Monitoring report form

(Version 04.0)

MONITORING REPORT	
Title of the project activity	Efficient Fuel Wood Stoves for Nigeria
Reference number of the project activity	2711
Version number of the monitoring report	05
Completion date of the monitoring report	27/03/2015
Registration date of the project activity	12/10/2009
Monitoring period number and duration of this monitoring period	MP 03 01/07/2012 – 30/06/2013
Project participant(s)	Developmental Association for Renewable Energies Atmosfair gGmbH Lernen-Helfen-Leben e.V.
Host Party(ies)	Nigeria
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	3: Energy demand AMS II.G., version 1 (EB37), "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	34,027 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	8,415 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	4,208 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	4,207 tCO_2e

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 project activity is the dissemination of up to 12,500 efficient fuel wood stoves (SAVE80) and heat retaining polypropylene boxes (hereafter referred to as the SAVE80 system) in different states located in the Guinea Savannah Zone of Nigeria, at subsidized prices.
Users are households who previously used inefficient, traditional fireplaces, consuming non-renewable biomass. The SAVE80 system saves up to 80% of fuel wood. By reducing the fuel wood consumption, the project activity hence reduces greenhouse gas emissions stemming from the use of non-renewable biomass.

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

The SAVE80 is 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.

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

Date	Milestone
01/04/2008	Starting date of the project activity: First stove sales under CDM activity
12/10/2009	Registration with UNFCCC
12/10/2009 – 30/06/2010	First Monitoring Period
01/07/2010 – 30/06/2012	Second Monitoring Period
01/07/2012 – 30/06/2013	Third Monitoring Period

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

8,415 t CO_2e

A.2. Location of project activity

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(a) Host Party:
Federal Republic of Nigeria

(b) Region/ State/ Province:
The project activity is located in the states belonging to the Guinea Savannah Zone of Nigeria:

The following states mainly belong to the Guinea Savannah Zone:

a. Benue
b. Enugu
c. Kaduna
d. Kogi
e. Kwara
f. Nasarawa
g. Niger
h. Oyo
i. Plateau
j. Taraba
k. Federal Capital Territory (FCT)

(c) City/ Town/ Community:
The SAVE80 systems were installed in households in the Guinea Savannah Zone.

(d) Physical/ Geographical location:

In the registered PDD, the coordinates of DARE's former main office in 97/98 Kachia Road, Kaduna, were used to represent the physical location of the project activity:

Latitude: 10.476944 degree
Longitude: 7.419444 degree

Please note: DARE moved to other premises located at KM 38, Kaduna-Zaria Expressway (after JAJI Military Cantonement), Sabon Yelwa - Kaduna State

The coordinates are:

Latitude: 10.866425 degree
Longitude: 7.614297 degree

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)
Nigeria (host)	Developmental Association for Renewable Energies (private entity)	No
Germany	1. Atmosfair gGmbH (Private entity) 2. Lernen-Helfen-Leben e.V. (private entity)	No

A.4. Reference of applied methodology and standardized baseline

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AMS II.G., version 1 (EB37), "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass"

A.5. Crediting period of project activity

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Fixed crediting period (10 years)
Start of crediting period: 12/10/2009
End of crediting period: 11/10/2019

A.6. Contact information of responsible persons/ entities

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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 SAVE80 is 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.

(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 SAVE80 systems deployed under the project activity since the starting date of the project activity on 01/04/2008 and as recorded in the database at the end of the monitoring period. Please note: Not all SAVE80 systems that were sold until the end of the respective Monitoring Period were yet recorded in the database. Hence deployment figures in the subsequent monitoring reports may slightly vary.

Year	ICS deployed
2008 (01/04 – 31/12)	347
2009	846
2010	1,362
2011	2,744
2012	104
Total	**5,403**

Note: Each SAVE80 system starts to generate emission reductions in the month following the delivery of the SAVE80 system.

