COMPONENT PROJECT DESIGN DOCUMENT FORM FOR SMALL-SCALE COMPONENT PROJECT ACTIVITIES (F-CDM-SSC-CPA-DD) Version 02.0

COMPONENT PROJECT ACTIVITIES DESIGN DOCUMENT (CPA-DD)

SECTION A. General description of CPA

A.1. Title of the proposed or registered PoA

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This CPA is included in the proposed PoA titled "Domestic Cooking Stoves substitution programme in Mozambique".

A.2. Title of the CPA

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CPA No. 01: "Domestic Cooking Stoves in Maputo (Mozambique)"
Version 01
17/01/2014

A.3. Description of the CPA

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The goal of the small-scale CPA (SSC-CPA) "Domestic Cooking Stoves in Maputo (Mozambique)" is to improve energy efficiency by substituting inefficient traditional cooking stoves with more effective ones and at the same improving the conditions of the local population living in spontaneous settlements in Chamanculo C and Xipamanine in the city of Maputo, Mozambique. The project involves the distribution of around 10,000 energy efficient stoves to households during the years 2014, 2015 and 2016 with total estimated reductions of 202,908 CO2-e.

The stove model used in the project is CH-2200 Charcoal Cooking stove which 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 University[1]. The stoves will sold with a subsided prise and be distributed for users in exchange for the rights to the CERs. The project activity will be financed with the revenues from the sale of CERs.

Up to now approximately 95% of the households within the districts of Chamanculo C and Xipamanine cook with stoves based on coal usage[2]. The used coal 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 efficient cooking stove model CH-2200 is one of the world's most fuel-efficient charcoal cooking stove models and it can lead to a charcoal usage reduction of up to 50% compared to traditional stoves[3]. Majority of the families would not have access to the market of fuel-efficient cooking stoves for economic reasons in absence of the proposed project.

Users will enter into an agreement with the CPA implementer transferring rights to the CERs generated by the CPA in return for the improved stove and its on-going maintenance over a lifetime of the CPA. The users must also agree to submit to the monitoring programme like described in the Domestic Cooking Stoves substitution program in Mozambique PoA-DD and in this CPA-DD. Each family will

[1] Colorado State University, 2011. Emissions and Performance Report CH2200.
[2] Cooperação para o Desenvolvimento e Morada Humana (CDM)_2012. Baseline survey.
[3] Colorado State University, 2011. Emissions and Performance Report CH2200.

participate in the cost of the new efficient stoves with a subsided payment. Moreover, each family is encouraged to dispose the old inefficient stove enhancing their sell to local iron recycling companies.

Monitoring the data collected during the distribution and operation of the stoves will be stored in an electronic project database. From this data, the emissions reductions of the CPA will be determined. This system will be available for review by the Designated Operational Entity (DOE) during the validation and verification.

The project implementer, Fondazione AVSI, has undertaken a stakeholder commitment procedure for the proposed CPA under the PoA, ensuring that stove users understand the distribution agreement and have been trained on how to use the stoves and are able to give adequate feedback on their usage.

Contribution to sustainable development

The CPA contributes to the sustainable development in a number of ways:

a) Environmental

- The efficient stoves reduce the consumption of charcoal for cooking and thus reduce CO_2 emissions.
- The potential the decrease of charcoal production will also reduce greenhouse gas emissions as charcoal production is responsible 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.
- On the other hand, thanks to the enhancement of the awareness for a sustainable use of natural resources, it will be possible to increase the amount of water available for the local community.

b) 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.

c) 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.
- The project can provide also useful tools for local economy, in particular for the production and sale of meals on local markets.

A.4. Entity/individual responsible for CPA

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Fondazione AVSI is the CPA implementer responsible for CPA and as well a named Project Participant in the PoA.

The other implementer of this CPA, giving consultation and other kind of support to AVSI are :

- CarbonSinkGroup s.r.l.
- Cloros Srl
- MAN.SE.F. Onlus

A.5. Technical description of the CPA

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The main manufacturing/production technologies, systems and equipment involved in the CPA

The project is a Sectoral Scope 3, Type II (Energy efficiency improvement projects) small-scale project. The project will reduce the consumption of energy by substituting inefficient traditional cooking stoves with more effective ones. The energy efficient stove model used in the project is CH-2200 Charcoal Cooking stove.

Imagine A-1. CH-2200 Charcoal Cooking Stove (source: Envirofit)

The CH-2200 Charcoal Cooking stove 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 University[4]. The stove is highly durable, with an average lifetime of the equipment corresponding to seven years, and has five years warranty from the manufacturer. 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.

Table A-1. Product Specifications for CH-2200 Charcoal Cooking Stove[5,6]

Product specifications	Manufacturer rating
Average Thermal Efficiency	38.2 %
Average Fuel use	190.6 g
Average CO emissions	31.4 g
Unit Size (height x width x depth)	15.4 x 31.3 x 22.9 cm
Unit Weight	2.3 kg
Materials	Insulated metal

[4] Colorado State University, 2011. Emissions and Performance Report CH2200.
[5] Colorado State University, 2011. Emissions and Performance Report CH2200.
[6] Envirofit, 2012a. CH-2200 Charcoal Cookstove.

Distribution of the stoves will be done during the years 2014, 2015 and 2016. During the project a total of 10,000 stoves will be distributed to 6,250 families. It is foreseen to distribute one stoves for the families which are traditionally used to cook with one fire stove and two stoves for the families traditionally used to cook with two fire stove (Table A-2).

Table A-2. Distribution of the stoves

	2014	2015	2016	Total
Distribution time	November-December (2 months)	January-December (12 months)	January-February (2 months)	16 months
Number of stoves distributed	1,184	7,840	976	10,000
Number of new families in the project	740	4,900	610	6,250

Energy and mass flows and balances of the systems and equipment included in the CPA

Energy and mass flows and balances of the systems and equipment included in the project activity are demonstrated in Section D and in the separate spreadsheet provided in Appendix 4. These calculations demonstrate that within the project boundary, each household saves energy 22.56 MWh in year.

The types and levels of services provided under the CPA

- **Baseline stoves used in Maputo**

Up to now approximately 95% of the households within the districts of Chamanculo C and Xipamanine cook with traditional unimproved charcoal stoves.[7] The baseline charcoal stoves are unimproved models without an improved combustion air supply or flue gas ventilation system like shown in Imagines A-2 to A-4. Stoves that lack these types of design characteristics can be assumed to have a low efficiency, approximately around 10%. It is estimated that around 60% of the project area households are using two-pot stoves and around 40 % stoves with one fire.

The baseline scenario of the project is the same as the scenario existing prior to the implementation of the project activity.

[7] Cooperação para o Desenvolvimento e Morada Humana (CDM)_2012. Baseline survey.

Imagine A-2. Typical charcoal stoves used in the district of Chamanculo C and Xipamanine (source: Fondazione AVSI)


Two-pot stove, simple model


Two-pot stove, simple model


Two-pot stove, reinforced


Traditional cooking with three stone fireplace

Imagine A-3. Two-pot stove, simple model (source: CarbonSinkGroup)

Imagine A-4. Round metal sheet stove (source: CarbonSinkGroup)

- **How technology and measures and know-how are transferred to the Host Party**

To ensure environmentally safe and sound operations, users will receive training to use and maintain the new stoves. The introduction of the domestic improved stoves in the local communities will be valuable in raising the environmental awareness on topics such as fuel efficiency and risks deriving from deforestation. Training will also be provided to the inhabitants to monitor the project activity.

A.6. Party(ies)

Name of Party involved (host) indicates a host Party	**Private and/or public entity(ies) CPA implementer(s) (as applicable)**	**Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)**
The Republic of Mozambique (Host)	Private entity (NGO): Fondazione AVSI	No

A.7. Geographic reference or other means of identification

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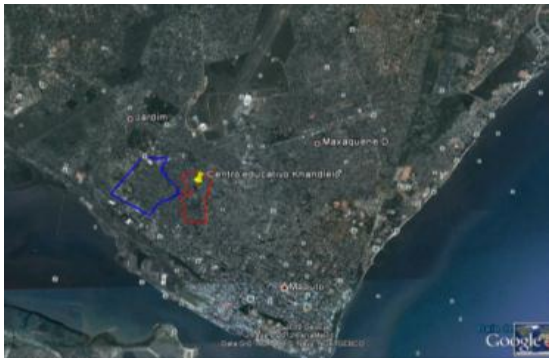
The project activity is limited to the districts of Chamanculo C and Xipamanine in the city Maputo, Mozambique (Imagines A-5 to A-8). The GPS coordinates of the project area and the related map presented in Appendix 3 allow unique identification of the CPA. Each new energy efficient stove will has in its side a serial number from a manufacturer. This number will be used as a unique identification number and it will be assigned together with the GPS coordinate to demonstrate that the stove is a part of the project activity. The stove information will be filled into the electronically project database and the information will be made available for DOE during verification.

