Monitoring report form for CDM programme of activities **(version 01.0)**	

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

MONITORING REPORT		
Title of the programme of activities (PoA)	Improved Cook Stoves programme for Rwanda	
UNFCCC reference number of the PoA	6207	
Version number(s) of the PoA-DD(s) applicable to this monitoring report	7.0	
Coordinating/managing entity (CME)	atmosfair gGmbH	
Version number of this monitoring report	1	
Completion date of this monitoring report	07/10/2016	
Monitoring period number and dates covered by this monitoring report	3, 01/07/2015 – 30/06/2016, both days inclusive	
Monitoring report number for this monitoring period	1	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no)
	Rwanda	Yes
	Cameroon	Yes[1]
Sectoral scope(s)	3: Energy demand	
Selected methodology(ies)	AMS II.G., version 3, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass"	
Selected standardized baseline(s)	Not applicable	
Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case-case CPAs in the PoA covered in this monitoring report	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0	68,457

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[1] CPA 6207-0004 and 6207-007 are considered for this Monitoring Period. However, no CERs are being claimed.

PART I - Programme of activities

SECTION A. Description of PoA

A.1. Brief description of the PoA

>>
1. General operating and implementing framework

The programme replaces traditional stoves with high efficiency biomass fired cook stoves (hereafter referred to as "Improved Cookstoves" or "ICS[2]") in Rwanda and Cameroon. Rwanda is amongst the Least Developed Countries (LDCs) in the world[3]. The use of woody biomass (wood and charcoal which is derived from wood) leads to deforestation, erosion and environmental problems. The use of charcoal also leads to high cost for households for cooking.

The purpose of the PoA is to use carbon finance for the dissemination of ICS to the people of Rwanda and Cameroon, replacing less efficient charcoal or wood cook stoves currently in use, thereby reducing the use of non-renewable biomass. The PoA reduces CO_2 emissions due to more efficient fuel combustion and thus less biomass consumption in Improved Cookstoves and by directly using wood for cooking and thus avoiding the inefficient conversion of wood into charcoal.

The PoA is implemented by atmosfair gGmbH who is the coordinating/managing entity (hereafter referred to as "CME") for the PoA. The CPA implementer for CPA 6207-0001 is atmosfair gGmbH in partnership with ENEDOM Domestique s.a.r.l (ENEDOM). Other implementing entities assisting the CPA implementers are SaferRwanda and Rwanda Women Network. The CPA implementer for CPA 6207-0005 and 6207-0006 is atmosfair gGmbH in partnership with SaferRwanda and Rwanda Women network.

The CPA implementer for CPA 6207-0002, 6207-0003,6207-0004, and 6207-0007 is atmosfair gGmbH and the implementing entities assisting the CPA implementer are United Nations High Commissioner for Refugees (UNHCR) (6207-0002), Inyenyeri (6207-0003) and Pro Climate International (6207-0004 and 6207-0007).

2. Policy/measure or stated goal of the PoA

The aim of the PoA is to distribute ICS to reduce carbon emissions, reduce health problems related to smoke, reduce deforestation and erosion due to extensive woody biomass sourcing for firewood utilization and charcoal production and to increase purchase power of rural households.

3. Confirmation that the proposed PoA is a voluntary action by the CME

atmosfair gGmbH as the CME confirms that the PoA is a voluntary action. Participation of all involved stakeholders is completely voluntary.

There are no laws or regulations in Rwanda or Cameroon stipulating the use of efficient cook stoves. Existing laws and regulations concerning the protection of forestry areas in Rwanda and Cameroon are partly not enforced.

Sustainable development:

Environment

The programme helps to preserve the existing forests due to current consumption activities of biomass, particularly wood. Furthermore, it helps preventing adverse changes in the ecosystem as a result of deforestation leading to erosion which could harm the local community. The PoA triggers

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[2] Other expressions used in this document for an Improved Cookstove are "system", "appliance", "installation".

[3] http://www.unohrlls.org/en/ldc/25/

communities to maintain and preserve the forest so that they can continuously maintain their traditional life and get benefit from the project. The use of ICS reduces the pressure placed on local forests (as firewood resources and for the production of charcoal) through less amount of woody biomass being consumed. Also, it helps preventing woody biomass from being harvested faster than it is being grown.

Social

The implementation of the PoA creates temporary and permanent employment opportunities through construction, dissemination, and customer support activities. Another opportunity comes from monitoring activities which also involve people from the local community.

Economic

The PoA yields environmental, social as well as economic benefits. If households are purchasing charcoal or wood, the cost savings from switching to wood or by reducing the wood consumption results in a substantial reduction of expenditures for the daily fuel consumption for cooking. Less money is spent on charcoal and wood and more money can be available to be spent on food, medical care and education. Thus, local people have the opportunity to enjoy a higher standard of living and they acquire knowledge about energy and environmental conservation.

For households cooking with collected wood, the application of more efficient stoves reduces time spent collecting firewood by the community resulting in more time which can be used to perform income-producing activities (more time can be saved to earn cash or produce other goods and services/boosting family's income).

The programme is developed and implemented as a CDM Gold Standard Programme of Activities.

A.1.1. Generic CPA(s)

Title, identification/reference number and/or version number of the generic CPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
CPA # x Improved Cook Stoves programme for Rwanda	3: Energy demand	AMS II.G., version 3, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" https://cdm.unfccc.int/methodologies/DB/KZ6FQOCEEHD1V02ARWTW1W2R9G45BX

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

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period	Title, identification/ reference number and version number of the generic CPA to which the specific-case CPA applies	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
6207-0001	CPA # x Improved Cook Stoves programme for Rwanda	01/07/2013-30/06/2023	Yes
6207-0002	CPA # x Improved Cook Stoves programme for Rwanda	01/02/2014 – 31/01/2024	Yes

6207-0003	CPA # x Improved Cook Stoves programme for Rwanda	01/02/2015 – 31/01/2025	Yes
6207-0004	CPA # x Improved Cook Stoves programme for Rwanda	01/03/2015 – 28/02/2025	Yes
6207-0005	CPA # x Improved Cook Stoves programme for Rwanda	01/08/2015 – 31/07/2025	Yes
6207-0006	CPA # x Improved Cook Stoves programme for Rwanda	01/08/2015 – 31/07/2025	Yes
6207-0007	CPA # x Improved Cook Stoves programme for Rwanda	01/03/2016 – 28/02/2026	Yes

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

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Coordinating/Managing entity (CME) and responsible persons
atmosfair gGmbH
Zossener Str. 55-58
10961 Berlin
Germany

Sven Bratschke and Allan Mubiru
Tel: +49 30 6273550-16
Email: bratschke@atmosfair.de and mubiru@atmosfair.de

SECTION B. Implementation of PoA

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

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Roles and responsibilities of personnel

atmosfair gGmbH is the Coordinating / Managing Entity (CME) for the PoA and is the overall in-charge for operational and management arrangements for the implementation of the PoA. atmosfair undertook the following responsibilities with respect to the implementation of the PoA:

- Created PoA documentation (PoA-DD and CPA-DD forms)
- Checked for compliance of CPAs with inclusion eligibility criteria
- Obtained Letter(s) of Authorization from host country(s)
- Obtained Letter of Approval from the Annex I party involved in PoA
- Coordinates and communicates with the validating/verifying DOE and the EB
- Drafts monitoring reports for all CPAs in accordance with the methodology outlined in the PoA-DD
- Requests the UNFCCC to issue CERs into a registry account of the CER buyer(s)

Record keeping system for each CPA under the PoA

The CME kept electronic files for each CPA under the PoA, which contains the following information per CPA[4]:

- Name and ID of the CPA
- Type of appliance (ICS type) deployed
- Name and contact details of the registered IEs for the CPA
- Serial numbers (Stove-ID) of all systems belonging to the CPA
- Start of CPA crediting period
- CERs issued per verification period

This database is updated as per the progress of the CPA.

