



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

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

MONITORING REPORT

| | | |
|---|--|---|
| Title of the programme of activities (PoA) | Domestic Cooking Stoves substitution programme in Mozambique | |
| UNFCCC reference number of the PoA | 9981 | |
| Version number(s) of the PoA-DD(s) applicable to this monitoring report | 05 | |
| Coordinating/managing entity (CME) | Fondazione AVSI | |
| Version number of this monitoring report | 01 | |
| Completion date of this monitoring report | 16/12/2016 | |
| Monitoring period number and dates covered by this monitoring report | Monitoring period 01 12/07/2016–30/11/2016 (first and last days are included) | |
| Monitoring report number for this monitoring period | 01 | |
| Host Party(ies) | Host Party(ies) of the PoA | Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no) |
| | Mozambique | Yes |
| Sectoral scope(s) | 03: Energy Demand | |
| Selected methodology(ies) | AMS-II.G. Energy efficiency measures in thermal applications of non-renewable biomass (Version 05.0) | |
| Selected standardized baseline(s) | N/A | |
| Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case CPAs in the PoA covered in this monitoring report | GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012 | GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards |
| | N/A | 8 219 tCO ₂ e |

PART I - Programme of activities

SECTION A. Description of PoA

A.1. Brief description of the PoA

The aim of the small-scale PoA “Domestic Cooking Stoves substitution programme in Mozambique” is to improve energy efficiency by substituting inefficient traditional cookstoves with more effective ones improving the conditions of the local population living in Mozambique and reducing the greenhouse gas emissions. The PoA and the CPAs under it are type II projects (Energy efficiency improvement project activities that reduce energy consumption) and implemented and monitored in accordance with the methodology AMS-II.G version 05.0.

The stove technology applied in each CPA may vary based on the different locations, climates and traditions and therefore the details concerning stove performance, distribution, and possible assembly will be provided at the CPA level. One example of the used stove models is CH-2200 Charcoal Cookstove which is one of the world’s most fuel-efficient charcoal cookstove models¹. The stoves distributed under each CPA will be sold with a subsidized price and distributed for users in exchange for the rights to the CERs.

This PoA contributes to the sustainable development in a number of ways:

i.Environmental

- The efficient stoves reduce the consumption of charcoal or other biomass based fuel for cooking and thus reduce CO₂ emissions.
- The potential decrease in charcoal production will also reduce greenhouse gas emissions as charcoal production is responsible for example for the emission of methane (one of the most dangerous GHGs).
- The project activity will lead to a decrease in the use of woody biomass discouraging the deforestation with consequent decrease of biodiversity loss.

ii.Social

- Especially women and children’s overall health will be improved as the amount of indoor air pollutants from the burning of biomass in the family home will be reduced. Less carbon dioxide, carbon monoxide and particulate matter will be emitted. Thus there is a potentiality of reducing the number of deaths from poisoning as well as the respiratory tract infection.
- Considerably less time will be needed for cooking which has implications on livelihoods and on social relations.

iii.Economic

- Costs for fuel purchase will be reduced through increased thermal efficiency, the saved money can be used for other basic needs and therefore reduce poverty.
- The project activity will also give the opportunity to increase employment. There will be some local people hired for the distribution of the new stoves and the removal of the inefficient traditional stoves.

Timeline of the PoA

The PoA duration is 28 years, from 22/01/2014 until 21/01/2042. Currently there are three CPAs (9981-0001, 9981-0002 and 9981-0003) included in the PoA. All of these CPAs are currently active. The following table shows the start dates of each CPA.

¹ Colorado State University, 2013. Emissions and Performance Report CH2200.

| CPA name | Reference number | Start date (stove distribution start date) |
|--|------------------|--|
| Domestic Cooking Stoves in Maputo (Mozambique) | 9981-0001 | 08 January 2015 |
| Domestic cookstoves in Maputo (Mozambique), phase II | 9981-0002 | 18 June 2015 |
| Improved Cookstoves in Pemba | 9981-0003 | 15 July 2015 |

A.1.1. Generic CPA(s)

| Title, identification/reference number and/or version number of the generic CPA(s) of the PoA | Sectoral scope(s) | Applied methodology(ies) or combination of methodologies and/or standardized baseline(s) |
|--|---|---|
| <p>Generic CPA included in version 05 of the PoA 9811.</p> <p>Generic CPA has no title, identification or reference number. It will be henceforth be referred to as "Generic CPA of the PoA 9981 version 05"</p> | <p>Sectoral Scope 03: Energy Demand</p> | <p>(a) Methodology: AMS-II.G. Energy efficiency measures in thermal applications of non-renewable biomass (Version 05.0)²</p> <p>(b) Tools:</p> <ul style="list-style-type: none"> - General guidelines for SSC CDM methodologies (Version 20.0) -Guidelines on the demonstration of additionality of small-scale project activities (Version 09.0) - Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities (Version 03.0) - General guidance on leakage in biomass project activities (attachment C to appendix B) (Version 03) - Standard for sampling and surveys for CDM project activities and programmes of activities (Version 04.1) - Guidelines for sampling and surveys for CDM project activities and programme of activities (Version 03.0) - Guidelines on assessment of debundling for SSC project activities (version 03) <p>(c) Standardized baselines: N/A</p> |