Imagine A-5. Map of Africa

Imagine A-6. Mozambique

Imagine A-7. Map of Maputo



Imagine A-8. CPA location within Maputo

A.8. Duration of the CPA

A.8.1. Start date of the CPA

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01/11/2014 or the date when the first stoves are distributed to the families, whichever is later.

A.8.2. Expected operational lifetime of the CPA

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The expected operational lifetime is 21 years and 00 months.

A.9. Choice of the crediting period and related information

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Renewable crediting period.

A.9.1. Start date of the crediting period

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The length of the first crediting period is 7 years.

A.9.2. Length of the crediting period

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The start date of the crediting period is 01/11/2014 or the registration date of the PoA "Domestic Cooking Stoves substitution programme in Mozambique" whichever is later.

A.10. Estimated amount of GHG emission reductions

Emission reductions during the crediting period	
Years	**Annual GHG emission reductions (in tonnes of CO_2e) for each year**
1.11.2014-31.12.2014	189
2015	15,160
2016	31,790
2017	32,228
2018	32,228
2019	32,228
2020	32,228
1.1.2021-31.10.2021	26,857
Total number of crediting years	7
Annual average GHG emission reductions over the crediting period	28,987
Total estimated reductions (tonnes of CO_2e)	202,908

A.11. Public funding of the CPA

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There is no public funding involved in the project finance.

A.12. Debundling of small-scale component project activities

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According to paragraph 10 of Guidelines on Assessment of Debundling for SCC Project Activities (Version 03) in Annex 13 of EB 54[8]:

If each of the independent subsystems/measures (e.g. biogas digester, solar home system) included in the CPA of a PoA is no larger than 1 % of the small-scale threshold defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity.

> The proposed CPA can be considered as not being a de-bundled component of a large scale activity as each independent efficient cooking stove included in the proposed CPA is no larger than 1 % of the small-scale threshold (180 GWh_{th} per year) as described in Appendix 4.

A.13. Confirmation for CPA

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No other CPA or CDM project involving the distribution and/or installation of the efficient charcoal cooking stoves is already registered and operating in the same specific geographical area[9] and thus it can be proved that this SSC-CPA is neither registered as an individual CDM project activity nor is it part of another Registered PoA.

In Maputo area there is anyhow one registered CDM project[10] currently active, this project is distributing ethanol based cookstoves and therefore these projects are easily separable.

SECTION B. Environmental analysis

B.1. Analysis of the environmental impacts

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The Designated National Authority for the Clean Development Mechanism (DNA) in Mozambique has confirmed that according to the legislation in Mozambique, an Environmental Impact Assessment is not required for this project activity.

SECTION C. Local stakeholder comments

C.1. Solicitation of comments from local stakeholders

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The local stakeholders' meetings were conducted in CPA level based on the principals of the Gold Standard to ensure the quality of the consultation process.

Four stakeholder's meetings were conducted in the districts of Chamanculo C and Xipamanine on the 12th, 13th and 14th of September 2012. On the 12th of September, there was also a meeting at the Ministry of the Environment with the director of environmental co-operation during which the project and the CH-2220 cooking stove were presented. Furthermore two cooking demonstrations were made, in

[8] EB 54, Annex 13. Guidelines on Assessment of Debundling for SCC Project Activities (Version 03). http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17.pdf

[9] http://cdm.unfccc.int/Projects/projsearch.html (site visited on 13/10/2014)

[10] Cleanstar Mozambique - Maputo Ethanol Cookstove and Cooking Fuel Project 1. http://cdm.unfccc.int/Projects/DB/DNV-CUK1363087372.7/view (site visited on 13/10/2014)

a private house in Chamanculo C and in a fried food shop in Xipamanine[11]. Demonstrations attended by a twelve people, including local representatives.

Imagine C-1. Xipamanine, cooking demonstration (source: CarbonSinkGroup)

Invitations for all the stakeholders meetings were made through the local representatives who informed the local population and potential users. The meetings were held in public places or open spaces in order to have maximum visibility and to allow all persons interested to participate freely. At each meeting a translator was present.

Both local representatives and citizens participated with enthusiasm and interest in the meetings and in the cooking demonstrations.

Public participation for the project activity has formed an integral part of project planning; indeed, dissemination of the new stoves would not be possible without a demand by the users. Every user voluntary decides to participate in the project activity.

All the meetings followed a common approach:

- Introduction of the speakers.
- Opening: introductions of the project (with PowerPoint presentation when possible), understanding CPA process, who is involved, project phases and timelines, goal of meeting. Participation form, participants must sign this form to confirm their attendance. Delivery of the instructions for use of the stove[12].
- Questions & Answers: for clarification of key points.
- Evaluation forms: to be completed by all stakeholders. A simple evaluation form asks each stakeholder to write down their feelings and concerns about the meeting and the proposed project. For illiterate people the form was filled out by Helio Manhisse (Fondazione AVSI).
- Closure: complete evaluation forms and thanks.

Continuous updates on the status of the mission and meetings have been posted on the blog of CarbonSinkGroup (see the website http://carbonsinkmozambico.blogspot.it/).

[11] CarbonSinkGroup, 2012. Kitchen survey.
[12] Envirofit, 2012b. CH-2200 User Guide.

First stakeholders' meeting:

- Location: Scuola Maria Grazia Rizzo - 271, Rua de Xipamanine - Maputo
- Date: 12 September 2012
- Start Time: 8:30 am
- End Time: 10:30 am
- Number of participants: seven
- Language: Portuguese
- Attached documents: participation and evaluation forms[13]

Imagine C-2. Meeting with the local representatives (source: CarbonSinkGroup)

Second stakeholders' meeting:

- Location: Centro Comunitario, Chamanculo C, Maputo
- Date: 13 September 2012
- Start Time: 14:11 pm
- End Time: 15:30 pm
- Number of participants: 55
- Language: Changane dialect, with simultaneous translation in Portuguese
- Attached documents: participation and evaluation forms[14]

[13] Stakeholders_meeting_12092012
[14] Stakeholders_meeting_13092012

Imagine C-3. Meeting at Chamanculo C, Centro Comunitario (source: CarbonSinkGroup)

Third stakeholders' meeting:

- Location: Bairo do Xipamanine, Maputo
- Date: 14 September 2012
- Start Time: 10:56 am
- End Time: 11:40 am
- Number of participants: 50
- Language: Changane dialect, with simultaneous translation in Portuguese
- Attached documents: participation and evaluation forms[15]

Imagine C-4. Meeting at Bairo do Xipamanine (source: CarbonSinkGroup)

[15] Stakeholders_meeting_14092012_1

Fourth stakeholders'meeting:

- Location: Bairo do Chamanculo C Asscodecha Centro Comunitario, Maputo
- Date: 14 September 2012
- Start Time: 14:30 pm
- End Time: 16:30 pm
- Number of participants: 22
- Language: Changane dialect, with simultaneous translation in Portuguese
- Attached documents: participation and evaluation forms[16]

C.2. Summary of comments received

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The general impression of the meetings was very positive. Many participants pointed out that they found the meeting useful, educative and that they had got good benefit from the gathering. Some highlighted that the meeting helped to understand the environmental issues, and that the improved cooking stoves would be helpful in reducing pollution.

In particular, it was appreciated that the new stoves are cheaper on the fuel consumption and produce less smoke. In this way, it would contribute to improve one's health. Some had expressed the hope that the project would be extended to the whole area of Mozambique.

There had been no opposition to the project nor any negative outright comments. Some participants asked tough what would be the economic impact of the use of the new stoves on traditional stove producers.

The questions and comments turned around the following issues:

- affordability of the stove;
- technology of the stove;
- availability of the stove and of the spare parts in case of breakage;
- possibility of using the stove even in open spaces;
- possibility of the stove to bear very heavy loads.

C.3. Report on consideration of comments received

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The consultations with the stakeholders did not reveal any major problems, so it was not necessary to make specific changes to the project.

Based on the comments received during the meetings, to meet the needs of people who are use to cooking with two burners, it was therefore decided to distribute two stoves for these household. Moreover, training programmes for using the stove will be held - especially for women.

Regarding the concerns for the traditional stove producers they may be compensated by the opportunity of being involved in the sale and maintenance of the new stoves. A demonstration to test the resistance of the stove to bear heavy loads has been made (Imagine C-5).

