Monitoring report form
(Version 04.0)

CONSOLIDATED MONITORING REPORT	
Title of the project activity	PoA: Improved Cooking Stoves for Nigeria Programme of Activities CPA1: CPA # 1 Improved Cooking Stoves for Nigeria CPA2: CPA # 2 Improved Cooking Stoves for Nigeria CPA3:CPA # 3 Improved Cooking Stoves for Nigeria CPA4: CPA # 4 Improved Cooking Stoves for Nigeria CPA5: CPA # 5 Improved Cooking Stoves for Nigeria
Reference number of the project activity	PoA Ref. 5067 CPA reference numbers: CPA1: 5067-0001 CPA2: 5067-0002 CPA3: 5067-0003 CPA4: 5067-0004 CPA5: 5067-0005
Version number of the monitoring report	07
Completion date of the monitoring report	20/03/2015
Registration date of the project activity	10/11/2011
Monitoring period number and duration of this monitoring period	MP 02 01/07/2012 – 30/06/2013
Project participant(s)	atmosfair gGmbH
Host Party(ies)	Nigeria
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	3: Energy demand AMS II.G., version 3, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass"
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	CPA 1: 11,270 tCO_2e CPA 2: 8,423 tCO_2e CPA 3: 8,473 tCO_2e CPA 4: 1,425 tCO_2e CPA 5: 1,437 tCO_2e **Total: 31,028 tCO_2e**
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	CPA 1: 6,506 tCO_2e CPA 2: 2,618 tCO_2e CPA 3: 994 tCO_2e CPA 4: 0 tCO_2e CPA 5: 0 tCO_2e **Total:10,118 tCO_2e**
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31	CPA 1: 3,279 tCO_2e CPA 2: 611 tCO_2e CPA 3: 295 tCO_2e CPA 4: 0 tCO_2e

December 2012(if applicable)	CPA 5: 0 tCO_2e **Total: 4,185 tCO_2e**
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	CPA 1: 3,227 tCO_2e CPA 2: 2,007 tCO_2e CPA 3: 699 tCO_2e CPA 4: 0 tCO_2e CPA 5: 0 tCO_2e **Total: 5,933 tCO_2e**

One single Monitoring Report is prepared for this monitoring period, including data for the CPAs 1,2 and 3. Registered CPAs 4 and 5 have not been implemented so far, therefore no data is recorded and no emission reductions are claimed for CPA 4 and 5 for this monitoring period.

Details of CPAs included as on last date of this monitoring period (till 30/06/2013)

S /No	UNFCCC Ref. no	CPA Title	Name of the CME	Date of inclusion	Start date of crediting period
1	5067-0001	CPA # 1 Improved Cooking Stoves for Nigeria	atmosfair	10/11/2011	10/11/2011
2	5067-0002	CPA # 2 Improved Cooking Stoves for Nigeria	atmosfair	11/07/2012	15/07/2012
3	5067-0003	CPA # 3 Improved Cooking Stoves for Nigeria	atmosfair	11/07/2012	15/07/2012
4	5067-0004	CPA # 4 Improved Cooking Stoves for Nigeria	atmosfair	29/05/2013	01/06/2013
5	5067-0005	CPA # 5 Improved Cooking Stoves for Nigeria	atmosfair	29/05/2013	01/06/2013

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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(a) Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks

The purpose of the PoA is the dissemination of improved cooking stoves in Nigeria. The PoA "Improved Cooking Stoves for Nigeria Programme of Activities" is a joint initiative by the German NGOs atmosfair gGmbH and Lernen-Helfen-Leben e.V. (LHL) and the Nigerian Developmental Association for Renewable Energies (DARE) to promote dissemination of improved cooking stoves to households in the Federal Republic of Nigeria. The efficient stoves disseminated save up to 80% of fuel wood. The CME of the PoA is atmosfair gGmbH.
The ICS disseminated under this CPA save fuel wood and hence reduce greenhouse gas emissions stemming from the use of non-renewable biomass.

(b) Brief description of the installed technology and equipment;

The improved cook stove (ICS) disseminated under SSC-CPA 1 and SSC-CPA 2 is the "SAVE80", a portable stove made of stainless steel, developed and prefabricated by a German manufacturer and assembled locally to create employment and income.
The improved cook stove disseminated under the SSC-CPA 3 will be the Envirofit G3300, a wood efficient burning rocket stove.

(c) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)

Date	Milestone
29/03/2011	Starting Date of the CPA#1
10/11/2011	PoA registration date and inclusion date of CPA #1
10/11/2011	Starting date of crediting period
10/11/2011-30/06/2012	First Monitoring Period
05/02/2014	First issuance
01/01/2012	Starting Date of the CPA#2
11/07/2012	Date of CPA#2 inclusion
15/07/2012	Starting date of Crediting period
01/01/2012	Starting Date of the CPA#3
11/07/2012	Date of CPA#3 inclusion
15/07/2012	Starting date of the crediting Period of CPA #3
01/07/2012-30/06/2013	Second monitoring Period

(d) Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period.

CPA 1: 6,506 t CO_2e
CPA 2: 2,618 t CO_2e
CPA 3: 994 t CO_2e
CPA 4: 0
CPA 5: 0

Combine: 10,118 t 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.
- The ICS start to generate emission reductions only in the month following the sales of the ICS

A.2. Location of project activity

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(a) Host Party:
Federal Republic of Nigeria

(b) Region/ State/ Province:
The region, where ICS are distributed is the Federal Republic of Nigeria for all CPAs (1-5), since CPAs are not defined by location, but by stove numbers. The exact sales location for each stove is recorded on the sales receipt and documented in the sales record database. Please see below the list of states in which stoves have been distributed in the different CPAs.

The physical boundary of the PoA- the Federal Republic of Nigeria.
Source: http://upload.wikimedia.org/wikipedia/commons/d/d2/Nigeria_political.png, last accessed 15.02.2010

States

CPA 1	CPA 2	CPA 3	CPA 4	CPA 5
Abia State	Abia State	Adamawa State	no distribution so far	
Federal Capital/Abuja	Federal Capital/Abuja	Bauchi State		
Adamawa State	Adamawa State	Benue State		
Akwa Ibom State	Akwa Ibom State	Borno State		
Anambra State	Anambra State	Edo State		
Bauchi State	Bauchi State	Federal Capital/ Abuja		
Bayelsa State	Benin State	Gombe State		
Benue State	Benue State	Jigawa State		
Borno State	Borno State	Kaduna State		
Cross Rivers State	Delta State	Kano State		
Delta State	Edo State	Katsina State		
Ebonyi State	Ekiti State	Kogi State		
Edo State	Enugu State	Lagos State		
Ekiti state	Gombe State	Plateau State		
Enugu State	Imo State	Taraba State		
Gombe State	Jigawa State	Zamfara State		
Imo State	Kaduna State			
Jigawa State	Kano State			
Kaduna State	Katsina State			
Kano State	Kebbi State			
Katsina State	Kogi state			
Kebbi State	Kwara State			
Kogi State	Lagos State			
Kwara State	Nassarawa State			
Lagos State	Niger State			
Nassarawa State	Ogun State			
Niger State	Ondo State			
Ogun State	Osun State			
Ondo State	Oyo State			
Osun State	Plateau State			
Oyo State	Rivers State			
Plateau State	Sokoto State			
Rivers State	Taraba State			
Sokoto State	Yobe State			
Taraba State	Zamfara State			
Yobe State				
Zamfara State				

(c) City/ Town/ Community:
The ICS of all CPAs 1- CPA 3 were installed in households all over the Federal Republic of Nigeria. For distribution of stove in the single CPAs please see the table and map provided above. Implementation of CPA 4 and 5 are yet to be started.