² <http://cdm.unfccc.int/methodologies/DB/DCO8WRRQVTGLH1GHQBCL035F5M13R8>

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

| Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period | Title, identification/reference number and version number of the generic CPA to which the specific-case CPA applies | Crediting period dates of the specific-case CPA | Is this specific-case CPA covered in this monitoring report? (yes/no) |
|---|---|---|---|
| 9981-0001, version 05 “Domestic Cooking Stoves in Maputo (Mozambique)” | Generic CPA of the PoA 9981 version 05 | 01/01/2015 – 31/12/2022 | No |
| 9981-0002, version 02.1 “Domestic cookstoves in Maputo (Mozambique), phase II” | Generic CPA of the PoA 9981 version 05 | 12/07/2016 – 11/07/2023 | Yes |
| 9981-0003, version 02 “Improved Cookstoves in Pemba” | Generic CPA of the PoA 9981 version 05 | 01/08/2016 – 31/07/2023 | No |

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

CarbonSinkGroup S.r.l. (hereafter referred as CarbonSink)
Piazza Beverini 4, 19121 La Spezia, Italy
tel. +39 055 4574675
email: info@carbonsink.it

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

The management system of the PoA is designed to ensure that real, measurable and long term GHG emission reductions for the project activity are monitored and reported. As described in the validated PoA-DD, the management system covers the following:

- A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies
- Records of arrangements for training and capacity development for personnel
- A Procedure for technical review of inclusion of CPAs
- A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA)
- Records and documentation control process for each CPA under the PoA
- Measures for continuous improvements of the PoA management system

The operationalisation of the management system in case of the CPA 9981-0002 is described below in detail:

a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies

The CPA 9981-0002 is implemented by Fondazione AVSI who is the CME of this PoA. In line with the validated management system CarbonSink was responsible of the CPA-DD preparation and for the practical issues during the validation process with the DOE. The CPA 9981-0002 was validated successfully with the DOE and included under the PoA on 12/07/2016.

b) Records of arrangements for training and capacity development for personnel

The CPA 9981-0002 is implemented by CME of the PoA, Fondazione AVSI, who is moreover the implementer of the first CPA of this PoA (CPA 9881-0001) and, therefore, no additional training or capacity development for personnel was not required. Fondazione AVSI has been in charge for the training of the field staff responsible of the stove distribution and monitoring activities.

c) A Procedure for technical review of inclusion of CPAs

The CME together with CarbonSink has ensured before the inclusion that the CPA 9981-0002 met all the eligibility criteria. The documents related to the CPA are kept, organized and referred with the clear manner: Hard copies of the original monitoring documents are kept in AVSI officiness and the electronic material of the documents are kept by CarbonSink.

d) A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA)

The CPA 9981-0002 meets the eligibility criteria number 2 of the PoA ("The CPA ensures that double counting of emission reductions is avoided, through the identification of each stove with a unique identification number) as evidenced by the Stove Selling Database which includes the serial number of each distributed efficient cookstove together with the contact details of the user. In addition, it has been cross-checked with other CPAs of this PoA and with voluntary carbon activities operating in the same geographic area and it has been ensured that the CPA is not included in any other CDM project activity or voluntary carbon activity.

e) Records and documentation control process for each CPA under the PoA

CarbonSink is maintaining the general database of the CPAs included under the PoA and the separate electronic databases for each CPAs. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

f) Measures for continuous improvements of the PoA management system

CarbonSink, who is in responsible for the coordination of the monitoring activities of the current CPAs, is frequently in contact with the CPA implementers working in the field regarding the stove sellings as well as the monitoring issues to ensure that the work is proceeding and managed following validated CPA-DDs. In case of CPA 9981-0002 this has included monthly double check of the stove selling database by CarbonSink. The next foreseen improvement for the management system will include the introduction of a new application which enables the monitoring surveys to be filled directly by using a tablet or mobilephone instead of paper forms.

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

Sampling plans are implemented separately for each CPA during this monitoring period and therefore the project participants opted also for the multiple monitoring reports (one monitoring report for each CPA) for this monitoring period in line with applicable requirements in the CDM Project cycle procedure (PCP) and the CDM Project standard (PS).

SECTION C. Post-registration changes to the PoA (including the generic CPA(s))**C.1. Corrections**

N/A

C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), if a monitoring plan was not included at the time of registration

N/A

C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

N/A

C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA

N/A

C.5. Types of changes specific to afforestation and reforestation activities

N/A

PART II - Specific-case component project activity(ies)**SECTION D. Description of specific-case CPA(s)**

This section describes the implementation and monitoring of the specific-case CPA nro 9981-0002.