The stove records database contains specific information as outlined in section B.7.2, part two, of the registered PoA DD.

Avoiding double counting

In each CPA-DD it is stated that the CPA has not been and will not be registered either as a single CDM project activity or as a CPA under another PoA.
By checking the data from the record keeping system for each CPA under the PoA it is ensured that no CPA which has been registered as a CDM Project Activity or a CPA included into another PoA can be included in this PoA.

To ensure this, the record keeping system covers the following information:

- Name and ID of the CPA
- Type of appliance (ICS type) deployed
- Name and contact details of the registered IEs for the CPA
- Unique serial numbers (Stove-ID) of system belonging to the CPA (see also eligibility criteria Nr. 6)
- Start of CPA crediting period
- CERs issued per verification period

Awareness and agreement of those operating a CPA on PoA subscription

The CME signed agreements with Implementing Entities to ensure that all parties involved in implementing the CPAs are aware and agree that the CPAs are subscribed to the PoA.

At the user level, households are informed that their activity is being subscribed to the PoA and that they cede all rights on the CERs to the CME. Thus users are informed that the ICS is deployed to them due to CDM revenues stemming from emission reductions from using the ICS.

Arrangements for training and capacity development of personnel

The CME, the CPA implementing body or an entity assigned by the CME has conducted training and capacity building exercises for its own personnel based on any identified needs to ensure that continuous improvements of the PoA management system are taking place.

Measures for continuous improvement

The CME holds internal meetings with staff to review the performance of the PoA management system, in order to identify issues that need to be addressed for obtaining continuous improvements of the PoA management system.

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

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[4] The record keeping system collects as much information as necessary to facilitate the Verification of the CERs by the DOE.

A single sampling plan was implemented for CPAs 6207-0001 and 6207-0005 whereas a separate sampling plan was implemented for the specific-case CPA 6207-0002. (see section G.3. of part II for further information).

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

C.1. Corrections
>>
No corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report.

C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), if a monitoring plan was not included at the time of registration
>>
No inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), has been approved during this monitoring period or submitted with this monitoring report.

C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline
>>
No permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline have been approved during this monitoring period or submitted with this monitoring report.

C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA
>>
No changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA have been approved during this monitoring period or submitted with this monitoring report.

C.5. Types of changes specific to afforestation and reforestation activities
>>
Not applicable

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

SECTION D.   Description of specific-case CPA(s)
>>
The Monitoring Report covers and contains the specific case CPAs 6207-0001, 6207-0002, 6207-0003,6207-0004, 6207-0005, 6207-0006 and 6207-0007. The CPAs 6207-0003, 6207-0004, 6207-0006 and 6207-0007 were not monitored and emission reductions under these CPAs will not be considered for this monitoring period. In case of CPA 6207-0003 and 6207-0004   only a small number of ICS have been distributed until the end of the monitoring period. Due to the low number of expected emission reductions and considering the involved costs for monitoring and verification, the CME therefore decided to not include the CPAs into the monitoring and verification of the PoA. No ICS have been distributed under CPA 6207-0006 and 6207-0007 until the end of the monitoring period and implementation did not start. Thus, emission reduction values for CPAs 6207-0003, 6207-0004, 6207-0006 and 6207-0007 are set to 0 in the present Monitoring Report. Furthermore, the CME is not claiming any CERs for those CPAs in this respective Monitoring Period and in the future.

Since all CPAs are based on the same generic CPA, information on the CPAs are grouped in the present report wherever appropriate. Monitoring results, information on the sampling process and specific information unique to each specifc-case CPA are shown indidivudally per CPA, as appropriate.

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

>>

(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 CPAs is to use carbon finance for the dissemination of ICS to the people of Rwanda and Cameroon. The project activities will reduce CO_2 emissions due to more efficient fuel combustion and thus less biomass consumption in Improved Cookstoves and by directly using wood for cooking and thus avoiding the inefficient conversion of wood into charcoal. The project activities replace traditional stoves with high efficiency biomass fired cook stoves (hereafter referred to as "Improved Cookstoves" or "ICS "). The use of woody biomass (wood and charcoal which is derived from wood) leads to deforestation, erosion and environmental problems throughout Rwanda and Cameroon. The use of charcoal also leads to high cost for households for cooking. The energy efficient cook stoves disseminated save up to 80% of fuel wood.

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

The improved cook stove (ICS) disseminated under CPA 6207-0001,,6207-0002 and 6207-0005 is the "SAVE80", a portable stove made of stainless steel, developed and prefabricated by a German manufacturer and constructed locally to create employment and income.

The ICS disseminated under CPA6207-0003 is the Philips Woodstove. Under CPA 6207-0004 the Envirofit G3300 shall be disseminated and under CPAs 6207-0006 and 6207-0007 the Save80 shall be disseminated.

According to the manufacturer specifications of the SAVE80, Philips Woodstove and Envirofit G3300, the specified efficiency is >20%, which is above the CPA eligibility requirement (*"The stove type disseminated under the CPA has a specified efficiency of at least 20%"*).

The following total stoves were distributed until the end of this monitoring period (30.06.2016):
- Under CPA 6207-0001 a total of 10,559 stoves
- Under CPA 6207-0002 a total of 7,313 stoves
- Under CPA 6207-0005 a total of 7,645 stoves

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

Date	Milestone
15/05/2011 – 14/05/2039	PoA duration
31/08/2012	PoA registration date and inclusion date of CPA 6207-0001
01/07/2013	Starting date of crediting period CPA 6207-0001
23/01/2014	Inclusion date CPA 6207-0002
01/02/2014	Starting date of crediting period CPA 6207-0002
01/07/2013 – 30/06/2014	First Monitoring Period
01/07/2014 – 30/06/2015	Second Monitoring Period
12/01/2015	Inclusion date CPA 6207-0003

01/02/2015	Starting date of crediting period CPA 6207-0003
03/02/2015	Inclusion date CPA 6207-0004
01/03/2015	Starting date of crediting period CPA 6207-0004
01/07/2015 – 30/06/2016	Third Monitoring Period
28/7/2015	Inclusion date CPA 6207-0005 and 6207-0006
01/8/2015	Starting date of crediting period CPA 6207-0005 and 6207-0006
29/2/2016	Inclusion date CPA 6207-0007
01/03/2016	Starting date of crediting period CPA 6207-0007

(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 6207-0001: 43,357
CPA 6207-0002: 11,088
CPA 6207-0003: 0
CPA 6207-0004: 0
CPA 6207-0005: 14,012
CPA 6207-0006: 0
CPA 6207-0007: 0

Combined: 68,457 t of CO_{2e}

Conservative approach
The approach followed in monitoring and calculation of emission reductions is conservative as required by the methodology AMS II G, v3, for the following reasons:
- A weighted emission factor (81.6 t CO_2/TJ) is used instead of the emission factor for wood (112 t CO_2/TJ). Therefore, only 73% of the de facto emission reductions when using the ICS can be taken into account.
- Additional fuel wood savings up to 50% from using the heat retaining device, the Wonderbox, are not considered in calculation of emission reductions.