(d) Physical/ Geographical location:

All appliances disseminated under this CPA have a unique serial number, allowing to doubtlessly identify the appliance. Serial numbers are transferred to the corresponding CPA electronic record keeping system. For distribution of stove in the single CPAs please see the table and map provided above.

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Federal Republic of Nigeria (host)	atmosfair gGmbH (Private entity)	No

A.4. Reference of applied methodology and standardized baseline

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AMS II.G., version 3 (EB 60), "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass"

UNFCCC link:
http://cdm.unfccc.int/methodologies/DB/UFM2QB70KFMWLVO7LJN8XD1O2RKHEK

CDM-EB50-A30-STAN version 4.1 (EB 74, Annex 6): Standard - Sampling and surveys for CDM project activities and programme of activities.

A.5. Crediting period of project activity

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CPA 1:
Fixed crediting period (10 years)
Start of crediting period: 10/11/2011
End of crediting period: 09/11/2021

CPA 2:
Fixed crediting period (10 years)
Start of crediting period: 15/07/2012
End of crediting period: 14/07/2022

CPA 3:
Fixed crediting period (10 years)
Start of crediting period: 15/07/2012
End of crediting period: 14/07/2022

CPA 4:
Fixed crediting period (10 years)
Start of crediting period: 01 Jun 2013
End of crediting period: 31 May 2023

CPA 5:
Fixed crediting period (10 years)
Start of crediting period: 01 Jun 2013
End of crediting period: 31 May 2023

A.6. Contact information of responsible persons/ entities

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Atmosfair gGmbH
Zossener Strasse 55 -58
10961 Berlin, Germany

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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(a) Description of the installed technology, technical processes and equipment

The ICS deployed under SSC-CPA 1 and 2 is the “SAVE80”, a portable stove made of stainless steel, developed and prefabricated by a German manufacturer and assembled locally to create employment and income. The initial model has a specified thermal efficiency of 52% and nominal effective thermal power of about 1.5 kW. As per specification of the manufacturer, the SAVE80 needs only about 250 g of small brittle sticks of wood to bring 6 litres of water to the boil, 80% less than traditional fire places. The design ensures preheating of the air and a complete combustion with no visible smoke and only small amounts of ash. The SAVE80 system also consists of custom-fit pots, pans and a heat retaining box (‘Wonderbox’), where food can be transferred after reaching the boiling temperature, and where it will continue to simmer until it is well cooked. The Wonderbox allows important energy savings in addition to the savings by the Save80. However, these energy savings will not be taken into account for calculating emission reductions which is increasing the overall conservativeness of the Emission Reduction calculations.

The heat retaining box (left) and the SAVE 80

The improved cook stove disseminated under SSC-CPA 3 is the Envirofit G3300.
The G3300 is a wood burning rocket stove. Its unique design makes it easier to start a fire quickly and produces a much hotter and cleaner fire that uses significantly less fuel. A port (stove mouth) on one side of the stoves enables the user to feed fuel wood into the burning chamber. The inner and outer wood grate helps to feed in the wood and guarantee better ventilation. Only small wood sticks are needed to start the fire and keep it burning. After lighting, air is sucked in and enters the burning chamber from below. The combustion chamber is made out of alloy which prevents deterioration of the chamber and gives it an exceptionally long life. The design of the stove enables a fully combustion with a highly reduced smoke emission and only a small production of ash.

The Envirofit G3300 model

(b) Information on the implementation and actual operation of the project activity, including relevant dates (e.g. construction, commissioning, continued operation periods, etc.).

The following table lists the number of ICS deployed under the CPAs since the starting date of the corresponding project activity and as recorded in the sales record database at the end of the monitoring period.

CPA1:

Starting date of the project activity on 29/03/2011 (date of first sales under the PoA)

Sales Date	Year	ICS deployed
March	2011	5
April	2011	18
May	2011	13
June	2011	11
July	2011	26
August	2011	289
September	2011	45
October	2011	47
November	2011	113
December	2011	137
January	2012	112
February	2012	233
March	2012	888
April	2012	323
May	2012	624
June	2012	312
July	2012	4
Total		**3,200**

CPA2:

Starting date of the project activity on 01/01/2012 (date of first sales under the CPA)

Sales Date	Year	ICS deployed
June	2012	2
July	2012	364
August	2012	187
September	2012	145
October	2012	213
November	2012	149
December	2012	356
January	2013	184
February	2013	245
March	2013	217
April	2013	317
May	2013	246
June	2013	122
Total		**2,747**

CPA3:

Starting date of the project activity on 14/02/2012 (date of first sales under the CPA 3)

Month	Year	ICS deployed
February	2012	77
March	2012	94
April	2012	1
May	2012	1
June	2012	4
July	2012	3
August	2012	22
September	2012	48
October	2012	48
November	2012	38
December	2012	22
January	2013	91
February	2013	47
March	2013	80
April	2013	98
May	2013	46
June	2013	1
Total		**721**

CPA 4: No stove sales under this CPA until the end date of the Monitoring Period

CPA 5: No stove sales under this CPA until the end date of the Monitoring Period

The SSC limit of the CPAs was defined in the respective CPAs as follows: The CPA will remain under the limit of small-scale project activity types (annual energy savings below 180 GWh, threshold as per clarification request SSC_233) during every year of the crediting period. The calculation of the maximal number of ICS to be deployed per CPA in order to remain under the limit is according to the following equation:

$$180\frac{GWh}{year} > B_{old,appliance} \cdot N_y \cdot (1-\frac{\eta_{old}}{\eta_{new}}) \cdot NCV_{biomass}$$

Thus the Maximum number for the CPAs according to the SSC limit and the registered CPA DDs are:

CPA1: 3,200 stoves
CPA2: 3,200 stoves
CPA3: 3,750 stoves

Actually deployed stoves under the CPAs:

CPA1. 3,200 stoves
CPA2: 2,747 stoves
CPA3: 721 stoves

Thus the SSC limit of the CPAs has been met.