D.1. Brief description of implemented specific-case CPA(s)**(a) Purpose of the specific-case CPA and the measures taken for GHG emission reductions or net GHG removals by sinks**

The goal of the small-scale CPA "CPA No. 2: Domestic Cookstoves in Maputo (Mozambique), phase II" is to improve energy efficiency by substituting inefficient traditional cookstoves with more effective ones and at the same improve the conditions of the local population living in spontaneous settlements of Malanga, Minkadjuine, Munhuana, Unidade 7, Chamanculo A, Chamanculo B, Chamanculo D, Aeroporto A, Aeroporto B, Mafalala and Urbanizacao in the district of Nhlamankulu, in Maputo city, Mozambique. The stove distribution started on June 2015 and currently (by 30th of November 2016) 6 690 energy efficient stoves has been distributed. Totally around 11 530 stoves are foreseen to be distributed to the households under this CPA.

Approximately 95% of the households within the project area cook with stoves based on charcoal usage. The traditionally used charcoal stoves are characterized by low energy efficiency and as a consequence they are leading to unsustainable usage of non-renewable biomass in the cooking process. The project will thereafter reduce the consumption of charcoal as its substituting inefficient traditional cookstoves with more effective ones.

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

The currently only stove model distributed in the project is Envirofit's CH-2200 Charcoal Cookstove. CH-2200 Charcoal Cookstove has been tested in accordance with the "Emissions and Performance Test Protocol", with emissions measurements based on the stove testing protocol developed by Colorado State University³. This stove model has been selected based on its significant efficiency and the characteristics that match the need and cooking practices of the local population. The stoves are sold with a subsidized price and distributed for the users in exchange for the rights to the CERs. The project activity will be financed with the revenues from the sale of CERs.



Imagine D-1. CH-2200 Charcoal Cookstove (source: Envirofit)

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

| Step | Time |
|---|-------------------------|
| LSC process | 24/04/2015 – 04/06/2015 |
| Project start date (i.e. stove distribution start) | 18/06/2015 |
| Inclusion under the PoA and crediting period start date | 12/07/2016 |
| First monitoring period | 12/07/2016 – 30/11/2016 |
| Usage Survey | 10/10/2016 – 01/11/2016 |
| Kitchen Performance Test (KPT) | 17/10/2016 – 20/10/2016 |

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

During the first monitoring period, 12/07/2016–30/11/2016, totally 4 560 tCO₂-e has been achieved. The double counting is avoided as each energy efficient stove included under this project has a unique identification number which has been recorded on the project database to demonstrate that the stove is a part of the project activity.

³Colorado State University, 2013. Emissions and Performance Report CH2200.

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

Host Party: The Republic of Mozambique

Province: Province of Maputo City

City: Maputo

Physical/geographical location:

The project activity is limited to the neighbourhoods of Malanga, Minkadjuine, Munhuana, Unidade 7, Chamanculo A, Chamanculo B, Chamanculo D, Aeroporto A, Aeroporto B, Mafalala and Urbanizacao in the district of Nhlamankulu within the city of Maputo, Mozambique (Imagine D-2). The GPS coordinates of the project area are available in the registered CPA-DD.

The GPS coordinates of each stove has been recorded (when ever possible) into the Carbon Transfer Forms and in the electronic Stove Selling Database together with the unique serial number of each stove and the user's contact details.



Imagine D-2. CPA location within the city of Maputo.

SECTION E. Post-registration changes to specific-case CPA(s)**E.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

N/A

E.2. Corrections

N/A

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

In the registered CPA-DD indicated that the start date of the crediting period will be 01/07/2016 or the date when the project will be included into the PoA in case different. The CPA was included into the PoA on 12/07/2016 and therefore this date is also the start date of the crediting period.

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

N/A

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

N/A

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

As indicated in the registered PDD, the stove distribution was estimated to follow the below presented timeline. There has been anyhow some delays in the distribution and by the end of this monitoring period totally 2 004 stoves less than foreseen ex-ante have been distributed.

Table E-1. Number of the distributed stoves

| | 2015 | 2016 | Total |
|--|-------------------------------|-----------------------------------|-------|
| Distribution time | June – December (6 months) | January – November (11 months) | |
| Estimated number of stoves as presented in the registered CPA-DD | 1 830 | 6 864 | 8 694 |
| Real number of stoves distributed | 1 831 | 4 859 | 6 690 |

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

N/A

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

In line with the AMS-II.G the monitoring of the CPAs include the following activities:

- a) Checking of a representative sample of the operating devices at least ones every two years (biennial) to determine if they are still operating (called later on as “Usage Survey”) and
- b) Kitchen Performance Test Protocol to determine the fuel consumption per operating device of representative sample of all operating devices annually (called later on as “KPT”)

Moreover, monitoring will 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} .

To account for leakage a net to gross adjustment factor of 0.95 will be applied and therefore the monitoring of leakage is not required.

The organization of the project monitoring for CPA 9981-0002

Table F-1. The organization of the project monitoring

| Actor | Responsibilities and roles |
|---|---|
| Fondazione AVSI (local desk Mozambique) | <ul style="list-style-type: none"> • Coordinates the monitoring activities on the project site • Responsible on the data entries into the project database • Stores the original distribution and monitoring documents • Hires, trains and supervises the distribution and monitoring teams on their work |
| CarbonSink | <ul style="list-style-type: none"> • Supervises AVSI with the monitoring activities • Responsible on the distribution and monitoring data assessment • Prepares the monitoring report to be provided to the DOE for verification of emission reductions • Administrator of the electronic monitoring database |
| Distribution team | <ul style="list-style-type: none"> • Works under the supervision of AVSI • Reports the results to AVSI on the stove distribution |
| Monitoring team | <ul style="list-style-type: none"> • Works under the supervision of AVSI • Implements the monitoring surveys • Reports the results to AVSI |

Record keeping system and data archiving

The purpose of record keeping and data archiving is to provide enough information to enable full monitoring for each monitoring period. The electronic project database of CPA includes the information from the signed Carbon Transfer Forms (unique stove IDs, selling data, end user's contact details and the GPS coordinates when possible) and the data obtained during the monitoring surveys (survey date and answers together with the user's contact details and unique stove IDs).