Ensuring avoidance of double counting
All appliances disseminated under each CPA have a unique serial number, allowing to doubtlessly identifying the appliance and its corresponding CPA. The CME also reviews individual CPA documents and implementation to ensure no ICS distributed under a specific CPA is part of another single CDM project activity or CPA under another PoA.

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

\>>

(a) Host Parties:
Republic of Rwanda, Republic of Cameroon

(b) Region/ State/ Province:
The ICS deployed under the CPAs are spread all over Rwanda and Cameroon.
The location is recorded on the sales receipt(or user agreement) and documented in the sales record database (or stoves record database).

(c) City/ Town/ Community:
The ICS were installed in households in Rwanda and Cameroon.

(d) Physical/ Geographical location:

All ICS disseminated under the CPAs have a unique serial number, allowing to doubtlessly identify the ICSs. Serial numbers are transferred to the corresponding CPA electronic record keeping system.

Geographic coordinates of the Republic of Rwanda: 2.0000°S; 30.000°E.
Geographic coordinates of the Republic of Cameroon. 6.0000°N; 12.000°E

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

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

>>
No temporary deviations from registered monitoring plan or applied methodology have been applied during this monitoring period for the specifc-case CPAs.

E.2. Corrections

>>
No corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report for the specifc-case CPAs.

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

>>
No changes to the start date of the crediting period of the specific-case CPA(s) have been approved during this monitoring period or submitted with this monitoring report.

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

>>
No inclusion of a monitoring plan into the specific-case CPA(s) that was not included at registration has been approved during this monitoring period or submitted with this monitoring report for the specifc-case CPAs.

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

>>
No permanent changes to the monitoring plan as described in the registered specific-case CPA-DD(s), applied methodology or standardized baseline have been approved during this monitoring period or submitted with this monitoring report for the specifc-case CPAs.

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

>>
No changes to project design of the specific-case CPA(s) have been approved during this monitoring period or submitted with this monitoring report for the specifc-case CPAs.

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

>>
Not applicable

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

>>
The monitoring system described in this section is applicable to specific-case CPAs 6207-0001, 6207-0002 and 6207-0005.

Data collection procedures and organisational structure

The monitoring system is the same for CPA 6207-00016207-0002 and 6207-0005. Each CPA has a separate database and only on CME level, roles and responsibilities overlap for the three CPAs.

The monitoring consists of three stages for the CPAs:

1. (Continuous) Sales/distribution monitoring to determine $N_{i,y}$ *Adjusted total number of appliances deployed* and the *"Type of stove predominantly used before purchasing/acquiring the ICS"*

2.   Sample surveys after the end of the monitoring period and prior to verification to determine:

    - DO_y *Statistically adjusted drop out from total population of appliances*
    - $N_{eater\_project}$ *Average number of eaters for whom meals are prepared on the ICS*
    - η_{new} adjusted average efficiency of the system being deployed

3. Data compilation, quality control and drafting of the Monitoring Report

    1. Sales/distribution monitoring

Sales/distribution monitoring serves to determine the adjusted total number of appliances deployed until period y (N_y) and to determine the *Type of stove predominantly used before purchasing the ICS.*

The process of ICS deployment and sales monitoring data flow incl. organisational structure is illustrated in the following diagram:
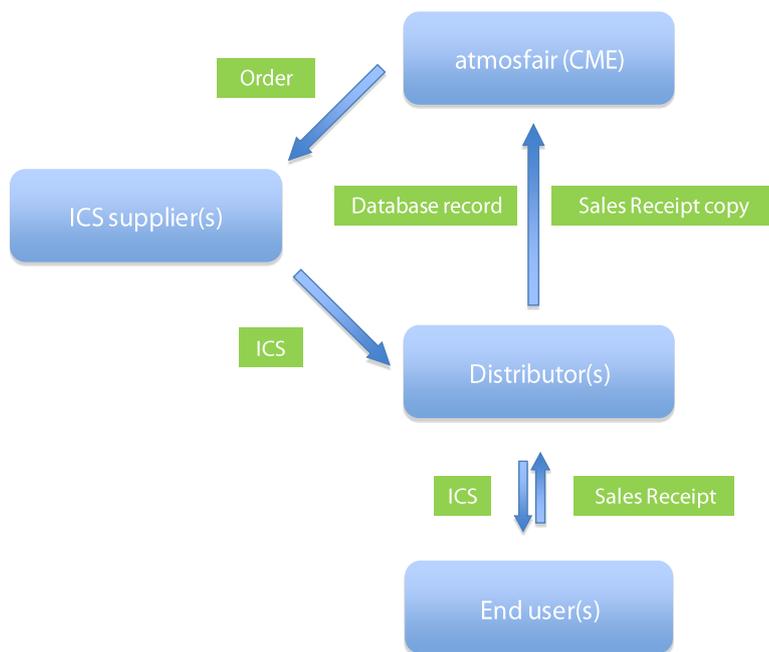
Diagram 1: Sales monitoring flow chart

Data generation:
Every end user acknowledges receipt of an ICS on a sales receipt/user agreement. The sales receipt/user agreement provides information on

-   Type of appliance (ICS type) deployed
-   Serial number (Stove-ID) of system
-   Delivery date of appliance (to user)
-   User details (Name, Address, etc.)

- Implementing Entity/ Contact Person
- Type of stove predominantly used before acquiring of the ICS

Data recording:
The distributor(s) collect the sales receipts/user agreements from the end users and enter the information from the sales receipts into an electronic database (the "sales records database").

Data aggregation and reporting:
The distributors submit both, copies of the sales receipt/user agreement and the electronic datasets from the sales receipts/user agreements to the CME. The CME checks for inconsistencies and instructs distributors to take corrective action where necessary.

2. Sample surveys

After the end of the monitoring period and prior to the verification, sample surveys are conducted that serve to determine the;

- statistically adjusted drop out from total population of appliances in period y (DO_y)
- average number of eaters for whom meals are prepared on the ICS ($N_{eaters\_project}$)
- adjusted average efficiency of the system being deployed (η_{new})

The sample survey data flow including organisational structure is illustrated in the following line diagram:

atmosfair (CME)		Monitoring team		atmosfair (CME)
Random sample from Sales records database	→	Sample Survey at end user location	→	Results reporting in Inspection database

Diagram 2: Sample survey flow chart

Data generation:
The CME draws a random sample from the sales/distribution records database and submits the electronic sample including the user details to the monitoring team. The monitoring team conducts the surveys (user interviews and efficiency tests) at the end user locations.

Data recording:
The monitoring team records the information from the user interviews on questionnaires and from the efficiency tests on data entry forms.

Data aggregation and reporting:
The monitoring team submits the questionnaires and the data entry forms to the CME. CME checks for inconsistencies and instructs the monitoring team to take corrective action where necessary. The CME aggregates and reports the results in an inspection/monitoring database.

