information (telephone number, exact address) is recorded.

Therefore, the selected samples are representative of the population as the sampling process is conducted in line with the CDM Guideline "Sampling and surveys for CDM project activities and programmes of activities", Version 03.0 and monitoring plan description provided in the registered PoA-DD. The procedure described above ensures that samples are randomly selected and are representative of the population.

In Malawi, as per the most recent Welfare Monitoring Survey 2011 conducted by the National Statistics Office between September 2011 and February 2012 which was based on a random sample that covered 14,000 households drawn from all the districts of the country, the vast majority of households use firewood as their main source of energy (88%), with others using charcoal (7%), electricity (3%) and very few use paraffin, gas and other sources.

**Table 6.22: Percentage distribution of households by main source of fuel for cooking according to background characteristics, Malawi 2011**

		Main source of fuel for cooking						
		Electricity	Solar energy	Gas	Paraffin	Charcoal	Firewood	Other
Sex of household head	Malawi	3.2	0.0	0.1	0.7	7.4	88.0	0.6
	Male	1.3	0.0	0.0	0.7	7.5	89.9	0.5
Age of household head	Female	9.8	0.1	0.1	0.8	6.9	81.4	0.8
	10-19	4.2	0.0	0.0	1.8	6.0	88.0	0.0
Educational level of head	20-24	1.1	0.0	0.1	1.1	6.1	91.0	0.7
	25-34	2.9	0.0	0.0	0.5	9.1	87.0	0.5
	35-49	3.7	0.1	0.0	0.7	7.2	87.7	0.5
	50-64	3.9	0.0	0.1	0.7	7.1	87.5	0.7
	65+	3.3	0.1	0.2	0.9	5.4	89.3	0.9
	None	1.3	0.0	0.0	0.0	1.3	97.3	0.0
Marital status of head	Junior primary	2.5	0.0	0.1	0.7	5.1	90.9	0.7
	Senior primary	3.0	0.0	0.0	0.5	6.2	89.7	0.6
	Junior secondary	3.2	0.1	0.0	1.3	10.2	85.1	0.1
	Senior secondary	5.5	0.1	0.0	0.7	16.0	77.4	0.2
	Post secondary	11.2	0.0	0.7	0.3	28.1	59.7	0.0
	Never married	6.1	0.2	0.2	1.5	18.8	72.7	0.6
Place of residence	Married	1.8	0.0	0.0	0.6	7.0	89.9	0.6
	Widowed	10.3	0.0	0.1	1.2	7.2	80.5	0.7
	Divorced/Separated	7.7	0.1	0.0	0.3	7.1	83.8	1.0
Region	Urban	13.2	0.0	0.1	0.6	41.7	44.1	0.4
	Rural	2.3	0.0	0.1	0.7	4.3	92.0	0.6
Region	Northern	4.2	0.1	0.0	0.2	3.5	92.0	0.0
	Central	2.2	0.0	0.0	0.5	7.2	89.3	0.8
	Southern	3.6	0.0	0.1	1.1	9.3	85.2	0.7

As per 10182 POA DD, households using firewood as their primary fuel, who represent over 90% of rural

households and approximately half of urban households in Malawi, are the target population for the PoA in Malawi. This population tends to be low-income rural and peri-urban households (i.e. households in population dense settings) using non-renewable biomass energy on traditional/unimproved/low-efficiency stoves. Areas such as urban Blantyre in Malawi, for example, where households predominantly use charcoal will not be targeted initially but households headed by people without formal education that use firewood as their main source of energy almost entirely (97.3%), as per above table 6.22 of the Welfare Monitoring Survey 2011, will. Note rural people represent 83% of total population of Malawi (<https://data.worldbank.org/indicator/SP.RUR.TOTL.ZG?locations=MW>).

The device promoted by POA10182 to date, called the *Chitetezo Mbaula*, is a clay stove fuelled by firewood only – charcoal require a different stove. The pre-project device is a three-stone fire using firewood (not charcoal) or a conventional device with no improved combustion air supply or flue gas ventilation. In Rwanda, the stove is called the *Canarumwe*, and was identified by the Government of Rwanda as the stove most appropriate for rural firewood consuming households (see footnote 39 on page 26 of 37 of registered PoA-DD for POA10182).

The entire population of POA10182 for monitoring period February 1<sup>st</sup> to May 31<sup>st</sup> 2018 was 180,095 stoves distributed among the households throughout the country. As explained above to optimise logistics and costs, 4 districts out of Malawi's 28 districts, from all three Regions namely Central, Northern and Southern Regions, were sampled (representing 46% of the entire PoA population) and subsequently households were sampled. The 145 randomly sampled households are rural and peri-urban households (i.e. households in population dense settings), that predominantly cook with firewood and are a subset that accurately reflect the characteristics of all households involved in the PoA.

The 'energy for cooking' market in Malawi cannot be considered sophisticated and heterogeneous, with options or choices of cooking technologies extremely limited, particularly for households that rely on unprocessed biomass as their fuel source (88% of Malawi population, 92% of rural population). The *Chitetezo Mbaula* stove's popularity is mainly due to fuel savings and because of its portability (i.e. you can cook where you like, when you like, often outside in the shade reducing exposure to smoke) and is for the vast majority of Malawians the only accessible alternative to the 3 stone fire, with few if any exceptions. PoA 10182 is driving a cooking transformation in Malawi. It is in this context that the market segment or population of "households that rely on firewood for cooking" are homogeneous, and represents the 9 in 10 of Malawi and the sampled subset represent the PoA's population that have accessed an alternative to the 3 stone fire, many for the first time ever.