Please note: Not all ICS that were sold until the end of the Monitoring Period were already recorded in the database. Hence deployment figures in the next monitoring reports may slightly vary.

(c) Description of:

(i) The events or situations that occurred during the monitoring period that may impact the applicability of the applied methodology;

No special events which may impact the applicability of the methodology occurred.

(ii) How the issues resulting from these events or situations have been addressed.

Not applicable

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

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No temporary deviations from registered monitoring plan or applied methodology have been applied during this monitoring period.

B.2.2. Corrections

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

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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A revision of the monitoring plan as Post Registration Change was triggered due to FAR1 raised by the DOE during MP1 following an incomplete notification for the first issuance request by the UNFCCC (http://cdm.unfccc.int/PoAIssuance/iss_db/poaiss571744464/view)

The PoA-DD and CPA-DDs were revised accordingly and now hold the version number 03.2.

Completion Date of the revised PoA DD and CPA PDDs: 24/09/2014

According to the FAR, the following changes have been made in the registered monitoring plan:

The PoA-DD and CPA-DDs where revised in a way to now incorporate the requirements of the latest sampling standard and sampling guidelines for monitoring with reference to
(a) the Desired Precision/Expected Variance and Sample Size;
(b) the frequency of sampling for each parameter (i.e. annual or biennial);
(c) the information regarding how the ICS age will be classified (e.g. classification of ICS deployed each 6 months);

The outline of the monitoring report was adapted to the sampling guidelines for monitoring (EB75 Annex 8:
Guideline for sampling and surveys for CDM project activities and programmes of activities). Detailed information on the desired precision, expected variance and sample size for the corresponding sampling frequency was provided in section D.7.2 A.4 of the CPA DDs. Frequency of sampling is provided in section D.7.1 of the CPA DDS. Information on age class classification is provided in section D.7.2 A.3 Sampling method.

Also a detailed description of the simple random sampling approach was included in the PoA-DD and CPA-DDs section D.7.2 A.3 Sampling Method, Approach 1: Simple Random Sampling.

Date of acceptance of the post registration change by the EB: 25.12.2014.

. The Monitoring Report is drafted in line with the revised monitoring plan PoA-DD and CPA DD versions 03.2)

B.2.4. Changes to project design of registered project activity

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No changes to the project design of the project activity have been approved during this monitoring period or submitted with this monitoring report.

B.2.5. Changes to start date of crediting period

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No changes to the start date of the crediting period have been approved during this monitoring period or submitted with this monitoring report.

B.2.6. Types of changes specific to afforestation or reforestation project activity

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Not applicable.

SECTION C. Description of monitoring system

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Data collection procedures and organisational structure

The monitoring system is the same for all CPAs.

The monitoring consists of three stages:

1. (Continuous) Sales monitoring
2. Sample surveys after the end of the monitoring period and prior to verification
3. Data compilation, quality control and drafting of the Monitoring Report

1. Sales monitoring

Sales monitoring serves to determine the adjusted total number of appliances deployed until period y (N_y).

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

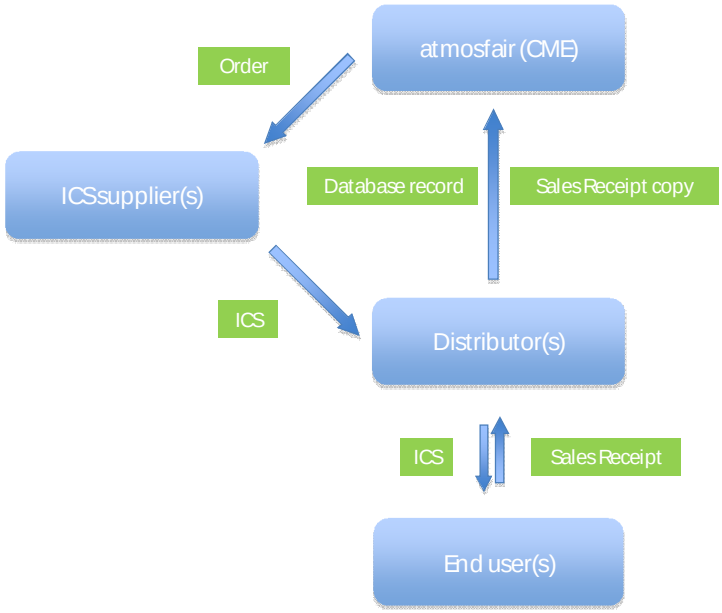


Diagram 1: Sales monitoring flow chart

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

- Name and contact details of the user
- Serial number of the ICS deployed
- Sales date

Data recording:
The distributor(s) collect the sales receipts 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 and the electronic datasets from the sales receipts to the CME. CME checks for inconsistencies and instructs distributors to take corrective action if 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 per appliance ($N_{eaters,appliance}$)
- adjusted average efficiency of the system being deployed (η_{new})

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

Diagram 2: Sample survey flow chart

Data generation:
The CME draws a random sample from the sales records database and submits the electronic sample incl. 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 if necessary. The CME aggregates and reports the results in an inspection database.

For the detailed sampling plan, see Section D.3.

3. Data compilation

The CME finally transfers the parameter values from the sales records database and from the inspection 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 administrator	The database administrator is responsible for updating and maintaining all electronic databases.
Monitoring team	The monitoring team will be assigned by the CME to conduct the user interviews and appliance tests during the periodic sampling and reports the results to the database administrator.

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 administrator checks correctness and consistency between information on the sales receipts and the corresponding sales database record. In case inconsistencies are detected, the CME database administrator 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 administrator checks the correctness and consistency of all sampling data collected and processed in in this Monitoring Period.

SECTION D. Data and parameters

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

Data and parameters values valid for CPA 1, CPA 2 and CPA 3.

Data / Parameter:	$B_{old,capita}$
Unit:	t/year
Description:	Average baseline fuelwood consumption per capita per year
Source of data:	UN Statistics Database, Value for 2006; Nigeria Census Data 2006
Value(s) applied):	0.692
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	η_{old}
Unit:	%
Description:	Efficiency of the baseline system being replaced
Source of data:	AMS II.G. (Ver. 3)
Value(s) applied):	0.10
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	L_{NRB}
Unit:	-
Description:	Net-to-gross adjustment factor for NRB Leakage
Source of data:	AMS II.G. (Ver. 03)
Value(s) applied):	0.95
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	L_{PoA}
Unit:	-
Description:	Net-to-gross adjustment factor for PoA Leakage
Source of data:	AMS II.G. (Ver. 03)
Value(s) applied):	0.95

Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	$f_{NRB,y}$
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:	FAO (2010): Global Forest Resource Assessment 2010, Country Report Nigeria, http://www.fao.org/forestry/20262-1-1.pdf
Value(s) applied):	0.77
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	$NCV_{biomass}$
Unit:	TJ/t
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data:	AMS II.G (Ver. 3)
Value(s) applied):	0.015
Purpose of data:	Baseline emission calculation
Additional comment:	