For the detailed sampling plan, see Section D.3 of the registered PoA DD.

3. Data compilation

The CME finally transfers the parameter values from the sales/distribution records database and from the inspection/monitoring database to an Excel spreadsheet containing the equations to calculate the emission reductions of the monitoring period. The so achieved values are reported in the monitoring report.

Roles and responsibilities of personnel

Person	Role
Managing Entity database manager	The database manager is responsible for updating and maintaining all electronic databases.
Monitoring team	The monitoring team per CPA will be assigned by the CME to conduct the user interviews and appliance tests during the periodic sampling and reports the results to the CME database manager.

Emergency procedures for the monitoring system

The CME has implemented a system of cross-checks to ensure data quality. There is a separation of roles for every step of the data generation, aggregation & recording, calculation and reporting between those who are responsible and those who are controlling the respective step.
In particular, the CME database manager checks correctness and consistency between information on the sales receipts/user agreements and the corresponding sales/distribution database record. In case inconsistencies are detected, the CME database manager instructs the distributors to search for the error source. If the error source can be found, the information is corrected accordingly, if not, the database record is removed from the database.

Furthermore, the CME database manager checks the correctness and consistency of all sampling data collected and processed in this Monitoring Period.

SECTION G.   Data and parameters

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

(Copy this table for each piece of data and parameter)

Data / Parameter:	$B_{old,\ capita,,\ 1,2}$
Data unit:	t/year/head
Description:	Average charcoal consumption per head per year for Scenario 1)-2)
Source of data:	See Step 1 section B.6.3 PoA-DD
Value(s) applied:	Rwanda: Scenario 1: 0.11972 t/y/head Scenario 2: 0.17958 t/y/head Cameroon: Scenario 1: 0.03731 t/y/head Scenario 2: 0 t/y/head
Choice of data or Measurement methods and procedures:	See section B.6.3 PoA-DD
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$f_{biomass/charcoal}$
Data unit:	Number
Description:	conversion factor wood to charcoal
Source of data:	See Step 1 section B.6.3 PoA-DD

Value(s) applied:	Rwanda: 9 Cameroon: 6
Choice of data or Measurement methods and procedures:	See section B.6.3 PoA-DD
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$B_{old, capita, 3}$
Data unit:	t/year/head
Description:	Average woody biomass consumption per head per year for Scenario 3)
Source of data:	See Step 1 section B.6.3 PoA-DD
Value(s) applied:	Rwanda: 0.6353 Cameroon: 0.6305
Choice of data or Measurement methods and procedures:	See section B.6.3.
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$\eta_{charcoal\_stove,1,2,}$
Data unit:	%
Description:	Efficiency of the baseline system being replaced
Source of data:	See section B.6.3 PoA-DD
Value(s) applied:	Scenario 1= 30% (efficient charcoal stove with clay) Scenario 2= 20% (inefficient charcoal stove without clay)
Choice of data or Measurement methods and procedures:	Scenario 1= literature value (see Part II - Section B.3 PoA DD) Scenario 2= literature value (see Part II - Section B.3 PoA DD)
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$\eta_{old,3}$
Data unit:	%
Description:	Efficiency of the baseline system being replaced
Source of data:	AMS-II.G. default value
Value(s) applied:	10% (default value for wood stove see below)
Choice of data or Measurement methods and procedures:	According to AMS-II.G., a default value of 0.10 can be used "if the replaced system is the three stone fire or a conventional system lacking improved combustion air supply mechanism and flue gas ventilation system i.e., without a grate or a chimney". See Section B.6.3, Step 4 PoA-DD
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/t
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data:	IPCC
Value(s) applied:	0.015

Choice of data or Measurement methods and procedures:	This is the IPCC default value for wood fuel as provided by AMS-II.G, par. 6
Purpose of data	Calculation of baseline emissions
Additional comment:	NCV for wood fuel

Data / Parameter:	$NCV_{charcoal}$
Data unit:	TJ/t
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data:	IPCC
Value(s) applied:	0.0295
Choice of data or Measurement methods and procedures:	This is the IPCC default value for charcoal fuel
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	tCO_2/TJ
Description:	Emission factor for the substitution of non-renewable woody biomass by similar consumers
Source of data:	AMS-II.G. default value
Value(s) applied:	81.6
Choice of data or Measurement methods and procedures:	According to AMS-II.G., the emission factor for the substitution fuel likely to be used instead of non-renewable woody biomass a value of 81.6 t CO_2/TJ is to be taken.
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	L_y
Data unit:	Fraction
Description:	Leakage adjustment factor period y
Source of data:	default value
Value(s) applied:	0.95
Choice of data or Measurement methods and procedures:	According to AMS-II.G.: Para 13 and Para 23, B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakage in which case surveys are not required.
Purpose of data	Calculation of baseline emissions by adjusting for leakage emissions
Additional comment:	

Data / Parameter:	$f_{NRB,y}$
Data unit:	
Description:	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass
Source of data:	See Section B.6.3 PoA-DD
Value(s) applied:	Rwanda: 0.98 or 98% Cameroon: 0.70 or 70%

Choice of data or Measurement methods and procedures:	See section B.6.3 PoA-DD
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data/Parameter	*HH_CAP*
Unit	Number
Description	Maximum number of eaters possible per specific ICS as applied in the specific CPAs
Source of data	Manufacturer's specifications
Value(s) applied	8
Choice of data or Measurement methods and procedures:	According to manufacturer's specifications
Purpose of data	Not used for emission reduction calculation. Only as a cap for monitored parameter $N_{eaters, appliance}$
Additional comment	

G.2. Data and parameters monitored

(Copy this table for each piece of data and parameter)

Data/Parameter	$N_{eaters\_project}$
Unit	number
Description	Average number of eaters for whom meals are prepared on the ICS
Measured/Calculated /Default	Calculated from sample survey
Source of data	Sample survey
Value(s) of monitored parameter	CPA 6207-0001 and 6207-0005: 4.96 CPA 6207-0002: 4.13 (Adjusted by lower bound of the 90% confidence interval: 3.61)
Monitoring equipment	Questionnaire
Measuring/Reading/ Recording frequency	Once for this monitoring period (i.e. annual inspection at 90/10 confidence/precision since monitoring period = 1 year and no across CPA sampling)
Calculation method (if applicable)	Monitoring of the statistically adjusted average number of eaters for whom meals are prepared on the ICS has been performed by monitoring a sample of all appliances deployed and involved two steps: Step 1: Sample survey amongst ICS deployed under the CPA Step 2: Calculation of the average number of eaters at 90% confidence level and 10% precision (annual inspections) The average number of eaters has been determined through interviews performed by a dedicated monitoring team according to the sampling procedure described below. Interviews were conducted using a questionnaire. Interviews were conducted with the aim to achieve the required precision of 10% for this parameter. By determining the average number of eaters for whom meals are prepared on the ICS, the continuous use of the baseline appliance is considered as only the baseline consumption which is reduced by the ICS is considered. All questionnaires and information gathered during the sampling by the monitoring team have been handed over to the CME that takes care of entering the information into an electronic database and updating databases where appropriate.
QA/QC procedures	All formulae applied to determine the statistical precision used have been standard formulae. Furthermore, according to AMS-II.G., par.22 the sampling error has to be deducted ("...the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen…") in the event that 90/10 precision could not be achieved because of a small sample size. Deductions were made, where 90/10 precision was not achieved by sampling an appropriate number of appliances. Data has been collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later
Purpose of data	Baseline emission calculation
Additional comment	