[16] Stakeholders_meeting_14092012_2

Imagine C-5. Chamanculo C, resistance test of the cooking surface at the centre of Asscodecha (source: CarbonSinkGroup)

SECTION D. Eligibility of CPA and Estimation of emissions reductions

D.1. Title and reference of the approved baseline and monitoring methodology(ies) selected:

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AMS-II.G. Energy efficiency measures in thermal applications of non-renewable biomass. Version 05.0[17]; Sectoral Scope: 03.

D.2. Application of methodology(ies)

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Table D-1. Applicability conditions of the Methodology AMS-II.G and the PoA

Applicability condition	Project scenario
Type II Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass: This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency[18] biomass fired cook stoves[19] or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers.	The proposed CPA involves distribution of improved energy efficiency biomass fired stoves to the households within the districts of Chamanculo C and Xipamanine in the city Maputo, Mozambique. This will contribute in reduction of non-renewable biomass consumption which would have been otherwise consumed by the less efficient cooking stoves. The cooking stoves being distributed have high thermal efficiency of 38 %. The test has been conducted by Colorado State University.[20]

[17] Available from http://cdm.unfccc.int/methodologies

[18] The efficiency of the project systems as certified by a national standards body or an appropriate certifying agent recognized by it. Alternatively manufacturers' specifications may be used.

[19] Single pot or multi pot portable or *in situ* cook stoves with specified efficiency of at least 20%.

[20] Colorado State University, 2011. Emissions and Performance Report CH2200.

Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	The production of charcoal has been referred to as one of the main causes of deforestation in Africa and in Mozambique.[2122] Although there are regulations for the exploitation of wood fuels, weak state capacity has led to uncontrolled and unsustainable charcoal production[23]. Unsustainable production together with an increased demand for charcoal in the urban centres of Mozambique has resulted in localised deforestation particularly surrounding the major cities. In the late 1980s the natural vegetation within the radius of 50–60 km around Maputo had been practically removed. In 1999 the forest was located within a radius of 150–200 km. Presently, Maputo is receiving charcoal and firewood from Inhambane and Sofala, 600 km away.[24] Moreover, also The Forest Resource Assessment 2010 of the Food and Agriculture Organization (FAO)[25] shows a significant decline in total forest area and carbon stock in forest land generally in Mozambique. Between 1990 and 2010 total forest area of Mozambique decreased 4,356,000 hectares and the carbon stock in living forest biomass decreased 186 million tonnes. Continuing the deforestation trend in Mozambique clearly indicates that forest resource consumption has been non-renewable.
The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.	The maximum thermal energy savings achieved by the proposed CPA is 113 GWh_{th} per year which is under the limits (180 GWh_{th}) of small-scale thermal project activities. Appendix 4 of the PDD provides a detailed calculation of the thermal energy savings and how the savings would not exceed the 180 GWh_{th} limit.
The project should reduce non-renewable biomass being used by proving two of the following	The project reduces non-renewable biomass being used as:

[21] Kityo Peter, 2004. Productivity and utilisation of natural fuel wood resources. An evaluation of the current situation in some parts of Gaza province, Mozambique. MSc thesis. Available at http://www.itc.nl/library/papers_2004/msc/nrm/peter_kityo.pdf (site visited 14/01/2014)

[22] Girard, P., 2011. Charcoal production and use in Africa: what future?, Unasylva 211, Vol. 53, 2002. Available at ftp://ftp.fao.org/docrep/fao/005/y4450e/y4450e05.pdf (site visited 14/01/2014)

[23] Perspectives GmbH , 2011. Proposal for a New Standardised Baseline for Charcoal Project in the Clean Development Mechanism. 2011. http://cdm.unfccc.int/methodologies/standard_base/npbcharcoal.pdf (site visited 14/01/2014)

[24] Ellegård, Anders et al., 2001. Charcoal potential in Southern Africa (CAPOSA). Final report for Mozambique. Maputo, Mozambique; December 2001. http://coastalforests.tfcg.org/pubs/Char_Southern_Africa_CHAPOSA.pdf (site visited 14/01/2014)

[25] FAO, 2010. Global Forest Resources Assessment 2010, Country Report Mozambique. http://www.fao.org/docrep/013/al575E/al575e.pdf (site visited 14/01/2014)

statements: 1. A trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area; 2. Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area; 3. Increasing trends in fuel wood prices indicating a scarcity of fuel-wood; 4. Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass.	1. A resent review "Energy situation in Mozambique" (Cuvilas et al. 2010)[26] shows increase in the distance the charcoal is transported to the project area; the transportation distance is increased more than 500 kilometres from the late 80's to the present day. 2. According to the Forest Resource Assessment Country Report for Mozambique (2010) [27] it is shown that Carbon Stocks in Mozambique are depleting since 1990. The assessment clearly indicates that forest resource consumption has been non-renewable. Also the increasing trend in the transportation distance of charcoal shows how the wood consumption for the production of charcoal for Maputo is non-renewable and thus carbon stocks are depleting in the project area and its surroundings.[28]

D.3. Sources and GHGs

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The sources listed below are included in the project boundary. The combustion of fuel in both the baseline scenario and project activity will release significant amounts of CO_2. The proposed small-scale CPA is limited to the districts of Chamanculo C and Xipamanine in the city Maputo, located the Republic of Mozambique and therefore within the geographical boundary of the registered PoA.

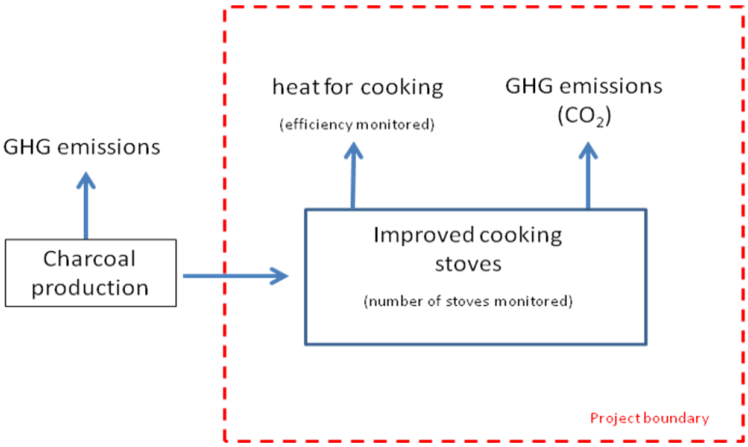
[26] Cuvilas et al. 2010. Energy situation in Mozambique, A review. Renewable and Sustainable Energy Reviews 14 (2010) 2139-2146. http://www.sciencedirect.com/science/article/pii/S1364032110000341 (site visted 14/01/2014)

[27] FAO, 2010. Global Forest Resources Assessment 2010, Country Report Mozambique. http://www.fao.org/docrep/013/al575E/al575e.pdf (site visited 14/01/2014)

[28] Cuvilas et al. 2010. Energy situation in Mozambique, A review. Renewable and Sustainable Energy Reviews 14 (2010) 2139-2146. http://www.sciencedirect.com/science/article/pii/S1364032110000341 (site visted 14/01/2014)

Table D-2. Emissions sources and GHGs included in or excluded from the CPA boundary

	Sources	Gas	Included?	Justification/Explanation
Baseline	Combustion of non-renewable biomass for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.
		N_2O	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.
Project activity	Combustion of non-renewable biomass for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.
		N_2O	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.



Imagine D-1. Flow diagram showing the equipments and emission sources include in the boundary

D.4. Description of the baseline scenario

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In absence of the project activity, the households of the project area would continue to use the traditional inefficient cooking stoves, consuming high quantity of non-renewable biomass. According to applied methodology AMS-II.G (paragraph 10)[29], in the absence of the project activity, the baseline scenario is the use of fossil fuels for meeting similar thermal energy needs. Thus baseline scenario is determined by calculating baseline emissions.

[29] Available at http://cdm.unfccc.int/methodologies (site visited 14/01/2014)

Determination of baseline Emissions

Emission reductions are calculated by multiplying the thermal energy from annual biomass savings of non-renewable biomass with an emission factor for fossil fuels as described in paragraph 5 of the applied methodology:

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

Where:

ER_y	Emission reductions during the year y in tCO2e
$B_{y,saivings}$	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 (NRB) values available on CDM website[30]
$NCV_{biomass}$	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

In order to determine $B_{y,savings}$ Option 2 of paragraph 12 of AMS-II.G is chosen and thus the following equation is used:

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

Where:

$B_{y,saivings}$	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
η_{old}	Efficiency of the system being replaced (fraction)
$\eta_{new,y}$	Efficiency of the device being deployed as part of the project activity (fraction)

[30] http://cdm.unfccc.int/DNA/fNRB/index.html

Table D-3. The steps for determination of baseline emissions.