#### Documentation provided by project participant

#### DOE assessment

Date: 28/04/2019

1. PoA-DD and CPA-DD mentions the monitoring frequency as annual for the parameter  $N_{y,i,a}$  as given in table in monitoring frequency section. PP/CME has followed the annual monitoring for the parameter which is in line with the registered documents. However, there is inconsistent information for the same parameter in other section of the table in PoA-DD and CPA-DD. PP has however done the monitoring annually which is found in line with the requirement of annual frequency. The assessment team has raised a FAR#08 for this inconsistent information in registered documents and to be rectified during or prior to verification of next monitoring period. The assessment team has found the approach correctly adopted in line with the registered documents. Hence, this point is closed by the assessment team.
2. There is no deviation in monitoring of parameter  $N_{y,i,a}$  - Number of project devices of type  $i$  and age  $a$  that are operating in year  $y$ . The parameter has been monitored annually which is found in line with the registered PoA-DD and CPA-DDs. However, there is inconsistent information for the same parameter in other section of the table in PoA-DD and CPA-DD. PP has however done the monitoring annually which is found in line with the requirement of PoA-DD and CPA-DD i.e. annual frequency. The assessment team has raised a FAR#08 for this inconsistent information in registered documents and to be rectified during or prior to verification of next monitoring period. The assessment team has found the approach correctly adopted in line with the registered documents. Hence, the issue is considered correct and accepted by the assessment team.
3. The value of 1.881 Tonne/year/stove for the parameter  $B_{y=1,new,i,survey}$  (Annual quantity of woody biomass used by project devices in tonnes per device of type  $i$ ) has been determined in the first year of introduction of the devices (e.g. during the first year of the crediting period,  $y=1$ ) in line with the

registered monitoring plan. The assessment team has checked and reviewed the details and found it correct and in line with the registered PoA-DD. A discount factor is used in the calculation of Emission Reduction in case any household has more than one stove. This factor is determined based on monitoring survey done by CME. Discount factor to account for households with more than 1 stove installed has been used to discount usage rate for each age group monitored. According to the usage and monitoring survey results conducted in February 2018, the discount factor for more than 1 stove installed was 3.64%. The assessment team has checked the details of the monitoring survey results and it is found that the factor used is correctly calculated and considered correct by the assessment team. Thus, the details provided by the PP is considered to be correct and accepted by the assessment team. It is further confirmed that the discount factor used in the calculation of ERs are correct with respect to the households with more than one stoves. In addition to the above there are other approach is applied to ensure conservativeness and avoid over issuance of emission reductions. The number of project devices of type I and age a that are operating in year y is estimated based on the number of technology days for each year.

Further, the usage rate is defined for each age group separately. The operational lifetime of the stoves are considered as 47 months or 1417 days and CME has limited the lifetime as 1417 days. The assessment team has checked and reviewed the approach and it is confirmed that the approach implemented by the CME resulted in conservative estimation of emission reductions.

4. During the review of database, it is observed that there are end users for which details are not available. The assessment team has reviewed the registered PoA-DD for the details of sampling plan. The description of the monitoring plan of the registered PoA-DD states that user details (name, address and telephone if available) will be collected for the majority of customers (page 35 of PoA-DD). The assessment team has checked the PoA-DD and it is mentioned that "Although it is difficult to track 100% of households that will eventually use the stove(s) promoted by the PoA, the CME will encourage project implementers to track as many as possible and definitely more than half" (footnote 44 at page 35 of PoA-DD). As observed during onsite assessment and review of documents, CME has followed the sampling approach as mentioned in the registered PoA-DD and collected such details for the vast majority of end users as observed based on document review during onsite assessment. There are different levels of details provided for the purchasers of stoves in the total sales records database. As discussed above by CME and also checked by the assessment team; the database revealed that for 78% of households in the total sales database (139,889 entries in the database) there is a contact information such as phone number or village or GVH administrative unit, which allows the possibility to track the stove user for usage and monitoring survey. which is significantly higher than "more than half" as defined in the registered PoA-DD. Thus, selected samples are considered representative of the population as the end user data are available for more than 50% of the population in line with the registered PoA-DD. Further, all the end users in database can be traceable. The stoves from users who received their stoves via onward gift or sale from the purchasers of multiple stoves have serial numbers and therefore have the equal probability to be randomly sampled (i.e. that person's serial number is as likely to be selected as any other serial number) and could be tracked via the initial purchaser PP/CME has also removed 149 stoves for which the name of stove purchaser was not available. All stoves have a unique ID number as observed during onsite assessment. The sampling conducted by CME is found in line with the requirements of AMS II.G v6.0 and the CDM Guideline "Sampling and surveys for CDM project activities and programmes of activities", Version 03.0. Thus, the justification provided by the CME is considered to be correct and it is confirmed that the selected samples are representative of the population.

CAR#07 is closed.

**Table 4. FAR from this verification**

<b>FAR ID</b>	08	<b>Section No.</b>	-	<b>Date :</b> 07/03/2019
<b>Description of FAR</b>				
Inconsistent information is provided in PoA-DD and CPA-DDs for the monitoring frequency for the parameter N <sub>y,i,a</sub> - Number of project devices of type i and age a that are operating in year y. The inconsistent information to be corrected during or prior to verification of next monitoring period for the PoA.				
<b>Project participant response</b>				<b>Date :</b> DD/MM/YYYY
<b>Documentation provided by project participant</b>				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY

- - - - -

### Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	29 December 2017	Revision to align with the requirements of the “CDM validation and verification standard for programme of activities” (version 01.0).
01.0	5 June 2015	Initial publication.

Decision Class: Regulatory  
 Document Type: Form  
 Business Function: Issuance  
 Keywords: programme of activities, verifying and certifying