Data/Parameter	$N_{i, y}$
Unit	-
Description	Adjusted total number of appliances deployed until period y per CPA
Measured/Calculated /Default	Calculated
Source of data	Sales Records
Value(s) of monitored parameter	CPA 6207-0001: 10,485 CPA 6207-0002: 7,245 CPA 6207-0005: 3,499
Monitoring equipment	Sales receipts/user agreements and sales\distribution records database for each CPA
Measuring/Reading/ Recording frequency	Continuous monitoring and recording of n_i
Calculation method (if applicable)	The total number of appliances deployed until the end of the monitoring period has been calculated based on information monitored through the stove records database separately per CPA. $$N_{i,y} = \sum_{j=1}^{y} n_{i,j} \cdot OT_{adjusted,i,j,y}$$ <table><tr><th>Parameter</th><th>Description</th></tr><tr><td>$n_{i,j}$</td><td>Number of ICS deployed in period j per baseline scenario i as reported in the stove records database</td></tr><tr><td>$$OT_{adjusted,i,j,y} = \begin{cases} 1 & , j < y \\ \dfrac{d_{average,i,y}}{mp_{length}} & , j = y \end{cases}$$</td><td>Adjustment factor for reduced operational time of appliances deployed in period y per baseline scenario i</td></tr><tr><td>$d_{average,i,y}$</td><td>Average number of days that appliances deployed in period y have been operational in period y as determined by respective deployment dates of appliances counted for n_y. Delivery dates are determined mutatis mutandis as in the context of n_i above.</td></tr><tr><td>mp_{length}</td><td>Length of monitoring period y</td></tr></table>
QA/QC procedures	Data is collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
Purpose of data	Baseline emission calculation
Additional comment	y= current monitoring period, j= term for monitoring period, i= comprises the four options according to the scenario 1)-4 .

Data/Parameter	DO_y
Unit	%
Description	Statistically adjusted drop out from total population of appliances under scenario 1) to 3) in this monitoring period
Measured/Calculated /Default	Calculated from sample survey
Source of data	Sample survey

Value(s) of monitored parameter	CPA6207-0001 and 6207-0005: 0.00% CPA6207-0002: 23.17%
Monitoring equipment	Questionnaire
Measuring/Reading/ Recording frequency	Once for this monitoring period (i.e. annual monitoring)
Calculation method (if applicable)	Monitoring of the statistically adjusted drop out are performed by monitoring a sample of all appliances and involves two steps: Step 1: Sample survey amongst ICS deployed under the CPA Step 2: Calculation of the average number of eaters at 90% confidence level and 10% precision (annual inspections) The Drop outs have been determined through interviews where it has been checked if the appliances are still operational, performed by a dedicated monitoring team according to the sampling procedure described below. Interviews were reported in a questionnaire. Checks were conducted with the aim to reach the required precision (10%) for this parameter. All questionnaires and information gathered during the sampling by the monitoring team have been handed over to the CME that takes care of entering the information to an electronic database and updating sample databases where appropriate.
QA/QC procedures	All formulae applied to determine the statistical precision used are standard formula. Furthermore, according to AMS-II.G., par.22 the sampling error has to be deducted ("...the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen…") in the event that 90/10 or 95/5 precision could not be achieved because of a small sample size. No deductions had to be made, since90/10 precision has been achieved by sampling an appropriate number of appliances. Data has been collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. A traceable "identity check" of the appliances visited during sampling has been performed and recorded (e.g. a picture of the appliance clearly showing its serial no., etc.).
Purpose of data	Baseline emission calculation
Additional comment	

Data/Parameter	η_{new}
Unit	% (efficiency value of ICS using biomass)
Description	Adjusted average efficiency of the system being deployed as part of the CPAs
Measured/Calculated /Default	Calculated from sample survey
Source of data	WBTs

Value(s) of monitored parameter	CPA6207-0001 and 6207-0005:	
	Stove ID:	**Thermal efficiency:**
	6207-10817	52.60%
	6207-19658	52.16%
	6207-12634	54.08%
	6207-14512	51.97%
	6207-24312	46.79%
	6207-16668	48.04%
	6207-14600	51.50%
	6207-15402	51.43%
	Average	**51.07%**

Survey Period: 20/07/2016 – 18/08/2016
Number of stoves tested: 8

CPA6207-0002:

Stove ID:	Thermal efficiency:
UN6207-100762	43.44%
6207-101365	36.73%
UN6207-100634	32.24%
UN6207-102455	37.23%
UN6207-104298	39.20%
6207-105749	38.76%
6207-102138	37.92%
6207-104801	39.49%
6207-102119	51.55%
Average	**39.62%**

Survey Period: 14/07/2016 – 23/08/2016
Number of stoves tested: 9

Monitoring equipment	CPA 6207-0001, 6207-0002 and 6207-0005	
		Weighing Scale
	Type	KD 7000
	Accuracy class	+/- 1 g
	Serial number	ESN56784224992T
	Date of last calibration	26/06/2016
	Calibration frequency	Once per 12 months
	Validity.	Valid
		Thermocouple
	Type	Greisinger Präzisionsthermometer GMH 3710
	Accuracy class	+/- 0.03°C
	Serial number	32402671
	Date of last calibration	07/07/2016
	Calibration frequency	Once per 12 months
	Validity.	Valid

Measuring/Reading/ Recording frequency	Once for this monitoring period (i.e. annual monitoring)

Calculation method (if applicable)	Monitoring of the statistically adjusted average efficiency involved two steps:
	Step 1: Sample survey and efficiency testing amongst appliances deployed under the CPA as specified in section B.7.2
	Step 2: Calculation of the adjusted average efficiency at 90% confidence level and 10% precision (annual inspections) or 95% confidence level and 5% precision (biennial inspections) following the statistical standard approach for a heterograde test of independent units that have a standard normal distribution.
	η_{new} was determined following the Water Boiling Test (WBT) protocol, performed by a dedicated monitoring team according to the sampling procedure described in section B.7.2. of the PoA-DD and following the WBT protocol. Tests were reported in spreadsheet templates.
	Checks were conducted with the aim to achieve the required precision (10%) for this parameter. The CME established a dedicated monitoring team itself.
QA/QC procedures	All formulae applied to determine the statistical precision are standard formula. Furthermore, according to AMS-II.G., par.22 the sampling error has to be deducted (*"...the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen…"*) in the event that 90/10 or 95/5 precision could not be achieved because of a small sample size. No deductions had to be made, since 90/10 precision has been achieved by sampling an appropriate number of appliances.
	Data was collected using the standard procedures and will be stored for the CPA crediting period and an additional two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
	A traceable "identity check" of the appliances visited during sampling was performed and recorded (e.g. a picture of the appliance clearly showing its serial no. was taken).
	Cross-checks: The monitoring team cross-checked results with literature values, or specifications from manufacturer, where available.
Purpose of data	Baseline emission calculation
Additional comment	

According to eligibility criteria number 5 of the PoA-DD, it needs to be shown that every CPA remains under the thermal threshold of 180GWh thermal energy savings. During verifications the DOE needs to assess, that the small scale limit (180 GWh per CPAs) was not exceeded at any time for any CPA.