Step	Parameter	Description	Data sources	Type
1	B_{old}	Quantity of woody biomass used in the absence of the project activity in tonnes per device	Calculation based on the Baseline Survey	Fixed
2	η_{old}	Efficiency of the system being replaced (fraction); measured using representative sampling methods or based on references literature values, use weighted average values id more than one type of device is being replaced. A default value of 0.10 may be optionally used if the replaced device is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; for other types of devices, a default value of 0.2 may be optionally used.	AMS-II G Default Value	Fixed
3	$\eta_{new,y}$	Efficiency of the device being deployed as part of the project activity (fraction); as determined annually[31] using the water boiling test (WBT) protocol carried out in accordance with national standards (if available) or international standards or guidelines. Use weighted average values if more than one type of system is being introduced by the project activity	Efficiency Testing (WBT)	Monitored
4	$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass	Country specific default value	Fixed
5	$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted	IPCC default value for wood fuel	Fixed
6	$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers	AMS-II G default value	Fixed
7	$N_{y,i}$	Number of project devices of type i operating in year y	Usage survey	Monitored

[31] Biennial monitoring (i.e. monitoring once every two years) may be chosen, if the project proponents are able to demonstrate that the efficiency of the cook stove does not drop significantly as compared to the initial efficiency of the new device, over a time period of two years of typical usage.

8	LAF	Leakage adjustment factor to account for leakages	AMS-II G default value	Fixed

To determine the required parameters (shown in table D-3 above) the following steps will be implemented.

Step 1.
Paragraph 13 of the applied methodology, AMS-II.G, provides two approaches to determine the quantity of woody biomass used in the absence of the project activity (B_{old}). Here is chosen to apply approach (a):

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

As official, historical data on woody biomass consumption are not available for the project area, the average annual consumption is estimated based on a survey of local usage. According to the Baseline Surveys[32], and as confirmed also by the site visit, an average household in the project area uses 675 Meticals (equivalent 0.03 USD) to buy charcoal in month which corresponds to around 80 kg of charcoal in month and 2.7 kg/households/day. Average woody biomass needed for production 1 kg of charcoal is assumed to be 7.41 kilograms[33]

B_{old} = charcoal/household/day * average woody biomass needed for production of charcoal * 365 days
= 2.7 kg/household/day * 7.41 kg/kg* 365 days
= 7.3 t/household/year

Step 2.
Option 2 described in the paragraph 12 of the methodology AMS-II.G provides two approaches to determine the efficiency of the baseline systems being replaced (η_{old}). Here below is how to apply the approach (2):

> "*A default value of 0.10 may be optionally used if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney; for other types of systems a default value of 0.2 may be optionally used*."

The baseline charcoal stoves are unimproved models without an improved combustion air supply or flue gas ventilation system[34]. Stoves that lack these types of design characteristics can be assumed to have a low efficiency and thus in accordance to the applied methodology a default value of 0.10 may be used.

η_{old} = 0.10

[32] Cooperação para o Desenvolvimento e Morada Humana (CDM)_2012. Baseline survey.
[33] Brouwer, R. and Falcão, M. P., 2004. Wood fuel consumption in Maputo, Mozambique. Biomass and Bioenergy. Volume 27, Issue 3, September 2004, Pages 233–245. Available at www.sciencedirect.com
[34] Cooperação para o Desenvolvimento e Morada Humana (CDM)_2012. Baseline survey.

Step 3.
In accordance to the applied methodology (AMS-II.G, paragraph 12, Option 2) efficiency of the systems being deployed (η_{new}) is measured using the Water-Boiling-Test (WBT) protocol. The values derived from efficiency tests conducted *ex post* shall be used to calculate *ex post* emission reductions. For the *ex ante* estimations η_{new} is determined based on the manufacturer's specification; the manufacturer specifications state the efficiency of the CH-2200 Charcoal Cooking Stove is 38.2 %[35].

η_{new} = 0.382

Step 4.
In accordance to the applied methodology (AMS-II.G, paragraph 11) fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass ($f_{NRB,y}$) can be estimated using survey methods or government data or default country specific fraction of non-renewable woody biomass values available on the CDM website[36].

The country specific fraction , 91 % for Mozambique[37] is used in accordance with the above description of the applied methodology and the description provided in the PoA.

$f_{NRB,y}$ = 0.91

Step 5.
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 ($NCV_{biomass}$).

$NCV_{biomass}$ = 0.015

Step 6.
According the applied methodology (AMS-II.G, paragraph 11) the value of 81.6 tCO2/TJ is to be used as emission factor for the substitution of non-renewable woody biomass by similar consumers ($EF_{projected\_fossilfuel}$).

$EF_{projected\_fossilfuel}$ = 81.6

Step 7.
According to the applied methodology (AMS-II.G, paragraph 22) the number of project devices that are operating in year y (N_y) needs to be monitored at least every two years. This will be done through a usage survey made on a representative sample as described in the monitoring plan of this CPA.

Step 8.
According to AMS-II.G (paragraph 29) the use of the methodology in a project activity under a programme of activities is legitimate if the following leakages are estimated and accounted for, if required on a sample basis using a 90/30 precision for the selection of samples:

(a) *Use of non-renewable woody biomass saved under the project activity to justify the baseline of other CDM project activities can also be a potential source of leakage. If this leakage*

[35] Colorado State University, 2011. Emissions and Performance Report CH2200.
[36] Default values endorsed by designated national authorities and approved by the Board are available at website: http://cdm.unfccc.int/DNA/fNRB/index.html (site visited 09/01/2014)
[37] http://cdm.unfccc.int/DNA/fNRB/index.html (site visited 09/01/2014)

assessment quantifies a portion of non-renewable woody biomass saved under the project activity that is then used as the baseline of other CDM project activities then B_{old} is adjusted to account for the quantified leakage;

(b) *Increase in the use of non-renewable woody biomass outside the project boundary to create non-renewable woody biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass outside the project boundary then B_{old} is adjusted to account for the quantified leakage;*

(c) *As an alternative to subparagraphs (a) and (b), B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.*

To account for leakage a net to gross adjustment factor of 0.95 (option c above) will be applied. In this case surveys on leakage are not required.

The leakage caused by "devices currently being utilised outside the project boundary transferred to the project activity" described in paragraph 21 of the applied methodology can be neglected as the project stoves are new stoves that has not being used before.

LAF = 0.95

D.5. Demonstration of eligibility for a CPA

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Eligibility criteria

The SSC-CPA meets all the eligibility criteria for inclusion in to the PoA like outlined in section B.2 of the SSC-PoA. This is shown below:

Table D-4. Eligibility criteria

Eligibility criteria	Criteria match	Justification
1. The geographical boundary of the CPA is within the geographic boundaries of Mozambique.	✓	Like described in Section A.7 and Appendix 3 the CPA is limited to the districts of Chamanculo C and Xipamanine in the city Maputo, Mozambique. The boundary is uniquely defined by a GPS coordinate and maps.
2. The CPA ensures that double counting of emission reductions is avoided, through the GPS tracking and identification of each stove with a unique identification number. Evidences are also provided that the CPA has not been and will not be registered as a single CDM project activity or as a CPA of another PoA.	✓	Like described in Section A.7, and in future also in the project database, each energy efficient stove has a unique identification number and GPS coordinate to demonstrate that the stove is a part of the project activity. In addition, CPA has be cross-checked with other CDM project activity/ voluntary carbon activity operating in the same geographic area and it is ensured that the CPA is not included in any other PoA, CDM project activity or voluntary carbon activity.
3. The CPA involves the distribution and installation of efficient cooking stoves.	✓	Like described in Section A.3 the CPA involves the distribution of energy

The specifications of the technology will be included with each CPA-DD		efficient stoves (model CH-2200) to households in the area where the traditional unimproved charcoal stoves are currently used.
4. The start date of the CPA is not be before the start date PoA, i.e. the date on which the CDM_PoA-DD is first published for global stakeholder consultation. The start date will be proofed by documentary evidence like the first stove receipt.	✓	The start date of the CPA is not before the start date of the PoA like described in Section A.8. A receipt of the first stove delivery to the project site will be available for the verification.
5. The CPA uses the latest version of the small scale approved methodology AMS.II.G: Energy Efficiency Measures in Thermal Applications of Non-renewable Biomass.	✓	The CPA uses the version 05.0 of the methodology AMS-II.G[38] which is the latest version of this methodology.
6. The CPA demonstrates additionality	✓	The proposed CPA distributes efficient cooking stoves for the household and the size of each unit is no larger than 5 % (only 0.01%) of the small-scale CDM threshold as proofed in Appendix 4. Thus, In accordance to the paragraph 2 point (c) of EB 68, Annex 27[39] the project activity can be considered additional.
7. The CPA includes a description and documentation about local stakeholder consultation, and environmental impact analysis in the case required by host country.	✓	The description and documentation about local stakeholder consultation is included in Section C. Environmental impact analyses is not required by the host country like described in Section B.
8. It is affirmed that in case of public funding it will not result in a diversion of Official Development Assistance.	✓	There is no public funding involved in the project finance like described in Section A.11.
9. The target group of the CPA are the households cooking with traditional stove for domestic purposes.	✓	The CPA involves distribution of energy efficient stoves to households in the districts of of Chamanculo C and Xipamanine (Maputo) where the traditional unimproved charcoal stoves are currently used. The specifications of the target group is described in Section A.5.
10. The CPA follows the sampling requirements specified in the latest version of Guidelines for sampling and	✓	The CPA follows the sampling requirements specified in Guidelines for sampling and surveys for CDM project