Project implementation is

Ahead of the schedule described in Section A.2 of the PDD	☐
As described in Section A.2 of the PDD	☐
Behind the schedule described in Section A.2 of the PDD	☑

Explanation:

After March 2012 no more stoves are distributed under this SSC project. Still not all shipped stoves were recorded in the database at the end of the monitoring period.

(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

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During this monitoring period a Post Registration Change for correcting:

a) The location of the project activity
b) Clarification related to length of monitoring period and duration of vintage
c) Editorial correction from $t_{j,i}$ to $t_{y,j}$

Has been submitted to the UNFCCC. The submission date was the 19th of June 2013.

The correction and the revised PDD were approved after the End of this monitoring period. The approval date of the Post Registration Changes was the 8th of November 2013. The PRC reference number is: PRC-2711-001 (https://cdm.unfccc.int/PRCContainer/DB/prcp445244817/view)

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

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No permanent changes from the registered monitoring plan or applied methodologies have been approved during this monitoring period or submitted with this monitoring report.

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

Monitoring was conducted in accordance with the registered PDD. As per the registered PDD, monitoring consists of:

Parameter	Data Source(s)
Number of SAVE80 systems in use ($N_{y,i}$)	1. Purchase Contracts 2. Project Database Records 3. Spot Checks to User Households
Operation time of the SAVE80 ($t_{y,j}$)	Project Database Records
Efficiency of the SAVE80 ($\eta_{new,i}$)	Water Boiling Test

Number of SAVE 80 systems in use and operation time of the SAVE80

- Users who wished to obtain a SAVE80 system under the CDM project 2711 signed a purchase contract, which contained their contact details, serial number (Cooker-ID) of the SAVE80 stove delivered, and the contract / delivery date.
- User contact information, Cooker-ID, contract and delivery date was regularly transferred to an electronic database ("Project database").
- The project database was used for calculation of number of systems delivered and recorded in the database as per end of the 3rd monitoring period on 30/06/2013, and for random selection of households for the spot checks for monitoring period 3, 01/07/2012 – 30/06/2013.
- Spot Checks to User Households were conducted in at least 100 households.
- Drop-Out rate (i.e. households found not to use the SAVE80 during the spot checks) was calculated and standard error added as per requirement of the PDD.
- The number of SAVE80 systems as recorded in the project database was multiplied with the drop-out rate + standard error determined for the monitoring period and adjusted for the operational time[1] to derive the parameter $N_{y,i}$ (Number of SAVE80 systems in use during the specified period)

* Note: not all users who obtained a SAVE80 stove during the monitoring period are contained in the databases used, due to administrative reasons. The users not yet recorded in the database do

[1] The operation time of a SAVE80 system is a simple calculation of months a SAVE 80 system generated emission reductions within the monitoring period divided by months of the year, to take into account that the Monitoring Period may be less than a year, or the systems start to generate emission reductions within a Monitoring period. According to the PDD, each SAVE80 system starts to generate emission reductions in the month following delivery of the SAVE80 system, to account for delays between purchase and first use. The operation time is hence the number of months during the Monitoring period where the system generated emission reductions, divided by the number of months of a year.

not count for calculation of emission reductions in this monitoring period; however, they may be added to the database later and hence count in the subsequent monitoring periods.

Efficiency of the SAVE 80. Water Boiling Test

- Efficiency Tests (Water Boiling Tests) were conducted during the presence of an experienced researcher as required by the PDD. Three SAVE80 cookers of the 1st vintage were tested. The SAVE80 cookers were obtained from frequent users that are using the SAVE80 at least 2-3 times a day.
- Data was recorded manually and thereafter entered into an electronic data sheet and cross-checked with manufacturer specifications and literature values.
- The mean values of the efficiency tests were calculated by atmosfair and multiplied with the conservativeness factor as in the registered PDD.

Organizational structure, roles and responsibilities of personnel

The following persons were in charge to conduct monitoring tasks during the third Monitoring Period.