Aggregated energy savings of all ICS included in CPA 6207-0001, 6207-0002 and 6207-0005 during this monitoring period are:
CPA 6207-0001: 158.11 GWh_{th}
CPA 6207-0002:   52,76 GWh_{th}
CPA 6207-0005:   51.11 GWh_{th}

G.3. Implementation of specific-case CPA level sampling plan
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a) Description of implemented sampling design;

According to AMS II.G. ver. 3, par. 15 and 16, *"Monitoring shall consist of checking the efficiency of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating at the specified efficiency (η_{new}) or replaced by an equivalent in service appliance. Where replacements are made, monitoring shall also ensure that the efficiency of the new appliances is similar to the appliances being replaced.*

Monitoring shall also consist of checking of all appliances or a representative sample thereof, at least once every two years (biennial) to determine if they are still operating or are replaced by an equivalent in service appliance"

Furthermore, according to par. 20, monitoring shall ensure that:

"Either the replaced low efficiency appliances are disposed of and not used within the boundary or within the region; or

If baseline stoves continue to be used, monitoring shall ensure that the fuel-wood consumption of those stoves is excluded from B_{old}."

For this reason, parameters as stated in Section G.2. of this Monitoring Report are monitored.
Due to the high number of appliances deployed an annual check of operation and efficiency of all appliances is economically not feasible. Therefore a representative sample was monitored to ensure that all the appliances deployed are still operating or not, or if appliances have been replaced. Additionally the efficiency of the appliances deployed and number of eaters per household was monitored within the representative sample to account for possible continuous use of baseline stoves.

N_y is monitored through sales/distribution records for all appliances deployed till the end of the Monitoring period, whereas the other parameters were determined through a sample survey.

A sample (the "sample database") was drawn from the stove records database by the CME via a computerized randomizer based on which all of the parameters determined via sampling were monitored.

Precision requirements:

As per applicable methodology AMS-II.G. ver. 3, par. 22: *"… when the project proponent chooses to inspect annually, a 90% confidence interval and a 10% margin of error requirement shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision is not achieved, the lower bound of a 90% confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 precision."*

Additional requirement for PoAs:

In case a single sampling plan for more than one CPA is used, *"parameter values shall be estimated by sampling in accordance with the requirements in the applied methodology separately and independently for each of the CPAs included in a PoA except when a single sampling plan covering a group of CPAs is undertaken applying 95/10 confidence/precision for the sample size calculation"*, as per Par. 20 of the Sampling Standard, EB 50, Annex 30 ver. 4.1.

According to the Monitoring plan of the registered CPAs, a single sample was drawn for both CPAs 6207-0001 and 6207-0005. Therefore, 95/10 confidence/precision for the sampling applies. A separate sample was drawn for CPA 6207-0002, therefore 90/10 confidence/precision for the sampling applies.

As per the registered CPA-DDs, the sampling procedure has to be a simple random sampling process which randomly samples households across the CPA. Though the monitoring team undertook the monitoring of the parameters simultaneously and on the same sample, different sample sizes applied since the confidence/precision of the parameter depend on the variation of the obtained values. The required sample sizes were calculated prior to conducting the sample survey using the equations for simple random sampling as per EB 67 Annex 6, para 16 to 26 for the proportional parameter of interest (DO_y) and para 51 to 57 for the mean value parameters of interest ($N_{eaters\_project;}\ \eta_{new}$)

Since the resulting sample is a random sample, stoves from all age classes and geographical representation were present as to their real percentage in the sample databases.

Sampling for CPAs 6207-0001 and 6207-0005:

The users in the sample were selected via a computerized randomizer from the combined sales records database of CPAs 6207-0001 and 6207-0005. The computerized randomizer produced an unsorted sample list i.e. a list of 80 ICS users. The sample was drawn on the 07/07/2016 and based on a total population size of 18,204 Save80 stoves.

In accordance with the Monitoring Plan of the registered PDD and to reduce monitoring efforts a single sample was drawn from the sales records database for both CPAs 6207-0001 and 6207-0005 based on which all of the parameters were monitored. This does not imply that for each of the parameters the same number of ICS had to be monitored during sampling.

Out of the 80 sampled ICS users, 68users could be contacted and an interview was performed to determine DO_y, which is more than the required minimum sample size for DO_y since a 80% response rate was assumed.

For $N_{eaters\_project}$ 68 ICS users were interviewed since 0 out of the 68 Save80 users interviewed to determine DOy qualified as drop out cases.

In order to determine η_{new} 8 WBTs were conducted. For this the first 10 users from the unsorted sample list (80 users) were selected for the performance of the Water Boiling Tests (WBTs). A total of 8 tests could be performed, which is equal to the required minimum sample size for η_{new} (n=2), since an 80% response rate was assumed.

Sampling for CPA6207-0002:

The users in the sample were selected via a computerized randomizer from the sales records database. The computerized randomizer produced an unsorted sample list i.e. a list of 94 ICS users. The sample was drawn on the 07/07/2016 and based on a total population size of 7,313 Save80 stoves.

In accordance with the Monitoring Plan of the registered PDD and to reduce monitoring efforts a single sample was drawn from the distribution records database based on which all of the parameters were monitored. This does not imply that for each of the parameters the same number of ICS had to be monitored during sampling. The calculation of the sample size for DOy led to the result of 94. Thus, 94 users were randomly selected from the overall database.

Out of the 94 sampled ICS users, 82 users could be contacted and an interview was performed to determine DO_y.

Out of the 82 interviewed ICS users, 19 were not using the ICS and qualified as Drop-Outs. Thus, in order to determine $N_{eaters\_project,}$ a total of 63 valid interviews were considered.

In order to determine η_{new} 9 WBTs were conducted. The first 10 stoves, randomly drawn from the unsorted sample list, were used for the Water Boiling Tests (WBTs). From the sample list of 10 stoves, only 4 could be availed for conducting the Water Boiling Tests. Thus, the 11th stove from the unsorted sample list of 94 drawn cases was tested, in order to achieve the assumed response of 80%. Finally, 9 tests could be performed, which fulfils the required minimum sample size for η_{new} (n=2).

b,c,d) Collected data, analysis of the collected data and demonstration of whether the required confidence/precision level has been met

The following tables summarise the collected data, give the analysis of the same and the demonstration on whether the confidence/precision has been met.

CPAs 6207-0001 and 6207-0005:

Parameter	n*	Response rate	Assumed response rate for oversampling	Result	Standard deviation	Confidence	**Precision**	Lower bound applicable?
η_{new}	8	80%	80%	51.07%%	2.38	90%	**2.90%**	No
DO_y	68	86.1%	80%	0.00 %	N/A	90%	**0.00%**	No
$N_{eaters\_project}$	68	85%	80%	4.96	1.75	90%	**7.12%**	No

*valid responses

CPA 6207-0002:

Parameter	n*	Response rate	Assumed response rate for oversampling	Result	Standard deviation	Confidence	**Precision**	Lower bound applicable?
η_{new}	9	90%	80%	39.62%	5.35	90%	**8.36%**	No
DO_y	82	87.23%	80%	23.17%	N/A	90%	**9.92%**	No
$N_{eaters\_project}$	63	87.50%	80%	3.61	2.48	90%	**12.58%**	Yes

*valid responses

The adjusted values are used for the emission reductions calculations.