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:	AMS II.G (Ver. 3)
Value(s) applied):	81.6
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	***HH_CAP***
Unit:	Number
Description:	Maximum number of eaters possible per specific ICS as applied in the specific CPA
Source of data:	Manufactures specifications
Value(s) applied):	8
Purpose of data:	Not used for emission reduction calculation. Only as cap for monitored parameter $N_{eaters,\ appliance}$
Additional comment:	

Data / Parameter:	$\eta_{specified}$
Unit:	%
Description:	Efficiency of the system being deployed as per manufacturer specification
Source of data:	Manufactures specifications
Value(s) applied):	For CPA 1 and 2: 52 For CPA 3: 32.6

Purpose of data:	Not used for emission reduction calculation. Only for demonstration of fulfillment of eligibility criterion 2 (for CPA inclusion).
Additional comment:	

D.2. Data and parameters monitored

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

Data / Parameter:	$N_{eaters,appliance}$
Unit:	-
Description:	Average number of eaters per appliance (capped at value for parameter HH_Cap, see above)
Measured/ Calculated / Default:	Calculated from sample survey
Source of data:	Sample survey
Value(s) of monitored parameter:	For CPA 1 and 2 : 7.11 For CPA 3 : 6.76
Monitoring equipment:	Questionnaire
Measuring/ Reading/ Recording frequency:	Once for this monitoring period Survey Period CPA 1and 2: 11.09.2013 - 05.04.2014 Survey Period CPA 3: 15.11.2013 – 18.03.2014 (According to AMS-II.G. ver. 3, par. 22, and Standard for Sampling and surveys (CDM-EB50-A30_STAN vers.4.1 par 20, confidence/precision criteria to be met is determined as follows: for CPA 1 and 2: annual inspection at 95/10 confidence/precision since monitoring period = 1 year and sampling covered more than one CPA, and for CPA 3: annual inspection at 90/10 confidence/precision since monitoring period = 1 year and sampling covered one CPA)
Calculation method (if applicable):	Monitoring of the statistically adjusted average number of eaters involves two steps: Step 1: Sample survey amongst appliances deployed Step 2: Calculation of the average number of eaters at confidence level and precision as required by the methodology (AMS II.G. ver. 3) for the inspection frequency chosen, following the statistical standard approach for a homograde test of independent units that have a standard normal distribution. The average number of eaters is determined through interviews performed by a dedicated monitoring team. Interviews are reported in a questionnaire. Interviews are conducted until the required precision for this parameter is achieved. All questionnaires and information gathered during the sampling by the monitoring team are handed over to the managing entity that takes care of entering the information to an electronic database and updating databases where appropriate.

QA/QC procedures:	All formulae applied to determine the statistical precision used, are standard formulae as of CDM EB67 A06 GUID version 3.0 (Guideline for sampling and surveys for CDM activities and programme of activities). Furthermore, according to AMS II.G (ver. 3), par.22 the sampling error has to be deducted (*"...the lower bound of a […] confidence interval of the parameter value may be chosen"*) in the event that the required precision could not be achieved because of a small sample size. No deductions have to be made if the precision is achieved by sampling a proper number of appliances. Data will be 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_y
Unit:	-
Description:	Adjusted total number of appliances deployed until period y
Measured/ Calculated / Default:	Calculated
Source of data:	Sales Records
Value(s) of monitored parameter:	CPA 1: 3,199.66 CPA 2: 1,339.17 CPA 3: 400.50
Monitoring equipment:	Sales receipts and sales records database
Measuring/ Reading/ Recording frequency:	Continuous monitoring and recording of n_i

Calculation method (if applicable):	The total number of appliances deployed until period y is calculated based on information monitored through the sales records database. $N_y = \sum_{i=1}^{y} n_i \cdot OT_{adjusted,i,y}$

Parameter	Unit	Description
n_i	-	Number of appliances deployed in period i as reported in the sales records database and adjusted to account for delays between sales date and first use. Every appliance starts to operate (deployment date) in the month following the month in which the appliance was sold.
$OT_{adjust,i,y} = \begin{cases} 1 & ,i < y \\ \frac{d_{average,y}}{mp_{length}} & ,i = y \end{cases}$	-	Adjustment factor for reduced operational time of appliances deployed in monitoring period y, whereas i = 1, …, y. For all appliances deployed in the periods i prior to Monitoring period y, the adjustment factor is 1.
$d_{average,y}$	days	Average number of days appliances deployed in period y have been operational in period y as determined by respective deployment dates of appliances counted for ny. Deployment dates are determined mutatis mutandis as in the context of ni above.
mp_{length}	days	Length of monitoring period y

QA/QC procedures:	Data will be 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:	DO_y
Unit:	%
Description:	Statistically adjusted drop out from total population of appliances in period y

Measured/ Calculated / Default:	Calculated from sample survey
Source of data:	Sample survey
Value(s) of monitored parameter:	For CPA 1 and 2: 23.91% (monitored drop-out rate) Due to non-achievement of the required precision we chose to use the lower bound value of the parameter for ER calculation. The precision achieved was 16% instead of the required 10%.To use the lower bound value on non-achievement of the required precision is according to the registered PoA-DD and CPA-DDs (all version 3.2) and the Sampling standard (CDM-EB50-A30 STAN version 4.1) Thus the applied DO_y lower bound value for ER calculation according to Section E4 equation 1 of this MR is: 36.24 For CPA 3: 6.38
Monitoring equipment:	Questionnaire
Measuring/ Reading/ Recording frequency:	Once for this monitoring period (i.e. annual monitoring) Survey Period CPA 1and 2: 11/09/2013 - 05/04/2014 Survey Period CPA 3: 15/11/2013 – 18/03/2014
Calculation method (if applicable):	Monitoring of the statistically adjusted drop out involves two steps: Step 1: Sample survey amongst appliances deployed Step 2: Calculation of the adjusted drop-out rate at confidence level and precision as required by the methodology (AMS II.G. ver. 3) for the inspection frequency chosen, following the statistical standard approach for a homograde test of independent units that have a standard normal distribution. The Drop outs are determined through interviews where it is checked if the appliances are still operational, performed by a dedicated monitoring team. Interviews are reported in a questionnaire. All questionnaires and information gathered during the sampling by the monitoring team are handed over to the managing entity that takes care of entering the information to an electronic database and updating databases where appropriate. The precision achieved was 16% instead of the required 10%, thus we chose to use the lower bound value of the parameter for ER calculation. Calculation of the lower bound value for DO_y (CPA1 and 2): According to Guideline Sampling and surveys for CDM project activities and programmes of activities (EB67-A06-GUID) par.91 onwards: $= p \pm z * \sqrt{\frac{p(1-p)}{n}}$ With p Monitored proportion (0.7609) z z value for confidence level (e.g. 1.960for 95% confidence level) n Sample size (valid answers from monitoring, 46) Sample size for DO_y was calculated with p= 1-DO_y (usage rate of appliances), which is applicable according to: Guideline Sampling and surveys for CDM project activities and programmes of activities (EB67-A06-GUID) par 21. The monitored value and lower and upper bound values are as follows:

	confidence interval upper bound: 0.8841 — Monitored value: 0.7609 — lower bound: 0.6376 Thus the most conservative value to be used for DO_y is: 1 - lower bound = 1 - 0.6376 = 0.3624
QA/QC procedures:	All formulas applied to determine the statistical precision used are standard formula. Furthermore, according to AMS II.G (ver. 3), par.22 the sampling error has to be deducted ("...the lower bound of a […] confidence interval of the parameter value may be chosen") in the event that the required precision could not be achieved because of a small sample size. No deductions have to be made if the precision is achieved by sampling a proper number of appliances. Data will be 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:	η_{new}
Unit:	%
Description:	Adjusted average efficiency of the system being deployed
Measured/ Calculated /Default:	Calculated from sample survey
Source of data:	Sample survey
Value(s) of monitored parameter:	For CPA 1 and 2: 0.4199

Prefix	**Stove ID:**	**Thermal efficiency:**
atm-BIA	0440	43.55%
atm-BIA	0509	47.57%
atm-BIA	0525	47.06%
atm-BIA	0795	39.78%
atm-BIA	1786	46.12%
atm 01	0039	43.43%
atm 01	0309	40.27%
atm 01	0373	39.88%
atm 01	1400	37.66%
atm 01	2033	41.64%
atm 01	2344	41.21%
atm 01	2625	42.25%
atm 01	2734	36.53%
atm 01	2982	41.27%
atm 01	3000	40.97%
atm 01	3227	41.72%
atm 01	3754	39.96%
atm 01	3912	40.89%
atm 01	3983	45.01%
atm 01	4731	42.48%
atm 01	4769	42.55%
	Average	**41.99%**

Survey Period: 11/09/2013 – 01/03/2014

Number of stoves tested: 21

For CPA 3: 0.3258

Prefix	Stove ID:	Thermal efficiency:
EG1J	000702	33.67%
EG1J	000867	29.94%
EG1J	000888	23.64%
EG1J	001106	23.20%
EG1J	114197	37.14%
EG1J	114779	35.78%
EG1J	114785	27.68%
EG1J	114842	30.40%
EG1J	115097	30.32%
EG1J	115640	29.66%
EG1J	115742	24.14%
EG1J	115792	34.60%
EG1J	115868	25.78%
EG1J	115871	36.28%
EG1J	115905	41.36%
EG1J	115913	34.40%
EG1J	115999	28.42%
EG1J	116068	30.17%
EG1J	116205	21.85%
EG1J	116217	41.84%
EG1J	116290	37.30%
EG1J	116347	37.40%
EG1J	116360	45.84%
EG1J	116386	31.49%
EG1J	116448	39.81%
EG1J	116508	24.31%
EG1J	120374	35.26%
EG1J	120497	38.77%
EG1J	120551	30.16%
EG1J	120658	32.66%
EG1J	120734	36.35%
EG1J	120759	33.83%
EG1J	120796	40.88%
EG1J	120843	27.32%
EG1J	121058	28.56%
Average		**32.58%**

Survey Period: 27/11/2013 – 03/03/2014
Number of stoves tested: 35

<table>
<tr><td>Monitoring equipment:</td><td>
<table>
<tr><td></td><td><u>Weighing Scale</u></td></tr>
<tr><td>Type/Name</td><td>KD 8000</td></tr>
<tr><td>Accuracy class</td><td>+/- 1 g</td></tr>
<tr><td>Serial number</td><td>#267834-06</td></tr>
<tr><td>Calibration status</td><td>Factory calibrated, according to manufacturer does not need to be recalibrated during its lifetime.</td></tr>
</table>
<table>
<tr><td></td><td><u>Thermocouple</u></td></tr>
<tr><td>Type/Name</td><td>Greisinger Präzisionsthermometer GMH 3710</td></tr>
<tr><td>Accuracy class</td><td>Temperature range -199.99° C - +199.99° C</td></tr>
<tr><td>Serial number</td><td>32402531</td></tr>
<tr><td>Calibration status</td><td>Calibrated on 03/07/2013</td></tr>
</table>
</td></tr>
<tr><td>Measuring/Reading/ Recording frequency:</td><td>Once for this monitoring period (i.e. annual monitoring)

CPA 1-2: Survey Period: 11/09/2013 – 01/03/2014
CPA 3: Survey Period: 27/11/2013 – 03/03/2014</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Monitoring of the statistically adjusted drop out involves two steps:

Step 1: Sample survey amongst appliances deployed
Step 2: Calculation of the average efficiency at confidence level and precision as required by the methodology (AMS II.G. ver. 3) for the inspection frequency chosen, following the statistical standard approach for a heterograde test of independent units that have a standard normal distribution.

η_{new} is determined following the Water Boiling Test (WBT), performed by a dedicated monitoring team.

Checks are conducted until the required precision for this parameter is achieved.</td></tr>
<tr><td>QA/QC procedures:</td><td>All formulas applied to determine the statistical precision are standard formula. Furthermore, according to AMS II.G (ver. 3), par.22 the sampling error has to be deducted (“...the lower bound of a […] confidence interval of the parameter value may be chosen”) in the event that the required precision could not be achieved because of a small sample size. No deductions have to be made if the precision is achieved by sampling a proper number of appliances.

Data will be 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.

Cross-checks: The monitoring team will cross-check results with the efficiency as determined at CPA inclusion stage. Additionally, literature values may also be used to compare the results.</td></tr>
<tr><td>Purpose of data:</td><td>Baseline emission calculation</td></tr>
<tr><td>Additional comment:</td><td></td></tr>
</table>

D.3. Implementation of sampling plan

>>

(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 D.2. of this Monitoring Report are monitored.
Due to the high number of appliances to be deployed an annual check of operation and efficiency of all appliances is not economically 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 records for all appliances deployed till the end of the Monitoring period, whereas the other parameters were determined through a sample survey.

A single sample (the "Inspection database") for CPA 1 and CPA 2 was drawn from the sample database (corresponds to sales records database) by the CME via a computerized randomizer based on which all of the parameters determined via sampling were monitored. A separate sample was drawn for CPA 3 from the corresponding database via a computerized randomizer based on which all of the parameters of CPA 3 determined via sampling were monitored. According to the Monitoring plan of the registered PoA sampling was carried out across CPAs for CPA 1 and 2, because they deploy the same stove type. Sampling of CPA 3 was carried out separately, since CPA 3 deploys a different stove type than CPA 1 and 2. Total number of applied stoves in CPA 1, 2 and 3 were 6,668.