Organisation	Name	Role as defined in the PDD	Responsibility/Tasks
DARE	Yahaya Ahmed	DARE CDM Monitoring officer (DARE-MO)	- Supervision of purchase contracts and project database recording - Supervision of Efficiency Testing and Spot Checks - Review of Monitoring Report
LHL	Bernd Blaschke	Assigned Monitoring Officer (LHL-MO)	- Efficiency Tests Data Assessment - Project Database Records Assessment - Preparation and Review of Monitoring Report
Atmosfair	Katrin Wolf	Assigned Monitoring Officer (atm-MO)	- Data Quality Control - CER calculation and Preparation of Monitoring Report

Emergency procedures for the monitoring system

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 DARE CDM monitoring officer checked correctness and consistency between information on the purchase contracts and the corresponding database record. If the Monitoring Officer detected inconsistencies, he instructed his team to search for the error source. If the error source could be found, the information was corrected accordingly, if not, the database record was removed from the database and did not count for this monitoring period.
The atmosfair Monitoring Officer was responsible for overall data control, i.e. checked again correctness and consistency of all data collected and processed in this Monitoring Period. This included, inter alia, a cross-check if the database record for a given stove-ID is in line with the information on the purchase contract, and if the equations and calculations of the efficiency test are correct and plausible.

Procedures for tracking of changes of ownerships and/or relocations of SAVE80 systems

Procedures for tracking of changes of ownership and/or relocations of SAVE80 systems have been implemented to address FAR Q1 of the first verification. In the monitoring spot checks, the monitoring team checked whether the contact details are still correct, and if not recorded the new

contact details. From these new contact details it could be determined whether the SAVE80 systems are outside of the project boundary. These systems were counted as drop outs.

SECTION D. Data and parameters

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

Data / Parameter:	$B_{yappliance}$
Unit:	tonnes/year
Description:	Quantity of Biomass used in the absence of the project activity (per appliance)
Source of data:	Baseline Survey
Value(s) applied):	4.6534
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	L_y
Unit:	fraction
Description:	Leakage Correction Factor
Source of data:	Derived from Leakage Assessment
Value(s) applied):	0.99
Purpose of data:	Baseline emission calculation
Additional comment:	As per AMS II.G., v1, if leakage has to be considered then B_y is adjusted to account for the quantified leakage. Therefore, the Leakage Correction Factor L_y is applied to the project activity, and leakage emissions are already considered in the baseline emissions calculation.

Data / Parameter:	η_{old}
Unit:	Fraction
Description:	Efficiency of the system being replaced
Source of data:	Water-Boiling Test
Value(s) applied):	0.1
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	$f_{NRB, y}$
Unit:	Fraction
Description:	Fraction of non-renewable biomass saved by the project activity
Source of data:	FAO (2003): Experience of Implementing National Forestry Programmes in Nigeria (see ftp://ftp.fao.org/docrep/fao/005/AC918E/AC918E00.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 non-renewable biomass that is substituted
Source of data:	IPCC default value for fuel wood
Value(s) applied):	0.015 TJ/tonne

Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	$EF_{projected\ fossil\ fuel}$
Unit:	t CO_2/TJ
Description:	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data:	IPCC default value for Kerosene
Value(s) applied):	71.5 t CO_2/TJ
Purpose of data:	Baseline emission calculation
Additional comment:	