[38] http://cdm.unfccc.int/methodologies (site visited 14/01/2014)
[39] EB 68, Annex 27. (Version 09.0). http://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf

surveys for CDM project activities and programme of activities[40] or any other relevant guidelines.		activities and programme of activities Version 03.0[41], which is the latest version of the guidelines. The sampling plan is described in Section D.7.2.
11. The CPA adheres to the small-scale threshold criteria and remains within that threshold throughout the crediting period.		Appendix 4 of the PDD provides a detailed calculation of the thermal energy savings and shows that the savings don't exceed the 180 GWh_{th} which is the limit for small scale Type II projects.
12. The CPA is not a de-bundled component of another CDM activity or PoA. The requirements for a debundling check as outlined in the latest version of the "Guidelines on assessment of debundling for SSC project activities"[42] are met.	✓	The demonstration that the CPA is not a de-bundling component of another CDM activity or PoA is provided in Section A.12.
13. End users receiving efficient stoves under the CPA contractually cede their rights to claim and own emission reductions to the CME of the PoA.	✓	Like described in Section A.3 users will enter into an agreement with the CPA implementer transferring rights to the CERs generated by CPA in return for the free installation of the improved stove and its on-going maintenance over a lifetime of the CPA.

D.6. Estimation of emission reductions

D.6.1. Explanation of methodological choices

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Estimations of emission reductions are made applying all relevant equations provided the methodology AMS-II.G, version 05.0. The applied methodology requires the following methodological choices to be to be worked out:

- $B_{y,savings}$ is estimated using one the following methods presented in paragraph 12 of the used methodology:
  - Option 1: $B_{y,savings} = B_{old} - B_{y,new}$
  - Option 2: $B_{y,savings} = B_{old} \cdot (1 - \frac{\eta_{old}}{\eta_{new}})$

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

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

[42] EB 54, Annex 13. Guidelines on Assessment of Debundling for SCC Project Activities (Version 03). http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17.pdf

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

- Option 3: $B_{y,savings} = B_{old} * (1 - \frac{SC_{new}}{SC_{old}})$

In accordance to the PoA the option 2 will be used in the proposed project. The justification is described in Section D.4, in Step 2 and 3.

- B_{old} is determined by using one of the following two options presented in paragraph 13 of the used methodology:
  - Option (a): Calculated as the product of the number of systems multiplied by the estimated average annual consumption of woody biomass per appliance (tonnes/year). This can be derived from historical data or a survey of local usage,
  - Option (b): Calculated from the thermal energy generated in the project activity.

In accordance to the PoA option (a) will be used in the proposed project. The justification and detailed calculation is described in Section D.4, in Step 1.

- Leakage

Like described in Step 7 of Section D.4 a net to gross adjustment factor of 0.95, i.e. the option c of paragraph 29 of the used methodology will be applied.

D.6.2. Data and parameters that are to be reported ex-ante

(Copy this table for each data and parameter.)

Data / Parameter	B_{old}
Unit	t/household/years
Description	Quantity of woody biomass used in the absence of the project activity in tonnes
Source of data	Calculation based on the Baseline Survey
Value(s) applied	7.33
Choice of data or Measurement methods and procedures	See section B.4 (Part II), Step 1.
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter is fixed for entire crediting period

Data / Parameter	η_{old}
Unit	Fraction
Description	Efficiency of the system being replaced
Source of data	AMS-II.G Default Value
Value(s) applied	0.10
Choice of data or Measurement methods and procedures	The baseline charcoal stoves are unimproved models without an improved combustion air supply or flue gas ventilation system. Stoves that lack these types of design characteristics can be assumed to have a low efficiency and thus in accordance to the applied methodology (AMS-II.G, paragraph 12) a default value of 0.10 may be used.
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter is fixed for entire crediting period

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
Source of data	Country specific default value[43]
Value(s) applied	0.91
Choice of data or Measurement methods and procedures	According the applied methodology (AMS-II.G, paragraph 11) a default country specific fraction of non- renewable woody biomass (NRB) values available on CDM website can be used.
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter is fixed for entire crediting period

Data / Parameter	$NCV_{biomass}$
Unit	TJ/tonne
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 baseline emissions
Additional comment	This parameter is fixed for entire crediting period

[43] http://cdm.unfccc.int/DNA/fNRB/index.html

Data / Parameter	$EF_{projected\_fossilfuel}$
Unit	tCO2/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 tCO2/TJ is to be used as emission factor for the substitution of non-renewable woody biomass by similar consumers ($EF_{projected\_fossilfuel}$).
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter is fixed for entire crediting period

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. In this case surveys are not required.
Purpose of data	Calculation of leakage
Additional comment	This parameter is fixed for entire crediting period. Survey will not be conducted to determine leakage.

D.6.3. Ex-ante calculation of emission reductions

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***Ex ante* calculation of emission reductions per households under the project activity**

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

$$ER_y = \left(B_{old} * LAF * \left(1 - \frac{\eta_{\text{old}}}{\eta_{new,y}} \right) \right) * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel} * N_{y,i}$$

ER_y = [7.33 * 0.95 * (1- 0.10/0.382)] * 0.91 * 0.015 * 81.6 * $N_{y,i}$

= 5.7 tCO2/household/year * $N_{y,i}$

Where:

ER_y	Emission reductions during the year y in tCO2e
$B_{y,saivings}$	Quantity of woody biomass that is saved in tonnes per household
B_{old}	Quantity of woody biomass used in the absence of the project activity in tonnes per household
η_{old}	Efficiency of the device being replaced
$\eta_{new,y}$	Efficiency of the device being deployed as part of the project activity
LAF	Leakage adjustment factor to account for leakages
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers
$N_{y,i}$	Number of project devices of type i operating in year y

***Ex ante* estimation of Number of households under the project activity**

The stove distribution will be made in years 2014, 2015 and 201. Each of the months around 300-700 stoves will distributed. It is foreseen to distribute one stoves for the families which are traditionally used to cook with one fire stove and two stoves for the families traditionally used to cook with two fire stove Finally, 10,000 new efficient stoves are estimated to be distributed to 6,250 households. The distributed stoves will be included in the project activity from the beginning of the next month in which they have been delivered to the households. For ex ante estimations it is estimated conservatively that only 90% of the households presented in table D-5 would be using the new stoves.

Table D-5. Number of households included at the CPA project activity

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2014	-	-	-	-	-	-	-	-	-	-	-	440
2015	740	940	1,380	1,820	2,260	2,700	3,140	3,580	4,020	4,460	4,900	5,340
2016	5,640	5,840	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250
2017	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250
2018	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250
2019	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250
2020	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250
2021	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	6,250	-	-

***Ex ante* calculation of emission reductions**

The electronic spreadsheet including the calculations for all the years is provided in Appendix 4.

D.6.4. Summary of the ex-ante estimates of emission reduction

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
1.11.2014-31.12.2014	179	0	10	189
2015	14,362	0	798	15,160
2016	30,117	0	1,673	31,790
2017	30,532	0	1,696	32,228
2018	30,532	0	1,696	32,228
2019	30,532	0	1,696	32,228
2020	30,532	0	1,696	32,228
1.1.2021-31.10.2021	25,443	0	1,414	26,857
Total	192,228	0	10,679	202,908
Total number of crediting years	7			
Annual average over the crediting period	27,461	0	1,526	28,987

*As per AMS-II.G leakage has been considered using the leakage adjustment factor (0.95) to adjust B_{old} in the baseline emission estimations (see Appendix 4). Therefore, the leakage emissions presented here are 5 % of the total emission reductions.

D.7. Application of the monitoring methodology and description of the monitoring plan
D.7.1. Data and parameters to be monitored
(Copy this table for each data and parameter.)

