



**Monitoring 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.

MONITORING REPORT

Title of the PoA	Improved Cooking Stoves Programme of Activities in Africa	
UNFCCC reference number of the PoA	5341	
Version numbers of the PoA-DD applicable to this monitoring report	Version 3.2 dated 27/11/2012	
Version number of this monitoring report	1.0	
Completion date of this monitoring report	12/06/2018	
Monitoring period number	Fourth monitoring period	
Duration of this monitoring period	01/01/2017 - 31/12/2017 both days inclusive	
Monitoring report number for this monitoring period	1.0	
Coordinating/managing entity	Envirofit International Ltd.	
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)
	Kenya	Yes
	South Africa	No
Sectoral scopes	Sectoral scope: 3: Energy demand	
Applied methodologies and standardized baselines	AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass, version 03.0	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0	149,720 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the CPA-DDs for the CPAs covered in this monitoring report	149,720 tCO ₂ e	

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

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The purpose of the Programme of Activities (PoA) is dissemination of high efficiency improved cook stoves (ICS) in Kenya and South Africa. The PoA promotes improved cookstove (ICS) technologies that replace existing, less efficient cooking stoves using woody-biomass (charcoal or wood-fuel).

The ICS distributed under the PoA are portable and use charcoal or woodfuel as fuel. These ICSs are more efficient in transferring heat from the fuel to the pot, thus saving charcoal/woodfuel compared to the traditional charcoal/woodfuel stoves currently used by the project households. Furthermore, these ICSs have been designed not only to increase heat transfer, but also to match traditional utensils and cooking habits of project households.

In accordance with version 3.0 of the small-scale CDM methodology AMS-II.G, in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs. Therefore, by reducing the amount of fuel required for cooking and thus the use of non-renewable woody biomass, the replacement of less efficient stoves with more efficient ICS reduces the amount of greenhouse gases (GHG) emitted into the atmosphere.

Envirofit International Ltd (Envirofit) is the coordinating/managing entity (CME) for this PoA and coordinates the efforts of different Distribution Organizations (DOs) who are involved in distribution of ICS within the boundary of the PoA and comply with the requirements of this PoA. Each DO sells ICSs either directly or through retailers, entrepreneurs or other agents sub-contracted by the DO. The CME provides training and guidance on the correct distribution and monitoring procedures to each DO. Each DO acts individually, implementing the CPA(s) in accordance with local circumstances and the requirements prescribed by CME.

A.1.1. Corresponding generic component project activities (CPAs)

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
Title: Improved Cooking Stoves Programme of Activities in Africa – CPA No. ##### Identification: Generic CPA-DD Reference: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/T0ZKV3S1F2JH8RL75D9GQ6AMO4XNIC/view Version: 1.0	Version 3.2 dated 27/11/2012	Sectoral Scope 3: Energy Demand	AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass, version 03.0

A.1.2. CPAs included in the PoA

Title and UNFCCC reference number of the CPA	Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Crediting period type and duration	Covered in this monitoring report? (yes/no)
Improved Cooking Stoves Programme of Activities in Africa – CPA No. 00001 (Kenya) 5341-0001	Title: Improved Cooking Stoves Programme of Activities in Africa – CPA No. ##### Identification: Generic CPA-DD	Version 3.2 dated 27/11/2012	15/12/2012 – 14/12/2022	Yes
Improved Cooking Stoves Programme of Activities in Africa – CPA No. 00002 (Kenya) 5341-0002			01/01/2014 – 31/12/2023	Yes

Improved Cooking Stoves Programme of Activities in Africa – CPA No. 00003 (Kenya) 5341-0003	Reference: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/T0ZKV3S1F2JH8RL75D9GQ6AMO4XNIC/view Version: 1.0		01/01/2014 – 31/12/2023	Yes
Improved Cooking Stoves Programme of Activities in Africa – CPA No. 00004 (Kenya) 5341-0004			01/04/2014 – 31/03/2024	Yes
Improved Cooking Stoves Programme of Activities in Africa – CPA No. 00005 (Kenya) 5341-0005			06/11/2017 – 05/11/2027	Yes
Improved Cooking Stoves Programme of Activities in Africa – CPA No. 00006 (Kenya) 5341-0006			06/11/2017 – 05/11/2027	No
Improved Cooking Stoves Programme of Activities in Africa – CPA No. 00007 (Kenya) 5341-0007			06/11/2017 – 05/11/2027	No