D.2. Data and parameters monitored

Data / Parameter:	$\mathbf{N_{y,i}}$
Unit:	Number
Description:	Number of SAVE80 systems in use per vintage The first vintage consists of all SAVE80 systems sold since the project start date until the end of the first monitoring period, the second vintage of all SAVE80 systems sold during the second monitoring period, the third vintages of all SAVE80 systems sold during the third monitoring period, and so forth.
Measured/ Calculated / Default:	Calculated
Source of data:	Purchase Contracts, Project Database records, Monitoring spot checks
Value(s) of monitored parameter:	Vintage 1: 12/10/2009 – 30/06/2010: 1,150.97 Vintage 2: 01/07/2010 – 30/06/2011: 1,103.78 Vintage 3: 01/07/2011 – 30/06/2012: 745.11 Vintage 4: 01/07/2012 – 30/06/2013: 0.00 Total $N_{y,i}$ = 2,999.86
Monitoring equipment:	Monitoring consisted of data recording in an electronic database. Sales of the SAVE80 systems were recorded. The user signed a purchase contract, where the date, the name of the user and contact details (if available) are noted to doubtlessly identify the user. Every SAVE80 cooker has an identification number (Cooker-ID) which was also noted on the purchase contract. The information from the purchase contract was transferred to the electronic database.
Measuring/ Reading/ Recording frequency:	Purchaser Contracts/ Project Database: Continuous recording frequency Spot Checks: annually
Calculation method (if applicable):	$N_{y,i} = \sum_{j=1}^{Ny.i} n_{y,j} \cdot t_{y,j}$ Where $n_{y,j}$ Appliance operating per year and vintage (adjusted for Drop-Outs incl. Standard Error) $t_{y,j}$ Fraction of operation time per SAVE80 system per vintage (months/months per year) (see monitoring parameter below)

QA/QC procedures:	Database entries were made by staff from DARE. They were supervised by the DARE CDM Monitoring Officer assigned by DARE, LHL and atmosfair. The database records and copies of the purchase contracts were transferred to Germany. LHL and atmosfair cross-checked the database entries with the purchase contracts. To check if the information in the database was correct and the SAVE80 systems are still operating, spot checks were conducted in the monitoring period. Spot checks covered 108 households. Conservative approach: To the share of households that were found not to use the SAVE80 in the Monitoring Sample group, the Standard Error was added. By multiplication with the total number of SAVE80 systems in use per vintage, the number of households that do not use the SAVE80 system per vintage was determined and was deducted from the number of appliances delivered per vintage.
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	$t_{y,j}$
Unit:	fraction
Description:	Operation time per SAVE80 system per vintage (months of the Monitoring Period/months per year).
Measured/ Calculated / Default:	Calculated
Source of data:	Project Database records
Value(s) of monitored parameter:	MP 3: 01/07/2012 – 30/06/2013 Delivery time | Vintage | Operational time $t_{y,j}$ 12/10/2009 – 30/06/2010 | 1 | 1.00 01/07/2010 – 30/06/2011 | 2 | 1.00 01/07/2011 – 30/06/2012 | 3 | 1.00 01/07/2012 – 30/06/2013 | 4 | <1.00 All Save80 systems included in the project have been sold before June 2012, therefore operation time started before July 2012 for all ICS. Thus $t_{y,j}$ =1 for all deployed systems.
Monitoring equipment:	Not applicable
Measuring/ Reading/ Recording frequency:	To be conservative every SAVE80 system started to generate emission reductions in the month following delivery of the SAVE80 system, to account for delays between purchase and first use.
Calculation method (if applicable):	$t_{y,j}$ = months system was operating within the Monitoring Period/months per year
QA/QC procedures:	Not applicable
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	$\eta_{new,i}$
Unit:	fraction
Description:	Efficiency of the SAVE80 system for each vintage
Measured/Calculated/Default:	Measured

Source of data:

Water Boiling Tests were conducted on 21/05/2010, 05/07/2011, 09/08/2012 and 16-17/04/2014, during the monitoring campaigns which are usually conducted after the end of the respective monitoring period.
To measure the efficiency of the SAVE80, the Water Boiling Test, as described under Section B.4 of the registered PDD, is conducted. 3 SAVE80 cookers from the first vintage, i.e. sold since the project start date until the end of the first monitoring period are tested in each monitoring campaign.
The test results are always multiplied by a conservativeness factor of 0.943 as determined in the registered PDD, to account for uncertainties.
For clarity, in line with the registered monitoring plan, the following source of data are to be used to determine the efficiency:

Monitoring period	Vintage	Value used
	1st vintage: All SAVE80 cookers sold since the project start date until the end date for the first monitoring campaign (= Monitoring period 1)	Efficiency value used: From efficiency testing during monitoring for Monitoring period 3 (tests conducted 16.-17/04/2014)
	2nd vintage: All SAVE80 cookers sold after end date for the first monitoring campaign until the end date for the second monitoring campaign (= Monitoring period 2, Part 1)	Efficiency value used: From efficiency testing in Monitoring Period 2. Part 1 (test conducted on 09/08/2012)
	3rd vintage: All SAVE80 cookers sold after end date for the second monitoring campaign until the end date for the third monitoring campaign (= Monitoring period 2, Part 2)	Efficiency value used: From efficiency testing in Monitoring period 2, Part 2 (test conducted on 05/07/2011)
	4^{th} vintage: All SAVE80 cookers sold after end date for the third monitoring campaign until the end date for the fourth monitoring campaign (= Monitoring period 3)	Efficiency value used: From efficiency testing in Monitoring campaign 1 (i.e. value from first monitoring period, test conducted on 21/05/2010)

Vintage i=1	**33.33%**	Efficiency Tests SSC Third Monitoring Period
Vintage i=2	**40.97%**	Efficiency Tests SSC Second Monitoring Period Part 2
Vintage i=3	**41.11%**	Efficiency Tests SSC Second Monitoring Period Part 1
Vintage i=4	**35.19%**	Efficiency Tests SSC First Monitoring Period

The efficiency applied in Monitoring Period 3 was calculated as the weighted average efficiencies of operational stoves per vintage during the monitoring period.

Value(s) of monitored parameter:	38.07% weighted average MP 3

Monitoring equipment:	<table><tr><td></td><td>Weighing Scale</td></tr><tr><td>Type</td><td>KD 8000</td></tr><tr><td>Accuracy class</td><td>+/- 1 g</td></tr></table><table><tr><td></td><td>Thermocouple</td></tr><tr><td>Type</td><td>Greisinger Präzisionsthermometer GMH 3710</td></tr><tr><td>Temperature range</td><td>-199.99° C - +199.99° C</td></tr></table>
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	To determine the efficiency of one stove, the mean value of the three tests per stove were taken, multiplied by a conservativeness factor of 0.943 as determined in the registered PDD, to account for uncertainties. To determine the efficiency of stoves from the tested vintage the average of the three tested stoves was calculated. Efficiency of stoves from the tested vintage (1): $\eta_{new,i} = 1/3 * [(\eta_{new,1,1} + \eta_{new,1,2} + \eta_{new,1,3})/3 + (\eta_{new,2,1} + \eta_{new,2,2} + \eta_{new,2,3})/3 + (\eta_{new,3,1} + \eta_{new,3,2} + \eta_{new,3,3})/3)] * 0.943$ To calculate the efficiency of the monitoring period, the calculated stove efficiency of each vintage i, was multiplied with the share of operational stoves[2] belonging to the vintage: The sum of so-obtained values for all vintages is the weighted average. $=N_{y,1}(\text{in }\%) * \eta_{new,1} + N_{y,2}(\text{in }\%) * \eta_{new,2} + N_{y,3}(\text{in }\%) * \eta_{new,3} + N_{y,4}(\text{in }\%) * \eta_{new,4}$
	<table><tr><th>vintage i</th><th>$N_{y,i}$</th><th>$N_{y,i}$ (%)</th><th>Efficiency ηnew,i</th></tr><tr><td>i=1</td><td>1150.97</td><td>38%</td><td>33.33%</td></tr><tr><td>i=2</td><td>1103.78</td><td>37%</td><td>40.97%</td></tr><tr><td>i=3</td><td>745.11</td><td>25%</td><td>41.11%</td></tr><tr><td>i=4</td><td>0.00</td><td>0%</td><td>35.19%</td></tr><tr><td colspan="3">Weighted average efficiency</td><td>38.07%</td></tr></table> Calculation weighted average efficiency: = 38%*33.33%+ 37%*40.97%+ 25%*41.11%+ 0%*35.19% = **38.07%**
QA/QC procedures:	The tests were supervised by the DARE CDM Monitoring Officer. An instruction for the efficiency test was provided by LHL and atmosfair. The tests were carried out in the presence of an experienced researcher. Results from the tests were cross-checked with literature values and specifications from the manufacturer of the SAVE80 and values were found to be reasonable. Conservative approach: Test results were multiplied by a conservativeness factor of 0.943 to account for bias uncertainty.
Purpose of data:	Baseline emission calculation
Additional comment:	