The administrator of the database is CarbonSink and the data entries has be operated by AVSI. A back-up of the database is made regularly and stored in a hard-copy form like CDs. The original copies of the field documents are stored by AVSI. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

SECTION G. Data and parameters

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

| | |
|--|---|
| Data/parameter | NCV_{biomass} |
| Unit | TJ/t |
| Description | Net calorific value of the non-renewable woody biomass that is substituted |
| Source of data | IPCC default value for wood fuel |
| Value(s) applied | 0.015 |
| Choice of data or measurement methods and procedures | According to the applied methodology (AMS-II.G, paragraph 11) IPCC default for wood fuel, 0.015 TJ/tonne can be used for net calorific value of the non-renewable woody biomass that is substituted (NCV_{biomass}). |
| Purpose of data | Calculation of project emissions or actual net GHG removals by sinks |
| Additional comments | This parameter is fixed at PoA level. This parameter is fixed for entire crediting period of the CPA. |

| | |
|--|--|
| Data/parameter | $EF_{\text{projected_fossilfuel}}$ |
| Unit | tCO ₂ /TJ |
| Description | Emission factor for the substitution of non-renewable woody biomass by similar consumers |
| Source of data | AMS-II.G default value |
| Value(s) applied | 81.6 |
| Choice of data or measurement methods and procedures | According the applied methodology (AMS-II.G, paragraph 11) the value of 81.6 tCO ₂ /TJ is to be used as emission factor for the substitution of non-renewable woody biomass by similar consumers ($EF_{\text{projected_fossilfuel}}$). |
| Purpose of data | Calculation of project emissions or actual net GHG removals by sinks |
| Additional comments | This parameter is fixed at PoA level. This parameter is fixed for entire crediting period of the CPA. |

| | |
|--|---|
| Data/parameter | B_{old} |
| Unit | t/device/year |
| Description | Quantity of woody biomass used in the absence of the project activity in tonnes per device |
| Source of data | Survey on local usage |
| Value(s) applied | 4.7638 |
| Choice of data or measurement methods and procedures | <p>The Baseline Survey estimated the average baseline charcoal consumption per household to be 80kg/household/month. Moreover, around 61% of the households in the project area uses traditionally two-fire charcoal stoves and around 39% single-fire stoves. Based on the above, the average monthly baseline charcoal consume per device is estimated conservatively to be 55.6 kg/device/month ($0.61 \cdot 80\text{kg} / 2 + 0.39 \cdot 80\text{kg} = 55.6\text{kg}$).</p> <p>Accordance to paragraph 14 of the methodology, the quantity of woody biomass (B_{old}) is determined by using a credible local conversion factor determined from literature. Here the conversion factor of 7.14 is chosen based on the study of Brouwer and Falcão, 2004.</p> |
| Purpose of data | Calculation of project s or actual net GHG removals by sinks |

| | |
|---------------------|---|
| Additional comments | <p>This parameter is fixed at CPA level.</p> <p>This parameter is fixed for entire crediting period of the CPA.</p> <p>B_{old} will be multiplied by a net to gross adjustment factor (LAF) to account for leakages.</p> |
|---------------------|---|

| | |
|--|---|
| Data/parameter | LAF |
| Unit | Fraction |
| Description | Leakage adjustment factor to account for leakages |
| Source of data | AMS-II.G default value |
| Value(s) applied | 0.95 |
| Choice of data or measurement methods and procedures | To account for leakage a net to gross adjustment factor of 0.95 (option c of the paragraph 29 of the AMS-II.G methodology) will be applied: Bold will be multiplied by a net to gross adjustment factor to account for leakages. In this case surveys are not required. |
| Purpose of data | Calculation of leakage |
| Additional comments | <p>This parameter is fixed at PoA level.</p> <p>This parameter is fixed for entire crediting period of each CPA.</p> |

G.2. Data and parameters monitored

| | |
|--|--|
| Data/parameter | $f_{NRB,y}$ |
| Unit | Fraction |
| Description | Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass |
| Measured/calculated/ default | Default |
| Source of data | A default country specific fraction of non-renewable woody biomass (f_{NRB}) value available on the CDM website (site visited 15/12/2016) ⁴ |
| Value(s) of monitored parameter | 0.91 |
| Monitoring equipment | N/A |
| Measuring/reading/ recording frequency | Annually |
| Calculation method (if applicable) | N/A |
| QA/QC procedures | N/A |
| Purpose of data | Calculation of project emissions or actual net GHG removals by sinks |
| Additional comments | N/A |

| | |
|------------------------------|---|
| Data/parameter | $B_{y,new,KPT}$ |
| Unit | t/device/year |
| Description | Annual quantity of woody biomass used during the project activity in tonnes per device, determined through a survey |
| Measured/calculated/ default | Measured |
| Source of data | Kitchen performance test (KPT) ⁵ |