The sampling of the stove IDs included in the Inspection/monitoring Database took place in the month after the end of the Monitoring Period (30/06/2016), when the sales/distribution record database was fully established.

Monitoring of the parameters DO_y and $N_{eaters\_project}$ was done through personal interviews of stove users using a common questionnaire. Monitoring of the parameter η_{new}, was done by applying the Water Boiling Test (WBT) protocol.

e) Demonstration of whether the selected samples are representative of the population

The selected samples are representative of the population since they were randomly drawn from the sales/distribution record databases containing the full ICS population considered under CPA 6207-0001, 6207-0002 and 6207-0005 for this Monitoring Period. Simple random sampling was applied. Further, sample sizes were calculated based on EB 67 Annex 6, para 16 to 26 for the proportional parameter of interest (DO_y) and para 51 to 57 for the mean value parameters of interest ($N_{eaters\_project}$; η_{new}). In case where calculated sample sizes were lower than the defined minimum sample sizes in the CPA-DD, the minimum sample sizes were applied. This is valid for CPAs 6207-0001, 6207-0002 and 6207-0005

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

The users were randomly selected via a computerized randomizer from the sales record databases containing the full ICS population considered under CPA 6207-0001 and 6207-0005 (single sampling plan) and 6207-0002 (separate sample) for this Monitoriong Period and as described in G.3. a) and e). Simple random sampling was applied for all CPAs (6207-0001, 6207-0002 and 6207-0005).

Quality assurance / Quality control

Procedures for conducting the data collection and/or field measurements:

Data collection and administration of data:

To ensure completeness and accuracy of monitoring information, electronic databases per CPA are operated and maintained by the CME's database manager.

Stove record database

The stove record database keeps information on all ICS deployed per CPA and included in this monitoring period. At least the following information will be recorded:

- Type of appliance (ICS type) deployed
- Serial number (Stove-ID) of system
- Delivery date of appliance (to user)
- User details (Name, Address, etc.)
- Implementing Entity/ Contact Person
- Type of stove predominantly used before purchasing of the ICS

Sample Database

From the stove record database the monitoring samples for CPA 6207-0001 and CPA 6207-0005 (single sampling plan) and 6207-0002 (separate sample) were drawn.
After monitoring the results were also included in an additional inspection/monitoring database. The following information were recorded:

- Serial number of appliance checked
- Continuous operation of appliance (yes/no) (to determine parameter DO_y,)
- Average number of eaters per appliance (to determine parameter $N_{eaters\_project}$)
- Date of the check
- Efficiency tested (to determine parameter η_{new})

After the sample was drawn, a monitoring List containing stove numbers and contact details of the users was sent to the Monitoring teams. Data collected and processed by the field staff during monitoring was checked by the CMEs' database manager and the QA/QC Manager.

Training of field personnel
All personnel involved in the monitoring were trained to ensure that each of them undertakes an appropriate monitoring assignment according to the Monitoring Plan.

Documentation of out-of-population cases, refusals, other sources of non-responses:
Refusals and non-respondents (i.e. households where the contact could not be established) were recorded by the monitoring team as well as the reason for the refusal. The results were reported in the Reporting Form for user interviews.

Outliers:
No outliers were recorded during the monitoring period.

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

H.1. Calculation of baseline emissions or baseline net GHG removals by sinks
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Please note that the methodology AMS II.G., ver. 3 does not provide specific equations for calculation of baseline emissions, project emissions or leakage, only for Emission reductions.

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

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Not applicable, as methodology AMS II.G., ver. 3 does not consider project emissions.

H.3. Calculation of leakage

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As per AMS-II.G. leakage has to be considered to adjust **B**_old_. Therefore, leakage emissions are considered in the baseline emissions calculation and do not need to be considered during monitoring.

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

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO₂e)	Project emissions or actual net GHG removals by sinks (tCO₂e)	Leakage (tCO₂e)	GHG emission reductions or net GHG removals by sinks (tCO₂e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
6207-0001	43,357	N/A	N/A	0	43,357	43,357
6207-0002	11,088	N/A	N/A	0	11,088	11,088
6207-0003	0	N/A	N/A	0	0	0
6207-0004	0	N/A	N/A	0	0	0
6207-0005	14,012	N/A	N/A	0	14,012	14,012
6207-0006		N/A	N/A	0	0	0
6207-0007		N/A	N/A	0	0	0
Total	**68,457**	**Not applicable**	**Not applicable**		**68,457**	**68,457**

Equations used for calculation of emission reductions:

In line with the AMS II. G., ver. 3, emission reductions are calculated using the following equation:
Emission Reductions are calculated as:

$$ER_y = B_{y,savings} \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected\_fossilfuel} \cdot N_{y,i}$$

Parameter	Unit	Type	Description
ER_y	tCO₂e	Calculated	Emission reductions of the project activity in period y
$B_{y,savings}$	t	Calculated	Quantity of woody biomass that is saved by the CPA in period y. $B_{y,savings}$ comprises three options defined according to the scenario 1) to 3) illustrated in section B.4 of the registered PoA-DD, part two.

$f_{NRB,y}$	%	Fixed	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass
$NCV_{biomass}$	TJ/t	Fixed	Net calorific value of the non-renewable woody biomass that is substituted (IPCC: 0.015TJ/t)
$EF_{projected\_fossilfuel}$	tCO_2/TJ	Fixed	Emission factor for the substitution of non-renewable woody biomass by similar consumers: $81.6 tCO_2$/TJ
$N_{y,i}$	-	Measured	Number of project devices of type i operating in year y, determined

$B_{y,savings}$ shall be calculated according to Option 2 of Para 6 of AMS II G:

$$B_{y,savings} = \sum_{i=1}^{3} B_{old,i} \cdot \left(1 - \frac{\eta_{old,i}}{\eta_{new}} \right)$$

Index i comprises four options according to the scenario 1)-3) illustrated in section E.4 of the registered PoA-DD. Please note: if instead of index i specific scenarios are selected the scenario number is stated as subscript as follows: X_1 = parameter X refers to scenario 1 only, $X_{1,2}$ = parameter X refers to both scenarios 1) and 2)

Parameter	Unit	Type	Description
$B_{y,savings}$	t	Calculated	Quantity of woody biomass that is saved
$B_{old, i}$	t	Calculated	Quantity of woody biomass used in the absence of the project activity
$\eta_{old, i}$	%	Fixed	Efficiency of the baseline system being replaced
η_{new}	%	Monitored	Efficiency of the system being deployed as part of the project activity

The efficiency of the charcoal stoves under scenario 1) and 2) still need to be converted to the efficiency of a fuel wood stove to derive the efficiency $\eta_{old,1,2}$:[5]

$$\eta_{old,1,2} = \frac{\eta_{charcoal\_stove,1,2} \bullet NCV_{charcoal}}{f_{biomass/charcoal} \bullet NCV_{biomass}}$$

Parameter	Unit	Type	Description

[5]Charcoal is already a transformed product, which in Rwanda needs 9 kg of wood to produce 1 kg of charcoal. Even though the NCV of the charcoal is more than twice that of the fuel wood, the losses during charcoal production mean that less than 23% of the energy contained in the fuel wood is transformed into charcoal.
A thermal efficiency of 30% like for the efficient charcoal stoves means that 30% of the energy content of the charcoal is going into the food, but taking into account the losses during charcoal production, only around 6.8 % of the energy content of the fuel wood which was used to produce the charcoal is going into the food.