A. Sampling Design

1. Sampling Objectives and reliability requirements

Sampling for CPA 1 and 2 where done in a common sample, while sampling for CPA 3 was done in a separate sample..

The table D.3.1 and table D.3.2 below summarizes the sampling framework of CPAs.

Table D.3.1:

Sampling framework for CPA 1 and CPA 2:

Parameter	Type	Timeframe	Confidence/ Precision across CPA sampling	Estimated value*
DO_y	percentage	annual	95/10	0.12
$N_{eaters,appliance}$	mean	annual	95/10	7.28
η_{new}	mean	annual	95/10	0.40

*Result from monitoring of PoA MP1

Table D.3.2:

Sampling framework for CPA 3:

Parameter	Type	Timeframe	Confidence/ Precision	Estimated value*
DO_y	percentage	annual	90/10	0.12
$N_{eaters,appliance}$	mean	annual	90/10	7.28
η_{new}	mean	annual	90/10	0.326**

* Result from monitoring of PoA MP1

**Manufacturers specifications as per CPA DD

a. Objective

Objectives of sampling is to monitor:

- operability (yes/no), in order to determine the statistically adjusted annual drop out rates (DO_y).
- annual mean value of thermal efficiency η_{new} of the ICS, tested according to the Water Boiling Test protocol.
- annual mean value of number of eaters per appliance distributed at the household level, ($N_{eaters,appliance}$) with the respective applicable precision shown in the table D.3.1.

b. Timeframe

Sampling will determine the parameter values (percentage or mean) valid for monitoring period 2.

For CPA 1: 01/07/2012 -30/06/2013

For CPA 2: 15/07/2012 -30/06/2013

For CPA 3: 15/07/2012 -30/06/2013

c. Estimated parameter values

The estimated parameter values are as per the results of the previous Monitoring Period 1 or as per Manufacturers specification. The values of the estimated parameters are included in tables D.3.1 and D.3.2 above.

d. Sampling 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:

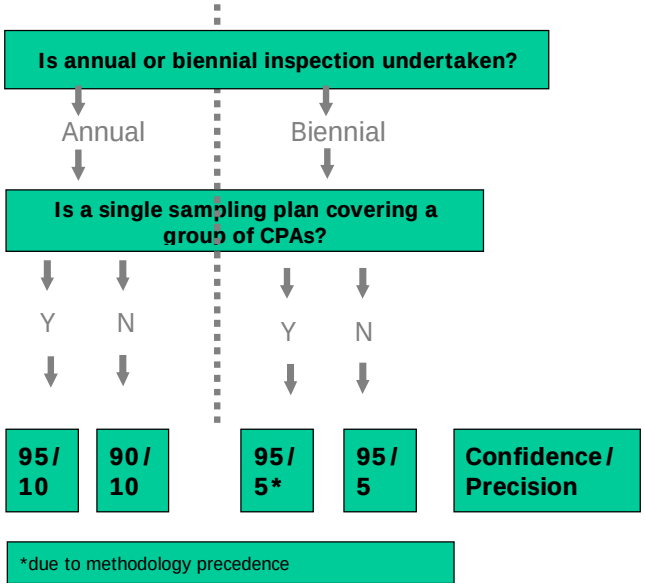
In case a single sampling plan for more than one CPA is used, *"parameter values shall be estimated by sampling in accordance with the requirements in the applied methodology separately and independently for each of the CPAs included in a PoA except when a single sampling plan covering a group of CPAs 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 latest PoA DD sampling was carried out across CPA 1 and 2, because they deploy the same stove type. Therefore as per methodology 95/10 confidence/precision for the sampling applied. For the monitoring of the single CPA 3, which deploys a different stove type, 90/10 confidence/precision for the sampling applied.

e. Confidence and precision

Confidence/precision criteria to be met:

According to AMS-II.G. ver. 3, par. 22, confidence/precision criteria to be met is determined as follows:



Therefore we used confidence and precision of 95/10 for our annual, across CPA 1-2 sampling and 90/10 for our annual sampling for CPA 3 in this Monitoring Period 2.

2. Target population

a. Definition

For the monitoring parameters $DO_{y,}$ and $\eta_{new,}$ the target population consists in all ICSs which are included until the end of the second monitoring period (30/06/2013). Total number of applied stoves in CPA 1 and 2 were 5,947. The total number of applied stoves for CPA 3 is 721 stoves.

For the monitoring parameter $\boldsymbol{N_{eaters,appliance}}$, the target population consists in all Save80 stoves (CPA 1and 2) or Envirofit stoves (CPA 3) respectively which are included until the second monitoring period; however households, where stoves are found to be not operational will not be considered to determine $\boldsymbol{N_{eaters,appliance}}$.

3. Sampling method

Two separate monitoring samples were drawn, one for CPA 1 and 2 and one for CPA 3, in order to obtain two separate inspection databases for the across CPA sample CPA1 and 2 and one for the separate CPA3. Both samples were drawn using the same approach described below.

The sampling approach chosen for this monitoring period was Approach 1: Simple random sampling. In order to obtain a final representative sample (Inspection database), we drew a simple random sample from the Sample database by means of a computerized randomizer[1]. The sample database equals the sales record database (in terms of number of cases). Since the resulting Inspection database is a random sample, stoves from all age classes and geographical representation will be present as to their real percentage in the sample database.

In accordance with the Monitoring Plan of the latest PoA DD and to reduce monitoring efforts a common sample is drawn from the sales records database based on which all of the parameters shall be monitored. This does not imply that for each of the parameters the same number of users/ ICS has to be monitored during sampling. The required sample sizes were calculated prior to conducting the sample survey using the equations for simple random sampling as per CDM-EB67-A06-GUID Appendix 1, para 12 to 22 for the proportional parameter of interest (DO_y) and para 50 to 56 for the mean value parameters of interest ($N_{eaters,appliance}$, η_{new}).

[1] The randomizer macro was programmed by atmosfair based on the excel tool of "RAND()" (https://support.office.com/en-in/article/RAND-function-e98f1011-127d-4815-96f5-a26850ca1866). The random select tool was provided to the DOE.

4. Sample Size: Estimated target number of units and justification

Across CPA Sample CPA 1 and 2:

Table D 3.3: shows the estimated sample size for the parameters of interest for CPAs 1 and 2.

For CPA 1 and 2 we calculated a necessary sample size of 52 stoves for the parameter DO_y, assuming a 70% response rate the common sample size is 74. The calculated necessary sample size for $N_{eaters,appliance}$ was 13 and for η_{new} it was 5 (after applying student T distribution).
We applied oversampling since as per CDM-EB50-A30-STAN, footnote 10 to compensate for, outliers or non-response associated with the sample. We assumed 70% response rate, based on the experiences from former Monitoring campaigns in Nigeria.
The monitoring team undertook the monitoring of the parameters determined via sampling simultaneously and on the same sample, but with different sample sizes since the confidence/precision of the parameter depend on the variation of the obtained values. We aimed to do a WBT for as many stoves of the common sample as possible.