A.2. Coordinating/managing entity

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Envirofit International Limited is the CME for the PoA. The responsible person for completing the CDM-PoA-MR-Form are as follows:

Rohit Lohia
Carbon Projects Development Manager
Envirofit International
rohit.lohia@envirofit.org

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

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Envirofit International Limited is the Coordinating and Managing Entity (CME) for the PoA. The Distributing Organization(DO) for the CPAs included in the PoA are as follows:

CPA	Name of DO	Status of CPA Implementation
5341-0001	East Africa Energy (EAE)	Not implemented
5341-0002	Envirofit Kenya	Implemented
5341-0003	Envirofit Kenya	Implemented
5341-0004	Envirofit Kenya	Implemented
5341-0005	Envirofit Kenya	Implemented

Envirofit Kenya Ltd. is the DO for the CPAs that have been implemented under the PoA so far and has subcontracted retailers/entrepreneurs (referred as dealers) for dissemination of project stoves. The implemented CPAs (5341-0002, 5341-0003, 5341-0004 and 5341-0005) follow the same management system as follows:

1. Envirofit provided instructions to various dealers to collect the end user information at the time of sales to make the stove eligible under the PoA. Envirofit made them aware of requirements of end user data collection. Guidance was provided to them on the correct procedures to be followed during distribution.
2. Envirofit maintains a PoA Distribution and Monitoring database. This database is a compilation of CPA distribution records. The database includes CPA wise list of stoves sales, based on

following information, received from various dealers, collected at the time of sale, in CPA distribution record form:

- a. Name of customer
- b. Address / location of the customer
- c. Stove unique serial ID number
- d. Stove Model
- e. Stove distribution date
- f. Type of old stove replaced by ICS i.e. the fuel type used in the baseline – wood or charcoal.

3. Envirofit performed cross-checks on the ICS sales information received from the dealers via CPA distribution records. The CME's logo is clearly displayed on the CPA Distribution Record, with a copy retained by Envirofit. A unique stove id is punched on each stove and the same serial ID is mentioned on the CPA distribution record. Therefore, it is possible to identify each stove in the PoA with its unique serial ID number. The unique serial number linked to each stove and its association with a unique CPA bearing a CPA ID number eliminates any risk of double-counting of ICSs between CPAs.
4. Envirofit obtained the customer's approval during distribution to exclusively assign carbon rights to the CME as per the disclaimer specified on stove boxes / CPA distribution records.
5. Envirofit coordinated all ex-post monitoring activities in the PoA. In addition the Envirofit;
 - a. Implemented the monitoring plan,
 - b. Determined the sample size as per sampling plan and identified the samples to be monitored (the sampling plan has been applied across group of CPAs as detailed in section E.3 below)
 - c. Ensured the quality of monitoring data obtained through QA/QC
 - d. Used this data for emissions reduction calculations.
6. Envirofit checked and recorded the following key parameters in a CPA Monitoring Record. Key monitored parameters were:
 - a. Efficiency of project stoves (η_{new})
 - b. Check if project stoves are operational and in use (SOF)
 - c. Check fraction of end users continuing to use baseline stoves (f_{old})
 - d. If baseline stoves are being used, the consumption accounted for by the old stoves (μ_{old})
7. Calculated of emission reductions based on monitoring data collected and preparation of monitoring report.

Thus, by carrying out the aforesaid, Envirofit ensured that the PoA Operational and Management plan as given in section A.4.4.1 of registered PoA-DD is duly implemented for concerned CPAs.

B.2. Post-registration changes to PoA

B.2.1. Corrections

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NA

B.2.2. Inclusion of monitoring plan

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NA

B.2.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

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NA

B.2.4. Changes to programme design

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NA

PART II Monitoring of CPAs

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This Monitoring Report covers all the five CPAs included in the concerned monitoring period. These CPAs have the same project boundary and follow a common generic CPA as identified in section A.1.1, Part I of this monitoring report. The following sections therefore represent all these five CPAs.

SECTION C. Implementation of CPAs**C.1. Description of implemented CPAs**

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(a) Purpose of the specific-case CPA(s) and the measures taken for GHG emission reductions or net GHG removals by sinks;

The purpose of the CDM Programme Activities (CPAs) is dissemination of improved cooking stoves (ICS) in the Republic of Kenya. The CPAs replace cooking stoves using charcoal / woodfuel with more efficient stoves using charcoal / woodfuel.