Data / Parameter	$\eta_{new,y}$
Unit	Fraction
Description	Efficiency of the device being deployed as part of the project activity in year y
Source of data	Efficiency Testing
Value(s) applied	For the ex ante calculation value 0.382 is used. For the ex post the value is determined through efficiency testing and
Measurement methods and procedures	Efficiency of the appliances is measured using the Water-Boiling-Test (WBT) protocol using the international standard testing protocol[44]. For the *ex ante* estimations $\eta_{new,y}$ is used the value (thermal efficiency of 38.2 %) provided by the manufacturer.
Monitoring frequency	Annually (or biennially)
QA/QC procedures	• The sample size will be chosen for a 90/10 precision (90% confidence interval and 10 % margin of error). In cases where the results indicate that 90/10 precision is not achieved, the lower bound of a 90 % confidence interval of the parameter value can be chosen as an alternative for repeating the survey efforts to achieve the 90/10 precision. • The Water-Boiling-Test is conducted with trained monitoring personal following the international standard testing protocol[45]. • Results from the test will be compared to the value adopted for baseline emission calculations (specifications from the manufacturer) and the conservative value will be considered for *ex post* emission reductions calculation. Testing is also used also to ensure that the stoves are still operating above the minimum 20% efficiency required by the AMS-II.G (version 05.0) methodology. • 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.
Purpose of data	Calculation of baseline emissions
Additional comment	The values derived from efficiency tests conducted *ex post* shall be used to calculate *ex post* emission reductions. For the *ex ante* estimations $\eta_{new,y}$ is determined based on the manufacturer's specification.

[44] For example available at http://www.aprovecho.org/lab/pubs/testing (site visited on 10/01/2014)
[45] For example available at http://www.aprovecho.org/lab/pubs/testing (site visited on 10/01/2014)

Data / Parameter	N_y
Unit	Number
Description	Total number of households using efficient cooking stoves under the project activity
Source of data	Project database records and usage survey on a representative sample
Value(s) applied	For the ex ante calculations it is assumed that 90% of the households would use the distributed efficient stoves presented in Section D.6.3, Table D-5. For ex post calculations the value is estimated via representative sample.
Measurement methods and procedures	The percentage of stoves on a representative sample still in operation in the monitoring period compared to the total number of stoves distributed according to the electronic project database will be assessed. Stoves in operation in the sample will be counted during each monitoring period to derive a drop-out rate (expressed as a percentage) and this percentage deduction will be applied to the total number of stoves.
Monitoring frequency	At least biennially
QA/QC procedures	• The sample size will be chosen for a 95/10 precision (95% confidence interval and 10 % margin of error). In cases where the results indicate that 95/10 precision is not achieved, the lower bound of a 95 % confidence interval of the parameter value can be chosen as an alternative for repeating the survey efforts to achieve the 95/10 precision. • 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 on a monthly basis by specialist of AVSI. The data-base entries will be cross-checked with the purchase contracts. In case of inconsistencies, the AVSI will take appropriate corrective actions. • Usage survey on a representative sample to confirm the share of the households sill 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 baseline emissions
Additional comment	The number of efficient stoves shall remain within the limit of 180 GWh_{th} for type II CDM project activities.

Data / Parameter	t
Unit	Number
Description	Number of months efficient cooking stove will be operational
Source of data	Project database records
Value(s) applied	The expected value is 12 months/year, as the efficient cooking stoves will be operational during the whole year. Only in the following cases the value will be < 12: • Efficient cooking stove is delivered during the year • Drop-outs or replacements has occurred Indicative implementation schedule is presented in section Table D-5.
Measurement methods and procedures	Each sold stove is recorded. The user signs a purchase contract, where the selling date, user´s name and the address and the geographical coordinates of the house are noted, to doubtlessly identify the user. Every efficient cooking stove has an identification number which is also noted on the purchase contract. The information from the purchase contract is transferred to the electronic database. The number of months calculated from the month after the signature of the purchase contract until the end of the monitoring period will be assessed from the project database.
Monitoring frequency	At least biennially
QA/QC procedures	• The unique reference number of each stove is transferred to the project database. The date of distribution is utilized to determine the months of the monitoring period that the stove has been in operation. Any interruption in the stoves' operation (e.g. where stoves are replaced or dropped out) will be registered as a missed operating time in the database. • The database entries of the sold efficient stoves are made on a monthly basis by specialist of AVSI. The database entries will be cross-checked with the purchase contracts. In case of inconsistencies, the AVSI will take appropriate corrective actions. • 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 baseline emissions
Additional comment	Emission reductions of each cooking stove is calculated only from the month after the signature of the purchase contract.

D.7.2. Description of the monitoring plan

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According to AMS-II.G (paragraph 22 and 23) monitoring shall consist of checking all devices or a representative sample thereof, at least ones every two years (biennial) to determine if they are still operating; those devices that have been replaced by an equivalent in-service device can be counted as operating. Monitoring shall also consist of checking the efficiency of all devices or a representative sample thereof annually (or biennially).

> Monitoring consist of checking a representative sample biennially to determine if the improved project stoves are still operating and annual checking of the stove efficiency of a representative sample of the households under the project activity. Where appliances are found to be operational but with a changed efficiency the actual efficiency determined in monitoring will be applied to calculate emission reductions. Where appliances are found not operational these households are excluded from the emission reductions calculations.
>
> Efficiency of the appliances is measured by using the Water-Boiling-Test (WBT) protocol. The test is carried out using the international standard testing protocol[46]. The value obtained from the test will be used to calculate the emission reductions of the systems for that year of operation.
>
> Where there is replacement of appliances, the replaced devices are considered with their related efficiency as applicable. If the appliance is replaced with a higher efficiency appliance, the same efficiency of the earlier appliance will be considered, to be conservative.

According to paragraph 23 of the applied methodology: For project activities using the Kitchen Performance Test Protocol to determine the quantity of fuel saved (i.e. paragraph 12, Option 1), monitoring shall determine the fuel consumption per operating device ($B_{y,new,KPT}$) of all operating devices or a representative sample thereof, annually.

> Annual monitoring of the fuel consumption can be neglected as Option 1 of paragraph 12 is not chosen to determine the quantity of the fuel saved as described in Section D.6.1.

According to paragraph 24 of the applied methodology: If Option (b) in paragraph 13 is chosen for determining B_{old}, monitoring shall include the amount of thermal energy generated by the project technology t in year y.

> B_{old} is determined with the Option (a) and not with Option (b) and thus the monitoring of the thermal energy generated by the project technology t in year y is not needed.

According to paragraph 25 of the applied methodology: In order to assess the leakage, monitoring shall include data on the amount of woody biomass saved under the project activity that is used by non-project households/users (who previously used renewable energy sources). Other data on non-renewable woody biomass use required for leakage assessment shall also be collected.

> Like described in Section D.4 to account for leakage a net to gross adjustment factor of 0.95 (option c of paragraph 29 of the AMS-II.G methodology) will be applied. In this case monitoring of leakage is not required.

Moreover, according to paragraph 26 of the applied methodology monitoring shall ensure that:

[46] For example available at http://www.aprovecho.org/lab/pubs/testing (site visited on 10/01/2014)

(a) Either the replaced low efficiency appliances are disposed of and not used within the boundary or within the region; or
(b) If baseline stoves continue to be used, monitoring shall ensure that the fuel-wood consumption of those stoves is excluded from Bold.

When each new efficient stove is sold the users sign a purchase contract where they agree to be included in the monitoring programme. It is enhanced that the old low efficiency stove will not be more used but instead to be sold to local iron recycling companies. During the verification the number of sold stoves and the number of dismantled stoves can also be compared through the information stored in the electronic database in case the iron recycling companies are collaborating with the project.

In cases if the further use of the inefficient baseline stoves is find out by the monitoring survey made on a representative sample, these households are excluded from the emission reductions calculations. There might be some cases where the users have migrated out of the project area, in such case the new user will be provided with a new stove so that the total number of stoves will remain the same.

The organization of the project monitoring

Table D-6. The organization of the project monitoring

Actor	Responsibilities and roles
Fondazione AVSI (local desk Mozambique)	- Coordinates the monitoring activities on the project site - Administrator of the electronic monitoring database responsible on the data entries into it - Stores the original monitoring documents - Hires, trains and supervises the distribution and monitoring teams on their work
LAMA Development and Cooperation Agency soc. coop.	- Supports AVSI on monitoring activities by assessing and evaluating socio-economic impacts at the project area and on people wellbeing and capabilities
CarbonSinkGroup s.r.l.	- Supports AVSI with the monitoring activities (surveys and stove efficiency testing) in close collaboration with LAMA Development and Cooperation Agency soc. coop. providing know-how on aspects related on carbon management, project implementation in line with CDM guidelines and UNFCCC procedures - Participates in monitoring data assessment - Prepares the monitoring report to be provided to the DOE for verification of emission reductions
Distribution team	- Works under the supervision of AVSI - Reports the results to AVSI on the stove distribution - Reports the results to AVSI on the possible supply of the of the old inefficient stoves to iron recycle companies
Monitoring team	- Works under the supervision of AVSI - Participates to the monitoring surveys - Reports the results to AVSI

Data archiving

The purpose of data archiving is to provide enough information to enable full monitoring for each monitoring period. The electronic project database included, for example, the information from the purchase contracts, the possible receipts of the selling of the stoves to the iron recycling companies as well as the data obtained during the usage surveys are transferred to the electronic database. A back-up of the database is made regularly and stored in a hard-copy form like CDs. The electronic project database and the backups will be operated and maintained by AVSI. The original copies of the field documents will be stored in the local office of AVSI in Maputo. 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.