[2] Operational stoves per vintage divided by total number of operational stoves in the specific monitoring campaign of the monitoring period

D.3. Implementation of sampling plan

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Please note that at time the project activity was registered (12/10/2009), the sampling standard (EB 65 Annex 2) was not yet adopted, neither were the sampling guidelines (EB 69 Annex 5). Therefore, the monitoring plan of the registered PDD does not contain a sampling plan.
Nonetheless, since data and parameters monitored which are described in section D.2 above are determined by a sampling approach, a description is provided on how the sampling efforts and surveys for those data and parameters were implemented.

(a) Description of implemented sampling design;

Simple Random Sampling was applied in accordance with the registered PDD.
The Monitoring Sample was selected via a computerized randomizer in the project database (cut-off date 30/06/2012), which selected households for the spot checks. The selected households were contacted either by phone or by physical inspection. In line with the registered PDD, the required number of households for each of the annual check was 1% of the population or at least 100: *"To check if the information in the database is correct and the SAVE80 systems are still operating, annual spot checks will be conducted. […]. Therefore, the spot checks will cover at least 1% of all households, at least 100."*
Therefore, the sample size is determined based on all the households, i.e. the total population which is 5,403 for monitoring period 3. 1% of 5,403= 54.03 which is less than the 100 required by the PDD. Therefore, the sample consisted of 100 households. Additionally, we applied oversampling as per EB 67 Annex 6, para 30 to compensate for, outliers or non-response associated with the sample. We assumed 60% response rate, based on the experiences from former Monitoring Periods. A total sample of 142 households was drawn from the project database.

The monitoring team undertook the monitoring of the parameters determined via sampling. Monitoring of the parameter DO_y to calculate $N_{y,i}$ was done by phone interviews or personal interviews of stove users using a common Questionnaire. In the questionnaire the stove user was asked if their stove is in use. The answer is either "yes" or "no". If the answer is "no" the stove is counted as "drop-out" (DO_y). The percentage of drop-outs is used to adjust the total number of stoves in the database, since $N_{y,i}$. is defined as number of SAVE80 systems in use.

After the monitoring team contacted all of the households on the list, only 90 persons could be interviewed. Therefore we drew a second "Replacement sample" of 25 additional households. The replacement sample is a random sample from the project database, where we excluded the households which were already selected in the first sample (total stoves included in the database for sampling: 5,403 – 142 = 5,261). The computerized randomizer was used to select the replacement sample. From the replacement sample all the households were contacted and 18 households could be interviewed via phone or personally.

In total we interviewed 108 households, which is more than the required sample size of 100 households.

For the determination of η_{new}, the efficiencies of three stoves from the first vintage were tested using the water boiling test. Each of the 3 stoves was tested 3 times. The water boiling test was conducted as required in the PDD under the supervision of an experienced researcher. The test results were noted manually on a data entry form and later transferred into the efficiency calculation sheets. To determine stove efficiency the average of the 3 tests per stove was calculated and multiplied by a conservativeness factor (CF) of 0.943. To obtain the $\eta_{new,1}$ for vintage-1-stoves the average of the three tested stove efficiencies was calculated.

(b) Collected data, analysis of the same and demonstration on whether the confidence/precision has been met

The methodology (AMS II.G. ver. 1) does not stipulate any confidence/precision criteria which need to be met. The PDD however requires that the standard error is added to the Drop Out Rate.