Table D 3.3: Applied sample size for CPA 1 and same for CPA 2.

Parameter	Timeframe	Confidence/ Precision	Estimated value	Expected Variance*	Estimated Sample Size	Applied sample size
DO_y	annual	95/10	0.12	No variance	52	74
$N_{eaters,appliance}$	annual	95/10	7.28	1.20	13	74
η_{new}	annual	95/10	0.40	0.03	5	74

*Result from monitoring of PoA MP1

We contacted all of the 74 Save 80 users of the sample. Total 46 out of the 74 Save 80 users could be interviewed to determine DO_y and $N_{eaters,appliance.}$ This is less than the required minimum sample size for DO_y. Under the current difficult security situation in the project region of Nigeria[2] we were not able to draw another sample and continue the monitoring till reaching the necessary 95/10 precision. Therefore we decided to apply the lower bound of the 95% confidence interval of the parameter value as per AMS II.G., ver. 3, par. 22 which results in a reduction of Emission Reductions and is therefore conservative. The calculation of lower bound of the 95% confidence interval resulted in an applied DO_y of 36.24% (please see section D.2 of this monitoring report for calculation.

For $N_{eaters,appliance}$ 35 Save 80 users were interviewed since 11 out of the 46 Save 80 users interviewed to determine DO_y qualify as drop outs and thus could not be interviewed regarding the continued use of the baseline appliance. 35 valid answers is more than the required minimum sample size for $N_{eaters,appliance}$.

In order to determine η_{new} WBTs were conducted on 21 stoves. This is more than the required minimum sample size for η_{new}.

Single CPA Sample CPA3:

Table D 3.4: shows the estimated sample size for the parameters of interest for CPA 3.

For CPA 3 we calculated a necessary sample size of 36 stove IDs for the parameter DO_y. The calculated necessary sample size for $N_{eaters,appliance}$ was 10 and for η_{new} it was 4 (after applying students T distribution).

We applied oversampling since as per CDM-EB50-A30-STAN, footnote 10 to compensate for, outliers or non-response associated with the sample. We assumed 70% response rate, based on the experiences from former Monitoring campaigns in Nigeria and additionally increased the sample size by a number of 8 stoves, since many of the stoves have been distributed in zones that we considered difficult to reach due to the current security situation. Applying this oversampling approach, a common sample size of 59 resulted.

[2] See map on travel warnings as included in an letter to the EB: http://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20140430180112542/355_INQ-01832_Atmosfair_FORM.pdf

The monitoring team undertook the monitoring of the parameters determined via sampling simultaneously and on the same sample, but with different sample sizes since the confidence/precision of the parameter depend on the variation of the obtained values. We aimed to do a WBT for as many stoves of the common sample as possible.

Table D 3.4: Applied sample size for CPA 3

Parameter	Timeframe	Confidence/ Precision	Estimated value	Expected Variance*	Estimated Sample Size	Applied sample size
DO_y	annual	90/10	0.12	No variance	36	59
$N_{eaters,appliance}$	annual	90/10	7.28	1.20	10	59
η_{new}	annual	90/10	0.326	0.02	4	59

We contacted all of the 59 Envirofit stove users of the sample. Total 48 out of the 59 Envirofit users could be interviewed to determine DO_y and $N_{eaters,appliance.}$ This is more than the required minimum sample size for DO_y. For $N_{eaters,appliance}$ 44 Envirofit users were interviewed, since 4 out of the 48 Envirofit users interviewed to determine DO_y qualify as drop outs and thus could not be interviewed regarding the continued use of the baseline appliance. 44 valid answers is more than the required minimum sample size for $N_{eaters,appliance}$.

In order to determine η_{new} WBTs were conducted on 35 stoves. This is more than the required minimum sample size for η_{new}.

B. Data to be Collected

1. Overview over collected data, analysis of the same and demonstration on whether the confidence / precision has been met

Table D 3.5: Monitoring results for parameters for CPA 1 and 2

Parameter	n*	Response rate	Assumed response rate	Result	Standard deviation	Confidence	Precision	Lower bound applicable?
η_{new}	21	28.38%	70%	41.99%	2.80%	95%	3%	No
DO_y	46	62.16%	70%	23.91%	N/A	95%	16%	Yes
$N_{eaters,appliance}$	35	47.30%	70%	7.11	1.37	95%	5%	No

*valid responses

Table D 3.6: Monitoring results for parameters for CPA 3

Parameter	n*	Response rate	Assumed response rate	Result	Standard deviation	Confidence	Precision	Lower bound applicable?
η_{new}	35	61%	70%	32.58%	5.97%	90%	5%	No
DO_y	48	81.36%	70%	6.38%	N/A	90%	6%	No
$N_{eaters,appliance}$	44	74.58%	70%	6.76	1.62	90%	6%	No

*valid responses

a. Determination of appropriate timing

The sampling of the stove ID included in the Inspection Database took place in the month after the end of the Monitoring Period (July 2013), when the sales record database was fully established.

b. Description of measurement methods

Monitoring of the parameters DO_y and $N_{eaters,appliance}$ was done by personal interviews of stove users using a common Questionnaire. Monitoring of the parameter η_{new}, was done by applying a water boiling test (WBT).

2. Quality assurance/Quality control

a. Procedures for conducting the data collection and/or field measurements

i. Data collection and administration of data

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

Sample database

There are two separate sample databases existing, one fir CPA 1 and 2 and one for CPA 3. The sample databases are equal to their respective sales record data base (in terms of size) since all user details of all Save80 users or Envirofit G3300 users respectively are included in the sampling. The sample database keeps information on all appliances deployed. At least the following information will be recorded:

- Serial number of appliance sold
- Sales date
- CPA-ID (CPA to which the appliance belongs to)
- User details (Name, State, Local Government Area (LGA), Address if available, etc.)

Inspection Database

The Inspection databases keep monitoring results and information from the randomly sampled appliances of the respective CPAs. There is one Inspection database existing for CPA 1 and 2 and one separate Inspection database for CPA 3. The following information was recorded:

- Serial number of appliance checked
- CPA-ID (CPA to which the appliance belongs to)

Information as determined during monitoring:

- Continuous operation of appliance (yes/no) (to determine parameter DO_y,)
- Average number of eaters per appliance (to determine parameter $N_{eaters,appliance}$)
- 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 send to the Monitoring teams. Data collected and processed by the field staff during monitoring was checked by the CMEs' database administrator and the QA/QC Manager.

ii. Training of field personnel

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

iii. Provisions for maximizing response rates

Oversampling

We applied oversampling since as per CDM-EB50-A30-STAN, footnote 10 to compensate for, outliers or non-response associated with the sample. We assumed 70% response rate, based on the experiences from former Monitoring campaigns in Nigeria[3].