⁴ <http://cdm.unfccc.int/DNA/fNRB/index.html> (site visited 15/12/2016)

⁵ Project KPT Report

| | |
|---------------------------------------|---|
| Value(s) of monitored parameter | 1.8735 |
| Monitoring equipment | N/A |
| Measuring/reading/recording frequency | Yearly (or biennially) |
| Calculation method (if applicable) | N/A |
| QA/QC procedures | <ul style="list-style-type: none"> •The sample size will be chosen for a 90/10 precision when annual inspection and as 95/10 when biannual inspection is chosen. •The results will be stored for the crediting period of the project activity and an additional two years or until the last issuance of CERs for the project activity, whichever is later. •The KPT is conducted by trained monitoring personal. |
| Purpose of data | Calculation of project emissions or actual net GHG removals by sinks |
| Additional comments | <p>The KPT resulted that the annual charcoal consumption is 0.28835 t/year/hh. This value is converted to the charcoal consumption per device using the information that 82% of the families have one project stove and 18% of the families two project stoves:</p> $[(0.82 \times 0.28835 \text{ t/year})/2 + (0.18 \times 0.28835 \text{ t/year})] = 0.26240 \text{ t/year/device}$ <p>This value is converted as woody biomass as follows: $7,14 \times 0.26240 \text{ t/year/device} = 1.8735 \text{ t/year/device}.$</p> |

| | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------------------------|--|--|--|-------------------------------|------|-------|--|------|------|-------|--------|-------|-----------|-------|---------|-------|----------|-------|
| Data/parameter | N _{y,i} | | | | | | | | | | | | | | | | | | | |
| Unit | Number | | | | | | | | | | | | | | | | | | | |
| Description | Number of project devices of type i operating in year y | | | | | | | | | | | | | | | | | | | |
| Measured/calculated/ default | Measured | | | | | | | | | | | | | | | | | | | |
| Source of data | Project database records ⁶ and usage survey ⁷ on a representative sample | | | | | | | | | | | | | | | | | | | |
| Value(s) of monitored parameter | <table><tr><td></td><td></td><td>Number of operational devices</td></tr><tr><td>Year</td><td>Month</td><td></td></tr><tr><td rowspan="5">2016</td><td>July</td><td>3 112</td></tr><tr><td>August</td><td>3 464</td></tr><tr><td>September</td><td>3 845</td></tr><tr><td>October</td><td>4 380</td></tr><tr><td>November</td><td>4 826</td></tr></table> | | | | | Number of operational devices | Year | Month | | 2016 | July | 3 112 | August | 3 464 | September | 3 845 | October | 4 380 | November | 4 826 |
| | | Number of operational devices | | | | | | | | | | | | | | | | | | |
| Year | Month | | | | | | | | | | | | | | | | | | | |
| 2016 | July | 3 112 | | | | | | | | | | | | | | | | | | |
| | August | 3 464 | | | | | | | | | | | | | | | | | | |
| | September | 3 845 | | | | | | | | | | | | | | | | | | |
| | October | 4 380 | | | | | | | | | | | | | | | | | | |
| | November | 4 826 | | | | | | | | | | | | | | | | | | |
| Monitoring equipment | N/A | | | | | | | | | | | | | | | | | | | |
| Measuring/reading/ recording frequency | At least biennially | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable) | Based on the Usage Survey 83% of the sold devices are considered operational. Each sold stove recorded in the Selling Database is included in the emission reduction calculations from the beginning of the next month respecting the effective selling date. | | | | | | | | | | | | | | | | | | | |

⁶ Stove Selling Database

⁷ Usage Survey Database

| | |
|---------------------|--|
| QA/QC procedures | <ul style="list-style-type: none"> •The unique reference number of each stove is transferred to the project database. The date of distribution is utilized to determine the number of stoves in operation. •The database entries of the distributed fuel efficient stoves are made by AVSI based on the Carbon Transfer forms signed by the stove users. Part of the data-base entries will be re-checked by CarbonSink. In case of inconsistencies, the appropriate corrective actions will be taken. •Usage survey on a representative sample to confirm the share of the devices still operating the efficient stoves will be made by trained monitoring team. •The data will be stored for the crediting period of the project activity and an additional two years or until the last issuance of CERs for the project activity, whichever is later. |
| Purpose of data | Calculation of project emissions or actual net GHG removals by sinks |
| Additional comments | The number of efficient stoves shall remain within the limit of 180 GWh _{th} for type II CDM project activities. |

G.3. Implementation of specific-case CPA level sampling plan

(a) Description of implemented sampling design

To determine the parameters $N_{y,i}$ and $B_{y,new,KPT}$ described in section G.2 above two separate field surveys (Usage Survey and KPT) were conducted:

| Monitoring activity | Time | Sample size | Implementer |
|--------------------------------|------------------------|-------------|-------------|
| Usage Survey | 10/10/2016– 01/11/2016 | 53 | AVSI |
| Kitchen Performance Test (KPT) | 17/10/2016– 20/10/2016 | 38 | GIZ |