The project ICS are more efficient in transferring heat from the fuel to the pot, thus saving fuel compared to the baseline stoves which would have been used in the absence of the project activity. Furthermore, the ICSs applied in these CPAs have been designed not only to increase heat transfer, but also to match traditional utensils and cooking habits of people in Kenya.

(b) Description of the technology employed and installed equipment and/or infrastructure, including information requested by the eligibility criteria;

The Envirofit stoves have been designed with the specific intention of maximizing thermal efficiency while simultaneously minimizing the production of toxic emissions. While many interrelated factors need to be considered in order to achieve these goals, primary aspects of stove performance were explored during the development of the stoves: 1) fuel and air mixing 2) heat transfer to the pot. In order to maximize temperature, the combustion chamber shape, fuel amount, and air flow through the stove all need to be considered and correctly coordinated. In order to use the available thermal energy in the most efficient manner possible, specific stove geometry and configuration choices were made; including reducing stove thermal mass and minimizing heat flux through the sides and bottom of the stove. In order to minimize emissions, the combustion chamber shape, fuel amount, and air flow rate through the stove all need to be considered and correctly coordinated in order to maintain a proper air to fuel mixture.

The following table details the implementation status of the CPAs along with technology involved:

CPA	Type of Project stoves eligible	Stove models included ¹	Total number of stoves
5341-0001	Charcoal	--	0
5341-0002	Charcoal	CH2200, CH4400, CH5200	21,044
5341-0003	Woodfuel	M5000	17,754
5341-0004	Charcoal and Woodfuel	CH2200, CH4400, CH5200, CH5300, ECCL, M5000	20,000

¹ At the end of monitoring period

5341-0005	Charcoal and Woodfuel	CH2200, CH4400, CH5200, CH5300, ECCL, M5000	7,648
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The stove models referred above are shown below:

Woodfuel stoves



M5000

Charcoal Stoves



CH5200



CH2200



CH4400



CH5300



ECCL

Information required by Eligibility criteria

Eligibility criteria # 3, 4 and 11 that require information related to project technology / infrastructure are discussed below:

No.	Eligibility criteria		Assessment for CPAs	
	Description	Conditions to be met	Means of proof	Confirmation
#3	Applicability of Methodology AMS-II. G -Technology type	The ICS uses one of the following fuel types: <ul style="list-style-type: none"> Wood fuel Charcoal 	Technical specification of ICS provided	Refer D.1 (b) above for the type and number of stoves distributed in the CPAs till the end of the monitoring period. No other fuel type stove has been disseminated.
#4	Applicability of Methodology AMS-II. G – Minimum ICS efficiency/ specifications of technology including	The ICS has a minimum efficiency of 20% (AMS-II.G, V.3, para 1)	Technical specification of ICS provided (either from manufacturer's specifications or test results using the Emissions	Same as above. For all the stove models the manufacturer certified efficiency is more than 20%

	the level and type of service		& Performance Test Protocol (EPTP)	
#11	SSC Limit for CPAs	<p>The annual energy savings of each CPA shall not go beyond the limits of 180 GWh_{th}/year over the entire crediting period.</p> <p>In the case of using option 1 to prove additionality under Eligibility Criteria 7, the limit shall be 60 GWh_{th}/year over the entire crediting period.</p>	The maximum number of ICS will be determined in each CPA-DD depending on the technology used (excel sheet will be provided to show calculated energy savings). If a CPA exceeds the applicable limit in any year, the claimable emission reduction shall be capped based on the estimated GHG reductions in the CPA-DD).	Refer ER calculator, worksheet 'ER Calculations' which demonstrates that CPAs meet 180 GWh _{th} /year energy savings methodology threshold.

For detailed information on complete list of eligibility criteria refer the CPA-DDs available on UNFCCC website as mentioned in Section A.1.2, Part I of this monitoring report.