$\eta_{charcoal\_stove,1,2}$	fraction	fixed		Efficiency of the charcoal system/s being replaced
$NCV_{charcoal}$	TJ/t	fixed		Net calorific value of charcoal
$f_{biomass/charcoal}$	number	fixed		Conversion factor for wood to charcoal
$NCV_{biomass}$	TJ/t	fixed		Net calorific value of the non-renewable woody biomass that is substituted

For calculating $B_{y,savings}$ a CPA shall calculate efficiency gains of the ICS compared to the baseline efficiency.

In order to be able to calculate the Emission Reductions the following additional steps are required to determine: $B_{old,i}$, $f_{NRB,y}$, $\eta_{old,i}$

AMS-II.G., par.7 provides two principal approaches how to determine B_{old}. We choose to apply approach (a):

"Calculated as the product of the number of systems multiplied by the estimated average annual consumption of woody biomass per appliance (tonnes/year). This can be derived from historical data or a survey of local usage,"

Further assessment of the above paragraph shows that the average annual consumption of woody biomass in the baseline can be determined based on either Historical Data, or a Survey of Local Usage

As historical data on charcoal and fuel wood consumption is available for Rwanda, we chose option a) "historical data", and therefore establish the average annual consumption of woody biomass per system (B_{old}) ex ante in the PoA for scenario 1), 2) and 3).

$B_{old,i}$ shall be calculated according to the following formula:

$$B_{old,i} = B_{old,appliance,i} \cdot N_{i,y} \cdot (1 - DO_y) \cdot \frac{mp_{length}}{365} \cdot L_y$$

Index i comprises four options according to the scenario 1)-3) illustrated in section E.4 of the registered PoA-DD.

Parameter	Unit	Type	Description
$B_{old,i}$	t/year	Calculated	Quantity of woody biomass used in the absence of the project activity
$B_{old,appliance,i}$	t/year	Monitored	Average annual consumption of woody biomass per appliance $B_{old,appliance,i}$ e comprises four options according to the scenario 1) to 4) illustrated in section B.4 of the PoA-DD, part two.
$N_{i,y}$	-	Monitored	Total number of appliances deployed in period y
DO_y	%	Monitored	Statistically adjusted drop out from total population of appliances in period y

mp_{length}	days	Monitored (implicitly, no extra parameter)	Length of monitoring period y
L_y	-	Fixed	0.95 default value

Applying the procedures outlined in section section E.6.2 of the of the registered PoA-DD the value $B_{old,appliance,i}$ is derived from per capita woody biomass consumption ($B_{old, capita, i}$), (Step 1), multiplied with the average number of eaters per ICS as determined during monitoring ($N_{eaters\_project}$) (Step1), multiplied by total number of appliances deployed ($N_{i,y}$) times an adjustment factor for drop out (DO_y) as found during sampling (Step 2).

Since $B_{i,y, appliance}$ is an annual value the term is also adjusted according to the length of the monitoring period, in case it doesn't equal one calendar year. Finally, the term is adjusted for leakage (L_y) using the default leakage factor (Step 3).

Furthermore in order to determine Quantity of woody biomass that is saved ($B_{y,savings}$) the efficiency of the replaced and deployed appliances needs to be determined (Step 4).

At last the share of Non-Renewable biomass ($f_{NRB,y}$) needs to be determined in order to calculate the emission reductions (Step 5).

Please see the attached emission reduction spreadsheets for CPA 6207-0001, CPA 6207-0002 and 6207-0005 which include the calculations for each stove included in the monitoring period. The emission reduction calculations are done separately for each baseline scenario 1) to 3) per CPA.

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

Specific-case CPA reference number	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
6207-0001	42,354 *	43,357
6207-0002	35,566 **	11,088
6207-0003	41,806 ***	0
6207-0004	19,384****	0
6207-0005	40,350*****	14,012
6207-0006	40,350******	0
6207-0007	7003*******	0
Total	**226,813**	**68,457**

* Ex ante estimate based on CPA-DD values, as indicated for the period from 01/10/2014 to 30/09/2015 (365 days = 36,843 CERs) and 01/10/2015 to 30/09/2016 (365 days = 44,211CERs). The ex ante estimates for both periods have been calculated on a daily basis and multiplied with the specific days of the monitoring period as follow:(36,843 /365 * 92 days) +(44,211/365 * 273 days) = 42,354 CERs.

** Ex ante estimate based on CPA-DD values, as indicated for the year 2015 (365 days = 35,566 CERs) and 2016 (365 days = 35,566 CERs). The ex ante estimates for both periods have been calculated on a daily basis and multiplied with the specific days of the monitoring period as follow 35,566 /365 * 184 days + 35,566/365 * 181 days = 35,566 CERs.

*** Ex ante estimate based on CPA-DD values, as indicated for the year 2015 (365 days = 41.806 CERs) and 2016 (365 days = 41.806 CERs). The ex ante estimates for both periods have been calculated on a daily basis and multiplied with the specific days of the monitoring period as follow 41.806/365 * 184 days + 41.806/365 * 181 days = 41.806 CERs.

**** Ex ante estimate based on CPA-DD values, as indicated for the period of the second year (365 days = 19,384 CERs).

***** Ex ante estimate based on CPA-DD values, as indicated for Year 1 (365 days = 44,095 CERs). The ex ante estimate has been calculated on a daily basis and multiplied with the specific days of the monitoring period as follow 44,095/365 * 334 days = 40,350 CERs.

****** Ex ante estimate based on CPA-DD values, as indicated for Year 1 (365 days = 44,095 CERs). The ex ante estimate has been calculated on a daily basis and multiplied with the specific days of the monitoring period as follow 44,095/365 * 334 days = 40,350 CERs.

*******Ex ante estimate based on CPA-DD values, as indicated for Year 1 (365 days = 20,952 CERs). The ex ante estimate has been calculated on a daily basis and multiplied with the specific days of the monitoring period as follow 20,952/365 * 122 days = 7,003 CERs.

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

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For CPA 6207-0001 the monitoring results are slightly higher than the estimates since the distribution amongst the defined baselines and the total number of operating Save80 systems differ between the assumptions in the PDD and the monitored values. Thus the estimates in the PDD are not comparable to the monitored values.

For CPA 6207-0002 it was estimated that 11,000 stoves would be operational but during the systems deployment monitoring, only 7,313 stoves could be included in the distribution database hence the estimates are higher than the deployed stoves.

For CPA 6207-0005, it was estimated that 9,500 would be operational but only 7,645 were deployed until the end of MP3. The stoves deployed under the CPA were also only deployed from 1st August 2015, moreover many stoves were deployed in the second half of the monitoring period.

CPAs 6207-0003 , 6207-0004, 6207-0006 and 6207-0007 were not monitored for this monitoring period. Therefore, GHG emission reductions are set to 0.

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

Coordinating/managing entity and/or responsible person/entity	☒ Coordinating/managing entity ☒ Person/entity responsible for completing the CDM-MR-FORM
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