Separate samples were determined for both of the surveys through “Simple random sample on whole population”. As described in the registered CPA-DD this sampling method is appropriate method for Usage Survey as it is assumed that the population living in the area is homogenous compared to the continued use of the efficient cookstoves based on the fact that the target population shares similar socioeconomic circumstances and similar baseline cooking habits. Moreover, for this first monitoring period, the simple random sampling method is appropriate also for the KPT as practically only one age vintage is covered (The maximum stove is only 3 months more than 12 months). In latter monitorings, when the monitoring will cover stoves distributed in different years (i.e different vintages), the approach of “Simple random sampling on vintage-wise populations” is will be adapted.

All the samplers were hired locally and spoke the local language which enabled fully understanding of any responses given by users.

(b) Collected data (electronic spreadsheets may be attached and referenced)

Usage Survey

The data collected by the Usage Survey are shown in a separate document “Usage Survey Database”. The examples of filled surveys forms are available in the attached document “Scanned examples of Usage Survey forms”.

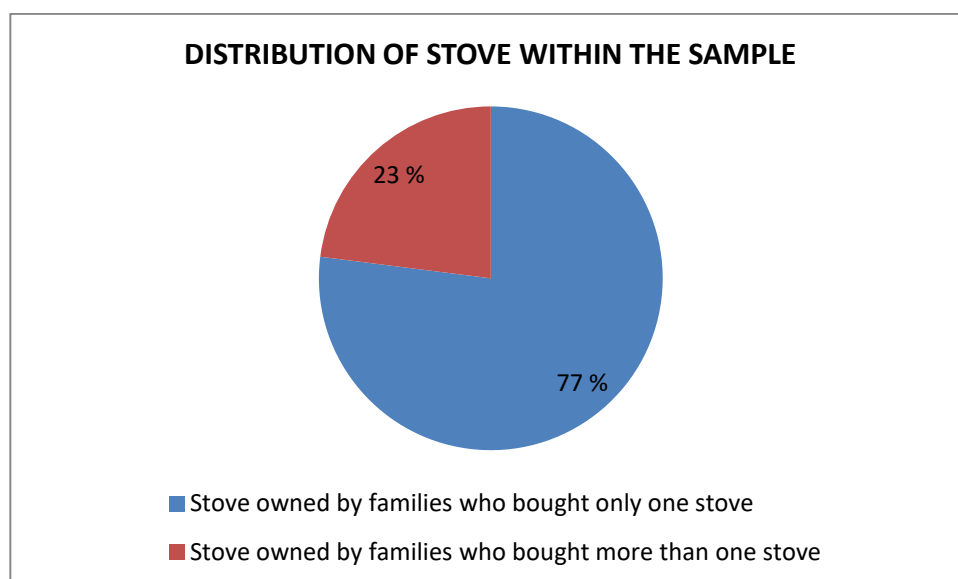
KPT

The applied KPT procedure and its results are described in a separate report “Project KPT Report”.

(c) Analysis of the collected data

Data analysis of the KPT is described in separate report “Project KPT Report”⁸. Here below are described the main findings of the Usage Survey. The raw data together with a more detailed data-analysis is included in the electronic Spreadsheet⁹.

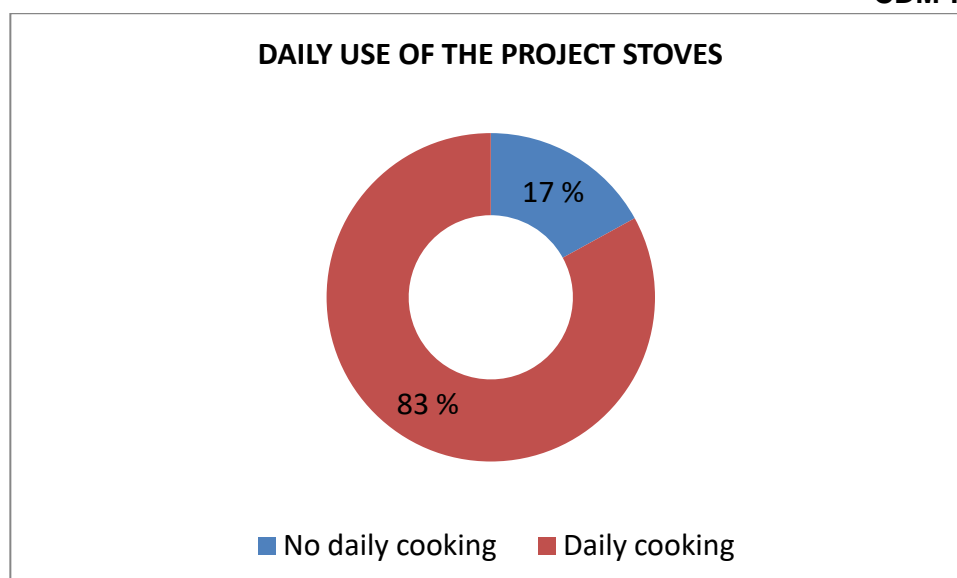
Sampled families and number of stoves (questions 8, 9 and 10): The 53 families interviewed had totally 69 project stoves. From these stoves 77% were owned by families who had bought only one project stove and the rest 23% by the families who had bought more than one stove. Majority (83%) of the families who had two project stoves had bought the both stoves at the same moment. The families had bought the stoves averagely 7 months ago. In average each family was composed of 4.7 standard adults.