Sampling plan

According to "Standard for sampling and surveys for CDM project activities and programme of activities (Version 04.1)"[47] sampling plan should include a description of the sampling approach, important assumptions, and justification for the selection of the chosen approach. Moreover, according to the "Guidelines for sampling and surveys for CDM project activities and programme of activities (Version 03.0)"[48] the sampling plan should contain information relating to (A) sampling design; (B) data to be collected; and (C) implementation plan.

A. Sampling design

A.1 Objectives and reliability requirements

The objective of the sampling is to determine and monitor variable parameters described in Section D.7.1, including the proportion of the households annually operating the efficient cooking stoves under the CPA activity (N_y) and to check the efficiency the stoves (η_{new}) during the monitoring period. The desired precision for all parameters is 95/10 (95 % confidence interval and 10 % margin of error) when monitored biennially. In case of annual surveys, a 90% confidence interval and a 10% margin of error shall be achieved for the sampled parameters. In cases where the survey results indicate that 95/10 precision or 90/10 precision are not achieved, the lower bound of 95% or 90% confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve 95/10 or 90/10 precision.

Moreover, one objective of the monitoring is to assess socio-economic impacts. This part of the monitoring is made by LAMA following their reliability requirements. To monitor socio-economic impacts of the project, LAMA will make a socio-economic analysis in the final evaluation of the project. For the socio-economic analysis LAMA is foreseen to:

- Collect locally reliable data on health, to understand the changes in respiratory tract infections found locally.
- Evaluate, using quality–quantitative analysis, the changes in capability dimensions of beneficiaries (especially women) that are affected by the project.
- Assess the individual and collective dimensions of empowerment caused by the project.
- Assess the cultural acceptance of the new technology and the cultural factors that may influence the decision making process concerning households decision linked to the project.

[47] CDM-EB50-A30-STAN (Version 04.1). Available at http://cdm.unfccc.int/Reference/Standards/index.html (site visited 09/01/2014)

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

- Assess how the saved money is used, and how much the project increases the possibilities of families for consumption.
- The project can provide also useful tools for local economy, in particular for the production and sale of meals on local markets. This aspect will be considered in the evaluation.

A.2 Target population

Target population is all the households included in the CPA project activity. Target populations consist of urban residential households in the districts of Chamanculo C and Xipamanine. These households used prior to project activity inefficient cooking stoves.

A.3 Sampling method

As a sampling method a "Simple random sampling" is chosen to estimate the proportion of the households operating the efficient cooking stoves as well as the efficiency of the stoves. The simple random sampling is an appropriate method as it is assumed that the population living in the project area is homogenous compared to the continued use of the efficient CH-2200 cooking stoves. Moreover, the CH-2200 cooking stoves distributed under the project activity are industrial products and can thus be assumed to have constant quality.

A.4 Sample size

As there are two parameters to be monitored through a survey on a representative sample (N_y and $\eta_{new,y}$) and therefore it is selected to make two separate surveys. The sample size is therefore determined for each parameter separately.

In accordance to paragraph 12 of the "Guidelines for sampling and surveys for CDM project activities and programme of activities"[49] the equation to calculate the required sample size for annual determining of $\eta_{new,y}$ can be written as follows:

$$n \geq \frac{1.645^2 N * p(1-p)}{(N-1) * 0.2^2 * p^2 + 1.645^2 p(1-p)}$$

$$n \geq \frac{1.645^2 * 6{,}250 * 0.6(1-0.6)}{(5{,}000-1) * 0.2^2 * 0.6^2 + 1.645^2 0.6(1-0.6)}$$

$$n \geq 44.8$$

Where:

n	Sample size
N	Total number of households (6,250)
p	Expected proportion (0.60[50])
1.645	Represents the 90% confidence required
0.2	Represents the 10% relative precision

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

[50] To be conservative it is assumed that that 60% of the efficient stoves would operate with the efficiency stated by the manufacturer.

Therefore the required sample size is at least 44.8 households. To be conservative it is expected the response rate from the sampled households is to be only 80% thus the sample size is scaled up accordingly. The sample size for the survey is chosen to be 44.8/0.8 = 56 households.

The equation to calculate the required sample size for biannual determining of N_y can be written as follows:

$$n \geq \frac{1.96^2 N * p(1-p)}{(N-1)*0.2^2 * p^2 + 1.96^2 p(1-p)}$$

$$n \geq \frac{1.96^2 * 6{,}250 * 0.5(1-0.5)}{(7{,}725-1)*0.2^2 * 0.5^2 + 1.96^2 0.5(1-0.5)}$$

$$n \geq 94.6$$

Where:

n	Sample size
N	Total number of households (6,250)
p	Expected proportion (0.50[51])
1.96	Represents the 95% confidence required
0.2	Represents the 20% relative precision[52]

Therefore the required sample size for biannual determining of N_y is at least 94.6 households. To be conservative it is expected the response rate from the sampled households to be 80%, and thus the sample size is scaled up accordingly to be 118 households (94.6/0.8 = 118 households).

A.5 Sampling frame

The sampling frame for all monitored parameters is the list of all the households under the CPA project activity i.e. all the households which have signed the purchase contract of the new efficient cooking stoves. The list can be obtained from the project database and it is available for check controls during the verification. 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.

B. Data to be collected

B.1 Field measurements

The method of collecting data will be field surveys of required sample size of efficient stove users in the database. Frequency of data collection is one survey per monitoring period. Data will be collected from the field surveys, entered in the database and included in the monitoring report.

[51] To be conservative it is assumed here that only that 50% of the efficient cook stoves would be operating

[52] Relative margin of error = absolute margin of error divided by the sample's point of estimate 0.1/0.50 = 0.2

Identification of all variables to be measured
The variables to be measured area η_{new} and N_y as described in the Section D.7.1.

Determination of appropriate timing
The sampling will occur at the end of each monitoring period and all the measurements will be conducted at the latest 6 months after the end of the specific monitoring period. The maximum length of one monitoring period will be two years (duration, not calendar years). Therefore the measurement will be conducted at the latest 24 + 6 months after the start of the specific monitoring period.

Frequency of measurements
All measurements will be one time measurements, i.e. for the determined number of samples the measurement will only be conducted once per sample.

Seasonal fluctuations
When the measurements are conducted only during limited time periods and are to be scaled up to the whole year, it needs to demonstrate that the parameter of interest is not subject to seasonal fluctuations or the time period selected is conservative or the necessary corrections are applied.

Parameter	Demonstration
η_{new}	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the water boiling test (WBT) protocol is not affected by seasonal fluctuations.
N	Total number of households using the CH-2200 cooking stoves under the project activity is not affected by seasonal fluctuations since the decision whether the CH-2200 or the baseline appliance is used depends on a household decision
t	Number of months the CH-2200 cooking stove will be operational is not scaled up for the whole year.

Description of measurement methods
Methods of measurement for each variable are described in the Section D.7.1. Measuring methods are to ensure that the field data collection is performed properly and that any potential intentional errors or unintentional errors are minimized and documented.

B.2 Quality assurance/Quality control

Procedures for conducting the data collection and/or field measurements

Measuring methods for data collection and field measurements described in Section D.7.1 are to ensure that the data collection is performed properly and that any potential intentional errors or unintentional errors are minimized and documented.

Data collected during the monitoring as well the data entered to the project database will be checked regularly by Fondazione AVSI. In case of inconsistencies, Fondazione AVSI will take appropriate corrective actions. All the monitoring data will be stored for the crediting period for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later. Appropriate record keeping procedures will be implemented to ensure that each monitoring period data set can be transparently attributed to the CPA, preventing any occurrences of double counting.

All personnel involved in the monitoring will be trained by Fondazione AVSI before performing any monitoring activities. The training includes the provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response and the documentation of above mentioned cases. Fondazione AVSI will ensure that personnel taking part in the monitoring undertakes

an appropriate monitoring assignment according to the monitoring plan. Only trained people are qualified to be involved in the monitoring.