(c) **Relevant dates for the specific-case CPA(s) (e.g. construction, commissioning, continued operation periods, etc.);**

CPA	5341-0001	5341-0002	5341-0003	5341-0004	5341-0005
Start Date as per CPA-DD	01/01/2012	16/03/2012	06/09/2013	16/03/2012	05/07/2016
Date of sale of first eligible stove included in the CPA	Not applicable	16/03/2012	03/04/2015	08/04/2012	05/07/2016
Continued operation period	Not applicable	since 16/03/2012	since 03/04/2015	since 08/04/2012	since 05/07/2016

(d) **Total GHG emission reductions or net GHG removals by sinks achieved in this monitoring period for the specific-case CPA(s), including information on how double counting is avoided**

CPA	Emission Reductions tCO ₂ e
5341-0001	13,556
5341-0002	43,063
5341-0003	42,811
5341-0004	43,384
5341-0005	6,906
Total	149,720

Each stove bears a unique serial ID punched on the stove. The same is recorded to trace the stove later and avoid double counting. Further, for each stove included under each CPA, information on the location of the stove has been collected by collecting address of the user at the time of sale in CPA Distribution Record. Thus, location of each stove in CPA distribution database can be traced. Please refer the ER calculator, worksheet 'CPA Distribution data' in which the sales information i.e. Stove unit details and the end user information for each stove is mentioned. The system of recording

the unique serial on each stove along with its location serves toward avoiding couple counting of stoves amongst various CPAs.

C.2. Location of CPAs

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All the CPAs have a common project boundary as follows:

Host Party(ies): Republic of Kenya

The geographical reference of the CPAs is determined by the location of the individual ICS households where the ICSs are distributed which is limited to the territorial area of the host country, Kenya. The capital of Kenya, Nairobi, is located at -1.283249, 36.816663. The distribution commenced in and around Nairobi and has expanded to further regions throughout Kenya.



Further, for each stove under each CPA, information on the location of the stove has been collected by collecting address of the user at the time of sale in CPA Distribution Record. Thus, location of each stove in each of the CPAs can be traced. Please refer the ER calculator, worksheet 'CPA Distribution data' in which the sales information i.e. Stove unit details and the end user information for each stove are mentioned. This also serves toward avoiding couple counting of stoves amongst various CPAs.

C.3. Post-registration changes to CPAs

C.3.1. Temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies or standardized baselines

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NA

C.3.2. Corrections

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NA

C.3.3. Changes to the start date of the crediting period

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NA

C.3.4. Inclusion of monitoring plan

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NA

C.3.5. Permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

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NA

C.3.6. Changes to project design

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NA

SECTION D. Description of monitoring system of CPAs

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Stoves were either distributed to end-users by Envirofit Kenya directly or via dealers sub-contracted by Envirofit. Any such third parties were trained by the Envirofit responsible for ensuring correct procedures according to the PoA are fulfilled.

At the CPA level, the dealers ensured that necessary data was correctly obtained from the customer and recorded in the CPA Distribution Record, firstly to avoid double counting and secondly to enable tracking of the ICS for monitoring purposes. This data captured included:

- a. Name of customer
- b. Address / location of the customer
- c. Stove unique serial ID number
- d. Stove Model
- e. Stove distribution date
- f. Type of old stove replaced by ICS r, i.e. the fuel type used in the baseline – wood or charcoal.

All other monitoring activities have been carried out at the PoA level, single stage sampling plan.

SECTION E. Data and parameters**E.1. Data and parameters fixed ex ante**

(Copy this table for each data or parameter.)

Data/parameter	Q_{biomass}
Unit	Tonnes/year
Description	Annual average biomass consumption per appliance
Source of data	Historical data from literature, as allowed by the methodology
Value(s) applied	3.56 for charcoal 4.176 for woodfuel
Choice of data or measurement methods and procedures	As per registered CPA-DDs
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Used for calculation of B_{old}

Data/parameter	$f_{\text{NRB},y}$
Unit	Fraction
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass.
Source of data	FAO and IPCC
Value(s) applied	0.92
Choice of data or measurement methods and procedures	As per registered CPA-DDs
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/parameter	NCV_{biomass}
Unit	TJ/tonne
Description	Net calorific value of the non-renewable biomass that is substituted
Source of data	2006 IPCC guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.015
Choice of data or measurement methods and procedures	As per registered CPA-DDs
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	EF_{projected_fossilfuel}
Unit	tCO ₂ /TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	2006 IPCC guidelines for National Greenhouse Gas Inventories
Value(s) applied	81.6
Choice of data or measurement methods and procedures	As per registered CPA-DDs
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	η_{old}
Unit	Efficiency
Description	Efficiency of the system being replaced
Source of data	AMS-II.G version 03
Value(s) applied	0.129 for charcoal stoves 0.108 for firewood stoves
Choice of data or measurement methods and procedures	As per registered CPA-DDs
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/parameter	LAF
Unit	Fraction
Description	Net to gross adjustment factor to account for leakages
Source of data	AMS-II.G version 03
Value(s) applied	0.95
Choice of data or measurement methods and procedures	As per registered CPA-DDs
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

E.2. Data and parameters monitored

(Copy this table for each data or parameter.)