**Usage rate of the project stoves (questions 11 and 14):**

Majority, 98%, of the respondents declared that they are using the project stoves. Daily the project stove/stoves were used by 83% of the respondents who indicated to cook 2-3 meals with the project stove/stoves (in average 2.5 meals/day/household which equals to 17.5 meals/week/household). Totally 17% of the respondents (owning in total 12 stoves), indicated to not cook daily with their project stove/stoves.

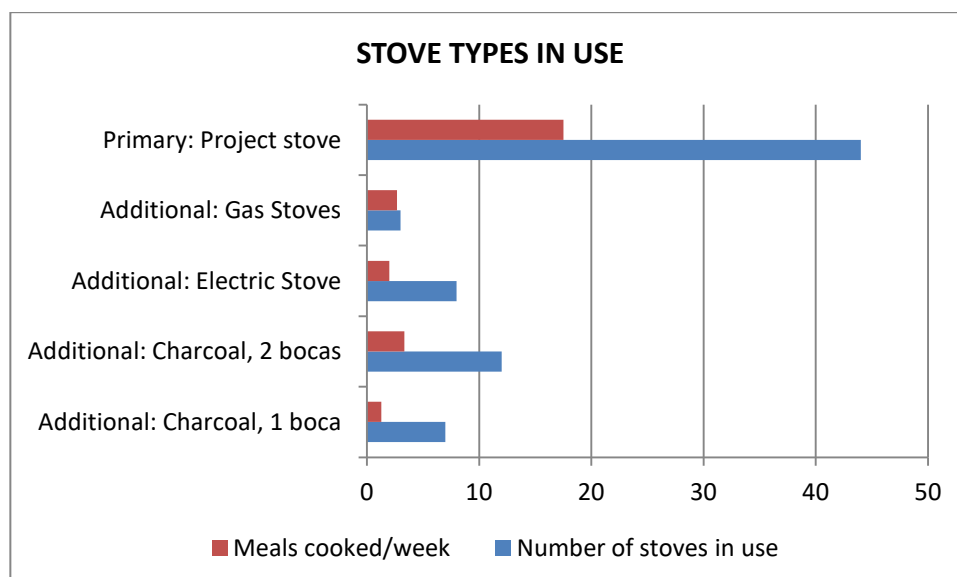
⁸ Project KPT Report

⁹ Usage Survey Database



Simultaneous use of additional technologies (questions 15 and 16): From the respondents indicating to use the project stove daily, 68% reported to use also other cookstove. Within these families the additional technologies are used anyhow only as secondary means of cooking during special days, ceremonies or weekends. Averagely, 0.3 meals/day are cooked by the additional technologies within the families using them. The most commonly used additional stove type is two-fire charcoal stove (27% of the additional stoves) with 3.3 weekly meals cooked on average by each.

Monitoring of the project charcoal consumption with the KPT ensures that the charcoal consumption used for the project situation is including also the consume of the additional use of baseline charcoal consumption (KPT measures the total fuel consumption of the sampled household without making difference if the consumption is made with the project stove or with baseline charcoal stove).



Re-selling/donating of old stoves to third parties (question 28): The families were offered a significant discount in case they gave away their old inefficient stove at the moment of boughing the project stove and for this reason basically all the families have disposed at least one inefficient stove. Eventough, the Usage Survey find 2 respondents (representing 4% of the sample) stating to have re-sold their old stoves to a peer (question 28). The baseline charcoal stoves being the most

common cooking method in the project area and easily available in all district of Nhamaculo, it is not estimated that the possible re-selling of the project stove would have any significant impact for adding the overall use of the inefficient charcoal stoves, the charcoal consumption in general, in the project area or in the region. Moreover, to account for leakage an adjustment factor of 0.95 has been applied in the emission reduction calculation. In addition, 66% of all the respondents declared to have promoted the project technology to at least one peer (question 27) which is indicating the high satisfaction of the respondents with the project stoves.

(d) Demonstration of whether the required confidence/precision level has been met

Usage Survey

The Usage Survey is a biannual survey and therefore the required precision, in line with the applied methodology, is at least 95/10 (a 95% confidence interval and a 10% margin of error). Based on this the sample size for this monitoring period was set to be at least 53 families as calculated in the separate Excel spreadsheet¹⁰. The required confidence/precision level was met as all the 53 families were reached and participated to the survey.

KPT

KPT is an annual survey and therefore the required precision, in line with the applied methodology, needs to be at least 90/10 (a 90% confidence interval and a 10% margin of error). As described in the separate KPT report the KPT¹¹, a 95% confidence (which is more robust in comparison with the methodology requirement) was met.