Monitoring Period 3: 01/07/2012 – 30/06/2013:

Parameter	n*	Value	Standard error
Drop Out	108	39.81%	4.66%
$\eta_{new,1}$ ($\eta_{new,1}$ including CF of 0.943)	9	35.35 (33.33)	0.41

*valid responses
For further details please refer to the CER calculation spreadsheet.

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

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

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Please note that the methodology ASM II.G., v1 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_y was adjusted to account for the quantified leakage. Therefore, the Leakage Correction Factor L_y was applied to the project activity.

The Emission reductions calculations as per the AMS II.G., v1 and as stated in the registered PDD is as follows (for each monitoring campaign of the monitoring period, i.e. there is a separate calculation for monitoring campaign 2 and monitoring campaign 3):

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

Where:

ER_y	Emission reductions during the year in t CO_2e
$B_{y,savings}$	Quantity of biomass that is saved in tonnes
$f_{NRB,y}$	Fraction of biomass saved by the project activity in year y that can be established as non-renewable biomass using survey methods
$NCV_{biomass}$	Net calorific value of non-renewable biomass that is substituted (IPCC default value for fuel wood 0.015 TJ/tonne, i.e. 15 MJ/kg wood)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable biomass by similar consumers

Calculation of Biomass Savings ($B_{y,savings}$):

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

$$= \sum_{i=1}^{n} B_{yappliance} \cdot L_y \cdot N_{y,i} \cdot (1 - \frac{\eta_{old}}{\eta_{new,i}})$$

Where:

$B_{y,adjusted,i}$	Adjusted quantity of biomass used in the absence of the project activity (tonnes/year/vintage)
$B_{y,appliance}$	Average annual biomass consumption per appliance (tonnes/year) (remains fixed throughout the crediting period)
L_y	Leakage Correction Factor (remains fixed throughout the crediting period)
$N_{y,i}$	Number of appliances operating per year and vintage
η_{old}	Efficiency of the system being replaced, measured using representative sampling methods or based on referenced literature values (fraction) (remains fixed throughout the crediting period)
$\eta_{new,i}$	Efficiency of the system

Number of appliances operating per year ($N_{y,i}$):

$$N_{y,i} = \sum_{i=1}^{Ny,i} n_{y,i} \cdot t_{y,i}$$

Where:

$n_{y,j}$	Appliance operating per year and vintage
$t_{y,j}$	Fraction of operation time per SAVE80 system per vintage (months/months per year)

Total Emission Reductions for this Monitoring Period are summarised in the table below:

Parameter	**Unit**	**Value**
$B_{yappliance}$	t/a	4.65
L_y		0.99
$N_{y,i}$		2,999.86
$B_{yadjusted,i}$	t	13,819.96
η_{old}		0.10
$\eta_{new,i}$		0.3807
$B_{y,savings}$	t	10,190.15
$f_{NRB,y}$		0.77
$NCV_{biomass\ (TJ7t)}$	TJ/t	0.015
$EF_{projected\ fossil\ fuel}$	t CO_2/TJ	71.5
$ER_{y\ (monitoring\ period\ 3)}$	**t CO_2e**	**8,415**

Note:

$N_{y,i}$ ("stove-years") is calculated by summing up the number of appliances operating / in use ($n_{y,j}$, i.e. number of systems delivered adjusted for drop-outs and Standard error) multiplied with their operational time $t_{y,j}$. Please refer to the CER calculation spreadsheet.

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

>>

Not applicable, as methodology ASM II.G., ver. 1 does not consider project emissions.

E.3. Calculation of leakage

>>

Leakage Correction Factor Ly as determined ex-ante and stated in the registered PDD was 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)
Total	8,415	Not applicable	Not applicable	8,415

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)	34,027	8,415

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

>>

Estimates in the PDD for the period covered under this Monitoring Report were as follows:

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

- the number of appliances (SAVE 80 system) were less (see Section B.1) than originally planned
- no drop-outs were assumed in the ex-ante calculation.

Hence the CER generated in the monitoring period is less than estimated value in registered PDD.

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)	4,208	4,207

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

1.

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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Salutation	
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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		