Data/parameter	$\eta_{new,y}$
Unit	Efficiency
Description	Efficiency of the system being deployed as part of the project activity
Measured/calculated/default	Measured
Source of data	As determined through sample testing of stoves by performing WBTs
Value(s) of monitored parameter	29.50%
Monitoring equipment	The equipment were either externally calibrated (Mini-thermometers) or were auto calibrated (Mass Balance, Moisture Meter) at the time of use so measurements were done with the necessary guarantees.
Measuring/reading/recording frequency	WBTs were carried out for a sample of installed ICSs in operation in line with the PoA Sampling Plan on an annual basis.
Calculation method (if applicable)	EPTP Protocol
QA/QC procedures	WBTs were conducted in line with the guidance provided by the CME
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Weighted average efficiency has been calculated as more than one stove model has been distributed

Data/parameter	N_{all}
Unit	Number
Description	Total number of stoves installed
Measured/calculated/default	Calculated
Source of data	CPA Distribution Records and logbooks
Value(s) of monitored parameter	66,446
Monitoring equipment	n/a
Measuring/reading/recording frequency	The CPA Distribution Records which provided the data used to calculate this parameter. This data was uploaded to the PoA Distribution and Monitoring Database maintained by the CME. The recording of the sales was done in a regular basis during the crediting period and the monitoring in a yearly basis.
Calculation method (if applicable)	Sum of all stove records in the CPA Distribution Database.
QA/QC procedures	
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	No samples were found using more than than one stove.

Data/parameter	SOF						
Unit	Fraction						
Description	Stove Operation Fraction – used to determine the share of distributed stoves that are still operating, measured ex-post through sampling						
Measured/calculated/default	Measured						
Source of data	Survey of end user behaviour as part of the PoA Sampling Plan						
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Stove model</th><th>Value (fraction)</th></tr> </thead> <tbody> <tr> <td>Charcoal</td><td>0.95</td></tr> <tr> <td>woodfuel</td><td>0.95</td></tr> </tbody> </table>	Stove model	Value (fraction)	Charcoal	0.95	woodfuel	0.95
Stove model	Value (fraction)						
Charcoal	0.95						
woodfuel	0.95						
Monitoring equipment	Parameter determined through monitoring survey using a questionnaire, no monitoring equipment has been used						

Measuring/reading/recording frequency	Measured ex-post by investigation of the number of operational ICS installations within the sampled ICS. This was done on an annual basis as per the PoA monitoring requirements
Calculation method (if applicable)	--
QA/QC procedures	The CME provided training, guidelines and monitoring templates to ensure that the Monitoring Organization responsible for monitoring followed appropriate procedures.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	μ_{old}						
Unit	kg/year						
Description	The amount of woody biomass consumption that is consumed through the continued use of old stoves						
Measured/calculated/default	Measured as per option A of CPA-DDs						
Source of data	Data from survey of end user behaviour as part of PoA Sampling Plan combined with the same source of data as for $Q_{biomass}$						
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Stove model</th><th>Value (fraction)</th></tr> </thead> <tbody> <tr> <td>Charcoal</td><td>1000</td></tr> <tr> <td>woodfuel</td><td>1000</td></tr> </tbody> </table>	Stove model	Value (fraction)	Charcoal	1000	woodfuel	1000
Stove model	Value (fraction)						
Charcoal	1000						
woodfuel	1000						
Monitoring equipment	Parameter determined through monitoring survey using a questionnaire, no monitoring equipment has been used						
Measuring/reading/recording frequency	<p>Measured ex-post by a representative sample of end users using the deployed ICS, as conducted in line with the PoA Sampling Plan. During the survey, the interviewer conducted an interview with the end user to identify how much the baseline (replaced) stove is being used. The value of μ_{old} has been determined by comparing the number of meals cooked on traditional cookstove before and after ICS distribution multiplied with the baseline fuel consumption ($Q_{biomass}$).</p> <p>This was done on an annual basis as per the PoA monitoring requirements</p>						
Calculation method (if applicable)	Based on the registered CPA-DDs, this parameter has been calculated by multiplying the baseline Fuel Consumption, $Q_{biomass}$, by the ratio of meals cooked by the traditional stove in operation before and after purchasing the Envirofit Stove as reported by households with continued usage of baseline stoves.						
QA/QC procedures	The CME provided training, guidelines and monitoring templates to ensure that the Monitoring Organization responsible for monitoring followed appropriate procedures						
Purpose of data/parameter	Calculation of baseline emissions						
Additional comments	-						