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

Target population is all the efficient cookstoves included in the CPA project activity. The sampling frame for all monitored parameters is the list of all the devices under the project activity i.e. all the efficient cookstoves listed in the stove selling database of this CPA. The sample is drawn at random from the sampling frame using a computerized randomizer. All random selections will be stored in the electronic database and therefore, traceability of the selection is provided.

The minimum sample size is calculated as showed in in the separate Excel spreadsheet¹². The calculation were made in line with the applied methodology and equations provided in "Guidelines for sampling and surveys for CDM project activities and programme of activities"¹³.

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

The sample was drawn at random from the sampling frame using a computerized randomizer and is representative of the population. All random selections are stored in the electronic database and therefore, traceability of the selection is provided.

¹⁰ Ex post ER calculations, sub-page "Sample size"

¹¹ Project KPT Report

¹² Ex post ER calculations, sub-page "Sample size"

¹³ CDM-EB67-A06-GUID (Version 03.0). Available at <http://cdm.unfccc.int/Reference/Guidclarif/index.html#pdd> (site visited 09/01/2014)

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

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

The calculation of baseline emission is described in the following paragraph H.2. together with the calculation of the project emission reductions.

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

Below are presented the used equations for calculating the emission reductions for this monitoring period. The full calculations are included in the separate electronic spreadsheet available for verification¹⁴.

Emission reductions

$$ER_y = B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected_fossilfuel} * N_{y,i}$$

Where:

| | |
|------------------------------|--|
| ER_y | Emission reductions during the year y in tCO ₂ e |
| $B_{y,savings}$ | Quantity of woody biomass that is saved in tonnes per device |
| $f_{NRB,y}$ | Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (f_{NRB}) values available on the CDM website |
| $NCV_{biomass}$ | Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, wet basis) |
| $EF_{projected_fossilfuel}$ | Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO ₂ /TJ |
| $N_{y,i}$ | Number of project devices of type i operating in year y |

Determination of $B_{y,savings}$

In order to determine ex post $B_{y,savings}$ equation 2 of Option 1 described in paragraph 12 of AMS-II.G is chosen and therefore, the following equation will be used:

$$B_{y,saving} = B_{old} - B_{y,new,KPT}$$

Where:

| | |
|-----------------|---|
| $B_{y,savings}$ | Quantity of woody biomass that is saved in tonnes per device |
| B_{old} | Quantity of woody biomass used in the absence of the project activity in tonnes per device |
| $B_{y,new,KPT}$ | Annual quantity of woody biomass used in year y in tonnes per device, measured as per the Kitchen Performance Test (KPT) protocol |

H.3. Calculation of leakage

To account for leakage a net to gross adjustment factor of 0.95 has been applied in line with the registered CPA-DD and therefore the B_{old} has been multiplied by a net to gross adjustment factor to account for leakages.

¹⁴ Ex post ER calculations

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

| Specific-case CPA reference number | Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e) | Project emissions or actual net GHG removals by sinks (tCO ₂ e) | Leakage (tCO ₂ e) | GHG emission reductions or net GHG removals by sinks (tCO ₂ e) achieved in the monitoring period | | |
|------------------------------------|---|--|------------------------------|---|-----------------|--------------|
| | | | | Up to 31/12/2012 | From 01/01/2013 | Total amount |
| 2016 (12/07/2016–30/11/2016) | 4 969 | 0 | 410 | N/A | 4 560 | 4 560 |
| Total | 4 969 | 0 | 410 | N/A | 4 560 | 4 560 |

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

| Specific-case CPA reference number | Value estimated in ex ante calculation in the included CPA-DD(s) | Actual values achieved by the specific-case CPA(s) during this monitoring period |
|------------------------------------|--|--|
| 9881-0002 | 8 219 tCO ₂ -e | 4 560 tCO ₂ -e |
| Total | 8 219 tCO ₂ -e | 4 560 tCO ₂ -e |

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

Emission reductions has been calculated with two different calculation methods; in the ex ante case the calculations were based on the estimated project and baseline stove efficiencies, in the ex post situation instead based on the project charcoal consumption which was monitored with KPT. Moreover, the below points are describing why the emission reductions are lower than estimated ex ante:

- **Number of distributed stoves**

Ex ante it was foreseen that 8 694 stoves would have been distributed by the end of November 2016. In reality 2 004 stoves less was distributed.

- **Usage rate**

The usage rate was estimated ex ante to be 90%. In reality the usage rate was 83% as showed by the results of the Usage Survey.

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

| | |
|--|---|
| Coordinating/managing entity and/or responsible person/entity | <input type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM |
| Organization name | CarbonSinkGroup S.r.l. |
| Street/P.O. Box | Piazza Beverini |
| Building | 4 |
| City | La Spezia |
| State/Region | |
| Postcode | 19121 |
| Country | Italy |
| Telephone | +39 055 4574675 |
| Fax | N/A |
| E-mail | info@carbonsink.it |
| Website | www.carbonsink.it |
| Contact person | Ulla Mauno |
| Title | |
| Salutation | |
| Last name | Mauno |
| Middle name | |
| First name | Ulla |
| Department | |
| Mobile | |
| Direct fax | |
| Direct tel. | +39 055 4574675 |
| Personal e-mail | ulla@carbonsink.it |