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.

[3] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7R1B09HSJV3FKIZYCA4D6XQOETP5GN/view

SECTION E. Calculation of emission reductions or GHG removals by sinks

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

>>

Please note that the methodology ASM II.G., ver. 3 does not provide specific equations for calculation of baseline emissions, project emissions or leakage, only for Emission reductions. As leakage was considered ex-ante, B_{old} was adjusted to account for the quantified leakage.

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

>>

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

E.3. Calculation of leakage

>>

Net-to-gross adjustment factors for NRB leakage (L_{NRB}) and for PoA leakage (L_{PoA}) (fixed default values of 0.95 as per AMS II.G. ver.3) were applied to the project activity to calculate Emission Reductions of this Monitoring Period.

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
CPA 1	6,506	Not applicable	Not applicable	6,506
CPA 2	2,618	Not applicable	Not applicable	2,618
CPA 3	994	Not applicable	Not applicable	994
Total	10,118	Not applicable	Not applicable	10,118

Equations used for calculation of emission reductions:

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

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

Parameter	Unit	Description
ER_y	tCO_2	Emission reductions of the project activity in period *y*
$B_{y,savings}$	t	Quantity of woody biomass that is saved by the CPA in period y
$f_{NRB,y}$	-	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass (fixed parametric value of 0.77)
$NCV_{biomass}$	TJ/t	Net calorific value of the non-renewable woody biomass that is substituted (fixed parametric value of 0.015 TJ/ton)
$EF_{projected\_fossilfuel}$	tCO_2/TJ	Emission factor for the substitution of non-renewable woody biomass by similar consumers (fixed parametric value of 81.6 tCO_2/TJ)

$B_{y,savings}$ is calculated according to the following formula, according to AMS II.G. ver. 3, par. 6, Option 2:

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

Parameter	Unit	Description
$B_{y,savings}$	t	Quantity of woody biomass that is saved
B_{old}	t	Quantity of woody biomass used in the absence of the project activity
η_{old}	%	Efficiency of the baseline system being replaced (fixed parametric value of 0.1)
η_{new}	%	Efficiency of the system being deployed as part of the project activity (**monitored** parametric value)

B_{old} is calculated according to the following formula:

Equation 1

$$B_{old} = B_{old,appliance} \cdot N_y \cdot (1 - DO_y) \cdot \frac{mp_{length}}{365} \cdot L_{NRB} \cdot L_{PoA}$$

Parameter	Unit	Description
B_{old}	t	Quantity of woody biomass used in the absence of the project activity
$B_{old,appliance}$	t/year	Quantity of woody biomass used in the absence of the project activity in tons, per appliance
N_y	-	Adjusted total number of appliances deployed in period y (**monitored** parametric value)
DO_y	%	Statistically adjusted drop out from total population of appliances in period y (**monitored** parametric value)
mp_{length}	days	Length of monitoring period y
L_{NRB}	-	Net-to-gross adjustment factor for NRB Leakage (fixed parametric value of 0.95)
L_{PoA}	-	Net-to-gross adjustment factor for PoA Leakage (fixed parametric value of 0.95)

$B_{old,,appliance}$ is calculated according to the following formula:

$$B_{old,appliance} = B_{old,capita} \cdot N_{eaters,appliance}$$

Parameter	Unit	Description
$B_{old,,appliance}$	t/year	Quantity of woody biomass used in the absence of the project activity in tons, per appliance
$B_{old,capita}$	t/year	Average baseline fuelwood consumption per capita per year (fixed parametric value of 0.692 t/year)
$N_{eaters,appliance}$	-	Average number of eaters per project appliance (**monitored** parametric value, capped as per parameter HH_CAP)

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)		
CPA 1	11,270	6,506
CPA 2	15/07/2012 – 31/12/2012: 2,692 01/01/2013 – 30/06/2013: 11,559 * (181 / 365) = 5,731.997 Total ER 15/07/2012 – 30/06/2013: 2,692 + 5,731.997 = 8,423.997 conservatively rounded to 8,423	2,618
CPA 3	15/07/2012 – 31/12/2012: 2,708 01/01/2013 – 30/06/2013: 11,627 *(181 / 365 = 5,765.718 Total ER 15/07/2012 – 30/06/2013: 2,708 + 5765,718 = 8,473.781 conservatively rounded to 8,473	994
CPA 4	01/06/2013 – 30/06/2013: 10,165 * (30 / 214) = 1,425 conservatively rounded to 1,425 Since according to the CPA DD 10,165 CERs are expected in a time period of 214 days (01/06/2013 – 31/12/2013)	0
CPA 5	01/06/2013 – 30/06/2013: 10,255* (30 / 214) = 1,437.617 conservatively rounded to 1,437 Since according to the CPA DD 10,255 CERs are expected in a time period of 214 days (01/06/2013 – 31/12/2013)	0

E.6. Remarks on difference from estimated value in registered PDD

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Regarding CPA 1 and 2:

In the registered CPA-DD 1 and 2, expected annual emission reductions are 11,270 tCO_2 and 8,423 tCO_2 respectively for this monitoring Period. The reasons for this are the lower than expected number of stoves sold till the end of the monitoring period 2 (3,200+2,747=5,947 stoves for CPA1 and CPA2 instead of the expected 3,160[4]+3,200=6360 for CPA1 and CPA2 according to the respective CPAs). Additionally other parameter values achieved during this monitoring period are lower than estimated in the CPA-DD:

- the average number of eaters ($N_{eater,appliance}$) is lower (7.11 instead of 8)
- the drop-out rate (DO_y) among the appliances deployed is higher (0.3624 instead of 0.05)

[4] According to the CPA DD we expected to sell 1600 stoves in 2012 and 3120 stoves in 2013. Thus till the end of monitoring period 2 on 30/06/2013 we expected to sell: 1600 + (3120÷2) = 1600 + 1560 = 3160 stoves.

Additionally the monitoring period for CPA 2 only covers 351 days (15/07/2012 – 30/06/2013, both days included).

Regarding CPA 3:
In the registered CPA-DD, expected annual emission reductions are 8,473 t CO_2 for this monitoring Period.

The actual values achieved during this monitoring period are lower than estimated in the CPA-DD. The reason is that compared to the estimates in the DD,

- the number of appliances deployed is lower (721 instead of 3,750)
- the average number of eaters is lower (6.76 instead of 8)
- the drop-out rate among the appliances deployed is higher than estimated (0.0638 instead of 0.05)

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)		
CPA 1	3,279	3,227
CPA 2	611	2,007
CPA 3	295	699
CAP 4	0	0
CPA 5	0	0

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Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Atmosfair gGmbH
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Document information

Version	*Date*	*Description*
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		