Provisions for maximizing response rates

The sample size is be chosen for a 95/10 precision (95 % confidence interval and 10 % margin of error) when monitored biennially. In case of annual surveys, a 90% confidence interval and a 10% margin of error shall be achieved for the sampled parameters. In cases where the survey results indicate that 95/10 precision or 90/10 precision are not achieved, the lower bound of 95% or 90% confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve 95/10 or 90/10 precision. To be conservative it is expected the response rate from the sampled households is to be only 80% thus the sample size is scaled up accordingly.

Procedure for refusals and non-respondents

Refusals and non-respondents (i.e. households where the contact could not be established) will be recorded by the monitoring team as well as the reason for the refusal. In case a household refuses to participate in the monitoring effort, the monitoring team will record the reason for the refusal. If the refusal is due to a likely non-use of the CH-2200 cooking stove, this household will be counted as Drop-Out. If the reason is e.g. a time constraint which cannot be solved by repeating the survey effort at this household at another date, the household will be replaced by another household chosen at random. Where appliances are found not operational these households are excluded from the emission reductions calculations.

Procedure for defining outliers

Outliers will be defined as those data points with values greater than three standard deviations from the mean of the sample. Data/measurements data points identified as outliers will be examined further to correct for possible transcription and data entry errors, but will be omitted from the analysis if no such administrative errors exist.

B.3 Analysis

Fondazione AVSI will assess all the monitoring data with the help of CarbonSinkGroup. CarbonSinkGroup is responsible for preparing the monitoring report which will present the data used to calculate the emission during the specific monitoring period. Monitoring report will be provided for the DOE for verification.

C. Implementation plan

C.1 Schedule for implementing the sampling effort

As mentioned above, the schedule for implementing the sampling effort shall be so that within 6 months after the end of the specific monitoring period the effort can be finalized.

C.2 Skills and resources required for data collection and the analyses

Fondazione AVSI will be responsible for managing data collection and data entries into the project database as well as analyses of the data. People participating in the monitoring will receive training organized by AVSI to ensure that all personnel have the skill required for his/hers particular monitoring task. The personnel participating in the monitoring needs to certify that they have no conflicts of interest. If there is conflict of interest, the personnel will not be allowed to participate in data collection and

analysis. Any people participating in the on-site monitoring will be required to speak the local language, or will be accompanied by interpreters, allowing for full understanding of any responses given by users, and any questions therein.

SECTION E. Approval and authorization

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The managing entity has obtained the Letter of Approval (LoA)[53] from the Host Party Designated National Authority (DNA).

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[53] DNA Mozambique, 2013. Letter of Approval (LoA)

Appendix 1: Contact information on entity/individual responsible for the CPA

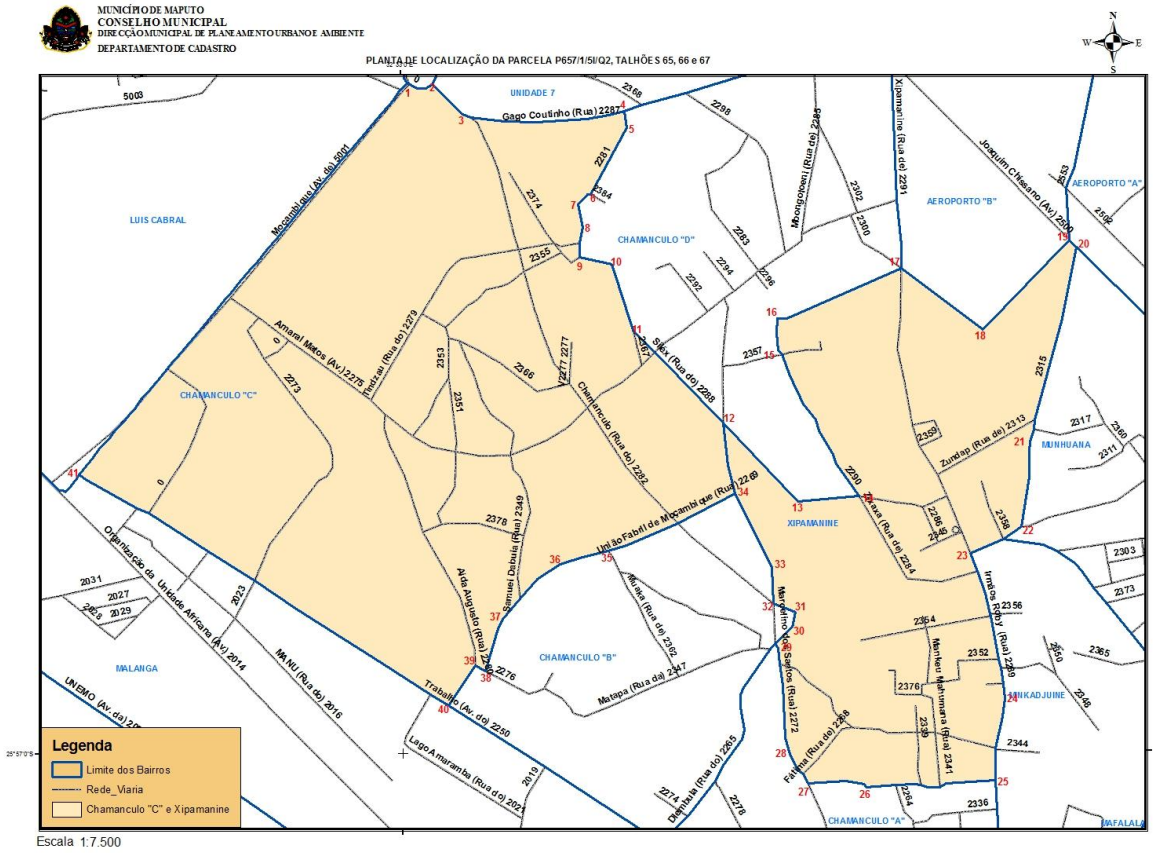
Organization	Fondazione AVSI
Street/P.O. Box	4, Via Legnone
Building	
City	Milano
State/Region	
Postcode	20158
Country	Italy
Telephone	+39 02 6749881
Fax	+39 02 6749 0056
E-mail	info@avsi.org
Website	www.avsi.org
Contact person	Giorgio Capitanio
Title	Mr.
Salutation	Country Representative
Last name	Capitanio
Middle name	
First name	Giorgio
Department	
Mobile	+39 347 4263726
Direct fax	+39 02 6749881
Direct tel.	
Personal e-mail	giorgio.capitanio@avsi.org

Appendix 2: Affirmation regarding public funding

N/A

Appendix 3: Applicability of the selected methodology(ies)

1. Map and GPS coordinates of the project area



Appendix 3, Imagine 1. Map of the project area with the reference points of the geographic coordinates.

Appendix 3,Table 1. Geographic coordinates of the project area[54]

Reference point in the map presented in Imagine 1	Geographical Reference	
	Latitude	Longitude
1	454957,037	7131469,928
2	455021,057	7131466,392
3	455098,252	7131389,687
4	455508,270	7131399,348
5	455512,759	7131357,339
6	455422,523	7131188,194
7	455390,942	7131162,027
8	455403,212	7131104,517
9	455394,890	7131030,214
10	455475,498	7131010,742
11	455528,619	7130844,468
12	455757,926	7130611,223
13	455946,724	7130411,234
14	456101,852	7130426,088
15	455896,447	7130795,720
16	455893,939	7130874,797
17	456208,297	7131001,807

[54] These coordinates area presented also in KML-format "CPA1_KML_borders"

18	456414,045	7130846,653
19	456632,616	7131073,252
20	456650,604	7131054,903
21	456532,447	7130537,033
22	456512,349	7130347,519
23	456382,532	7130280,147
24	456469,565	7129912,713
25	456445,525	7129707,727
26	456119,915	7129689,098
27	455972,556	7129698,291
28	455925,820	7129773,510
29	455888,989	7130052,369
30	455932,276	7130094,011
31	455939,889	7130131,854
32	455885,068	7130153,637
33	455880,570	7130244,526
34	455787,690	7130432,668
35	455466,099	7130287,717
36	455344,631	7130253,582
37	455200,661	7130114,124
38	455155,186	7129983,926
39	455130,740	7129997,071
40	455061,919	7129896,116
41	454128,554	7130479,116

Appendix 4: Further background information on ex ante calculation of emission reductions

1. A separate electronic spreadsheet “CPA1_ex ante_ER_calculations”

Appendix 5: Further background information on monitoring plan

N/A

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History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project design document form for small-scale component project activities" (EB 66, Annex 17).
01	EB33, Annex44 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		