Data/parameter	f_{old}
Unit	Fraction
Description	The fraction of end users that are still using baseline (replaced) stoves
Measured/calculated/default	Measured
Source of data	Survey data of end user behaviour as part of the PoA Sampling Plan
Value(s) of monitored parameter	$f_{old - charcoal} = 0.1$ for charcoal stoves $f_{old - wood} = 0.1$ for woodfuel stoves
Monitoring equipment	Parameter determined through monitoring survey using a questionnaire, no monitoring equipment has been used

Measuring/reading/recording frequency	Measured ex-post by estimation of a representative sample of end users using the deployed ICS, as conducted in line with the PoA Sampling Plan. Sampling estimated the value of this parameter through monitoring the fraction of end users not using baseline stoves ($f_{\text{non old}}$). This was done on an annual basis as per the PoA monitoring requirements
Calculation method (if applicable)	Based on the registered CPA-DDs, the fraction of users not using the baseline stoves ($f_{\text{non old}}$) has been monitored. Then f_{old} has been calculated as $f_{\text{old}} = 1 - f_{\text{non old}}$
QA/QC procedures	The CME provided training, guidelines and monitoring templates to ensure that the Monitoring Organization responsible for monitoring followed appropriate procedures.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	Stove_{year}
Unit	Year
Description	Calculated average stove year in the monitoring period.
Measured/calculated/default	Calculated
Source of data	PoA Distribution and Monitoring Database
Value(s) of monitored parameter	0.95
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Each ICS entered into the PoA Distribution and Monitoring Database was linked to a distribution date (recorded during distribution). Thus for any monitoring period it is possible to calculate the fraction of year covered by stoves for that monitoring period. The recording of the sales date was done in a regular basis during the crediting period and the monitoring on an annual basis.
Calculation method (if applicable)	Average of stove year of all stoves included in CPA Distribution database.
QA/QC procedures	The CME was responsible for overseeing the collection of data by DOs during distribution, training the DOs in correct data recording practices, maintaining a secure Database, and back up of files contained in the Database.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

E.3. Implementation of sampling plan

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a) List of CPAs to which the single sampling was applied

The eligible stoves distributed under the CPAs included in the PoA are as follows:

Table 1: CPA and Stove Installation

CPA	Scale	Type of Project stoves eligible under CPA	Total number of stoves in the CPA	CPA monitoring period covered under this PoA monitoring period
5341-0001	micro	Charcoal	0	01/01/2017 – 31/12/2017

5341-0002	Small	Charcoal	21,044 ^{2,3}	01/01/2017 – 31/12/2017
5341-0003	Small	Woodfuel	17,754	01/01/2017 – 31/12/2017
5341-0004	Small	Charcoal and Woodfuel	20,000	01/01/2017 – 31/12/2017
5341-0005	Small	Charcoal and Woodfuel	7,648	05/11/2017 – 31/12/2017

No eligible stoves were distributed in CPA 5341-0001 till the end of monitoring period. Hence, no ERs are being claimed for CPA 5341-0001 for this entire monitoring period. CPA 5341-0002 to 5341-0005 have been monitored under single sampling plan for this monitoring period.

b) Description of implemented single sampling design;

Due to the large number of ICS distributed under the PoA it was not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling was undertaken as part of a PoA-wide Sampling Plan. The sampling plan consisted of monitoring the following four parameters mentioned in section D.2.:

Parameter	Description of parameter
η_{new}	The thermal efficiency of the ICS distributed (%)
SOF	The Stove Operating Fraction, i.e. the fraction of users using the ICS
f_{old}	The fraction of stove users still using baseline (replaced) stoves
μ_{old}	The amount of woody biomass that continues to be used in the replaced stoves (kg)

Based on the registered PoA-DD and CPA-DDs for CPA 5341-0002, 5341-0003, 5341-0004 and 5341-0005, 95/10 reliability level was selected for cross-CPA sampling for the four parameters mentioned above.

As per page 43 of the PoA-DD (PoA sampling plan), for the parameter η_{new} , the population of each stove model shall be deemed homogeneous across CPAs as the stoves have been designed to meet stringent efficiency specifications and are manufactured in factories to specification.

As per page 47 of the PoA-DD, for other parameters (SOF, f_{old} , μ_{old}), the homogeneity of the population is demonstrated in compliance with the following conditions;

Homogeneity condition	Characteristic of Population	Status of population
Country	all units have been distributed in the same geographical area, i.e. Kenya	homogeneous
Fuel Type – charcoal / wood fuel	There are two fuel type in the population: Charcoal and woodfuel.	Charcoal stoves have been considered as one sampling frame and wood fuel stoves have been

² Section A.2, page 2 of the registered CPA-DD for CPA 5341-0002, clearly mentions, “CPA will have a maximum energy saving of less than or equal to 60/180 GWh_{th}/year, thus staying within the micro/small-scale threshold. Based on the estimated energy savings, it is envisaged that 18,500 number of stoves will be distributed under the CPA.” It must be noted that the CPA-DD does not restrict or set a limit on the number of stoves that may be implemented under the CPA and the number of stoves mentioned in respective CPA-DD is only an indicative number. As long as the micro/small-scale threshold is respected, the number of cookstoves under the CPA can change ex-post during the crediting period based on monitored performance. Refer ER calculator, worksheet ‘ER calculations’ where it has been demonstrated that even 21,044 stoves are contributing to only 87% of the methodology threshold of 180 GWh_{th}/year

³ Total number of eligible stoves implemented under the CPA is 24,783. Out of these, CH6600 stoves are not being considered for emission reduction calculations, hence the total stoves specified in table above is 21,044.

		considered as other sampling frame.
End user – domestic / small-medium enterprises / community	all units are for domestic (household) usage as per their design	Homogeneous within each sampling frame
Stove Type - efficiencies are in a similar range defined as being within +/-10% of each other and they have other common design features	the stove models disseminated have efficiencies within +/-10% of each other	Homogeneous within each sampling frame

The initial target population were the stoves distributed and recorded under CPA 5341-0002, 5341-0003, 5341-0004 and 5341-0005. The population was divided into two sampling frames based on fuel type. Simple Random Sampling approach was applied in each sampling frame separately to monitor the three parameters i.e. stove operation (SOF), fraction of traditional stoves still in operation (f_{old}) and amount of woody biomass that continues to be used by the replaced stoves (μ_{old}). Thus, the sample size calculations for parameters SOF, f_{old} , μ_{old} were calculated considering PoA population under two sampling frames.

The following is the number of samples covered during the monitoring activity. Refer ER calculator worksheet 'Sampling plan' for more details on calculation of sample size for each parameter. The expected parameter values (mean, standard deviation and proportion) have been determined based on project developer's knowledge and experience as per para 12(b) and 12(c) of the Sampling and surveys for CDM project activities and programmes of activities, Version 07.0

The stoves were selected by randomly assigning a number to each stove and sorting in increasing order from lower to higher number. Random numbers were generated using online random number generator and the numbers obtained were used to identify the samples from the population. A higher number of samples were monitored than that required to ensure that the desired precision / confidence is achieved as well as have sufficient number of samples that use both ICS and baseline stove for determining μ_{old}

c) Collected data (electronic spreadsheets may be attached and referenced);

Data was collected for SOF, f_{old} and μ_{old} following a specially design survey form. The information collected was introduced into an electronic database, the CPA Monitoring Record. This survey form was design in a way that would allow the surveyor first to check the validity of the records from the CPA Distribution Records, and secondly to collect the necessary information from field visit for the ER calculations. In order to achieve the 95/10 reliability level for cross-CPA sampling few additional stoves were sampled from the database than that required (as mentioned in the table above) to cover for non-responses, if any.

As for the thermal efficiency of the stoves, water boiling tests were conducted using WBT protocol by PCIA as available on GACC website. The WBT tests conducted, were distributed across various models. Refer ER calculator worksheet "Survey Summary" and "WBT Test Results" for details on data collected during monitoring.

The monitoring suryes and WBTs were conducted from February 2018 – April 2018

d) Analysis of the collected data;

Analysis of the data monitored through sampling revealed the following results:

Parameter	Results
$\eta_{new,y}$	29.5%
SOF _{charcoal}	0.95
SOF _{wood}	0.95

$f_{old} - \text{charcoal}$	0.1
$f_{old} - \text{wood}$	0.1
$\mu_{old} - \text{Charcoal}$	1000
$\mu_{old} - \text{Wood}$	1000

e) ***Demonstration of whether the required confidence/precision has been met,***

The following tables demonstrate the status of precision/confidence for each of the monitored parameters:

SOF_{charcoal}	0.95	Fraction
Precision for SOF _{charcoal}	3.87%	%
Result for SOF _{charcoal}	ok, acceptable	--

f_{old}_{charcoal}	0.1	Fraction
Precision for f _{non old} _{charcoal}	5.83%	%
Result for f _{non old} _{charcoal}	ok, acceptable	--

μ_{old}_{charcoal}	1.000	tonnes/y
Precision for μ_{old} _{charcoal}	8.54%	%
Result for μ_{old} _{charcoal}	ok, acceptable	--

SOF_{woodfuel}	0.95	Fraction
Precision for SOF _{woodfuel}	4.65%	%
Result for SOF _{woodfuel}	ok, acceptable	--

f_{old}_{woodfuel}	0.1	Fraction
Precision for f _{non old} _{woodfuel}	5.63%	%
Result for f _{non old} _{woodfuel}	ok, acceptable	--

μ_{old}_{woodfuel}	1.000	tonnes/y
Precision for μ_{old} _{woodfuel}	8.08%	%
Result for μ_{old} _{woodfuel}	ok, acceptable	--

η_{new}	29.5%	%
Precision for $\eta_{newCH2200}$	0.81%	
Result for $\eta_{newCH2200}$	ok, acceptable	--

For detailed calculations refer ER calculator.

f) ***Demonstration of whether the samples were randomly selected and are representative of the population.***

Stoves were selected by randomly after arranging them in chronological order of date of sale and assigning a number to each stove. Random numbers were generated using online random number generator available at <http://stattrek.com/statistics/random-number-generator.aspx> and the random numbers received were selected from sampling frame to identify the samples to be monitored. The approach ensured that the samples picked are random and represent the population.

SECTION F. Calculation of emission reductions or net anthropogenic removals

F.1. Calculation of baseline emissions or baseline net removals

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$$ER_y = B_{y,savings} \cdot f_{NRB} \cdot NCV_{biomass} \cdot EF_{projected\ fossil\ fuel}$$

$$B_{y,savings} = B_{old} \cdot \left(1 - \frac{\eta_{old}}{\eta_{new}}\right)$$

$$B_{old} = LAF \cdot N_{all} \cdot SOF \cdot (Q_{biomass} - \left(\frac{\mu_{old}}{1000} \cdot f_{old}\right)) \cdot Stove_{year}$$

F.2. Calculation of project emissions or actual net removals

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As explained above, the methodology directly provides equation for emission reductions; without separate baseline, project or leakage emission reduction equations. Calculation of Emission Reductions has already been explained above as per the methodology. Thus, this section is not applicable

F.3. Calculation of leakage emissions

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As explained above, the methodology directly provides equation for emission reductions; without separate baseline, project or leakage emission reduction equations. Calculation of Emission Reductions has already been explained above as per the methodology by application of Gross to Net Leakage adjustment factor of 0.95 to baseline emissions. Thus, this section is not applicable.

F.4. Calculation of emission reductions or net anthropogenic removals

CPA UNFCCC reference number	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
5341-0001	13,556	0	0	0	13,556	13,556
5341-0002	43,063	0	0	0	43,063	43,063
5341-0003	42,811	0	0	0	42,811	42,811
5341-0004	43,384	0	0	0	43,384	43,384
5341-0005	6,906	0	0	0	6,906	6,906
Total	149,720	0	0	0	149,720	149,720

F.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the included CPA-DDs

CPA UNFCCC reference number	Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante (t CO ₂ e)
5341-0001	13,556	13,556
5341-0002	43,063	43,063
5341-0003	42,811	42,811
5341-0004	43,384	43,384
5341-0005	6,906	6,906

Total	149,720	149,720
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F.6. Remarks on increase in achieved emission reductions

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There is no increase in the GHG emission reductions or net GHG removals by sinks achieved by the specific-case CPA(s) during this monitoring period.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for programmes of activities (CDM-EB93-A07-STAN); • Make editorial improvements.
01.0	1 April 2015	Initial publication.
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