Programme design document form for small-scale CDM programmes of activities

(Version 03.0)

Complete this form in accordance with the Attachment "Instructions for filling out the programme design document form for small-scale CDM programmes of activities" at the end of this form.

PROGRAMME DESIGN DOCUMENT (PoA-DD)	
Title of the PoA	Improved Cook Stoves programme for Rwanda
Version number of the PoA-DD	7.0
Completion date of the PoA-DD	23/06/2014
Coordinating/ managing entity	atmosfair gGmbH
Host Party(ies)	• Rwanda • Cameroon
Sectoral scope(s) and selected methodology(ies), and where applicable, selected standardized baseline(s)	II.G AMS-II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass Version 03

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

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Title: Improved Cook Stoves programme for Rwanda
Version: 7.0
Date of Completion: 23/06/2014

A.2. Purpose and general description of the PoA

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1. General operating and implementing framework

The programme will replace traditional stoves with high efficiency biomass fired cook stoves (hereafter referred to as "Improved Cookstoves" or "ICS[1]") in Rwanda and Cameroon. Rwanda is amongst the Least Developed Countries (LDCs) in the world[2]. The use of woody biomass (wood and charcoal which is derived from wood) leads to deforestation, erosion and environmental problems. The use of charcoal also leads to high cost for households for cooking.

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

The PoA will be implemented by atmosfair gGmbH who is the cooperating/managing entity (hereafter referred to as "CME") for the PoA. In Rwanda, ENEDOM Domestique s.a.r.l (hereafter referred to as ENEDOM) and in Cameroon, Pro Climate International (hereafter referred to as Pro Climate) or other Implementing Entities (hereafter referred to as "IE(s)") will be responsible for the on the ground distribution of stoves.

2. Policy/measure or stated goal of the PoA

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

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

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

There are no laws or regulations in Rwanda or Cameroon stipulating the use of efficient cook stoves. Existing laws and regulations concerning the protection of forestry areas in Rwanda and Cameroon are partly not enforced. For further details, please refer to Section B.1.

Sustainable development:

Environment

Introduction of the programme will help to preserve the existing forests due to current consumption activities of biomass, particularly woods. Furthermore, it will help preventing adverse changes in the ecosystem as a result of deforestation leading to erosion which could harm the local

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

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

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

Social

The implementation of the PoA will create temporary and permanent employment opportunities through dissemination, assembly, and customer support activities. Other opportunity will come from monitoring activities which may also involve people from the local community.

Economic

The PoA will yield environmental, social as well as economic benefit.
If households are purchasing charcoal or wood, the costs savings from switching to wood or by reducing the wood consumption will result in a substantial reduction of expenditures for the daily fuel consumption for cooking. Less money will be spent on charcoal and wood and more money will be available to be spent on food, medical care and education. Thus, local people will have opportunity to enjoy a higher standard of living and they will acquire knowledge about energy and environmental conservation.
For households currently cooking with collected wood the application of more efficient stoves will reduce time spent collecting firewood by the community resulting in more time which can be used to perform income-producing activities (more time can be saved to earn cash or produce other goods and services/boosting family's income).

The programme will be developed as a CDM Gold Standard Programme of Activities

A.3. CMEs and participants of PoA

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atmosfair gGmbH is the CME of the PoA who shall communicate with the Executive Board. Contact details are listed in Annex 1. It is also the project participant of the PoA.

A.4. Party(ies)

Name of Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Rwanda (host party)	atmosfair gGmbH	No
Cameroon (host party)	atmosfair gGmbH	No

A.5. Physical/ Geographical boundary of the PoA

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The geographical area within which all small-scale CDM programme activities (SSC-CPAs) included in the PoA will be implemented, is the Republic of Rwanda and Republic of Cameroon.

Geographic coordinates:

2.0000°S 30.000°E[3]

Figure: Map of Rwanda

Geographic coordinates:

6.0000°N 12.000°E[4]

Figure: Map of Cameroon

A.6. Technologies/measures

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Under the SSC-PoA ICS will be deployed which will reach a specified efficiency of at least 20%. Each CPA under the PoA shall only disseminate one cook stove technology. The technical description and technical details shall be described in the respective SSC-CPA-DD.

The first type of ICS disseminated for household usage under the PoA in Rwanda will be the “SAVE80”, a portable stove made of stainless steel, developed and prefabricated by a German manufacturer and assembled locally. As per specification of the manufacturer, the SAVE80 needs only about 250 g of wood to bring 6 litres of water to the boil, 80% less than traditional fire places and has a specified thermal efficiency of 52%[5]. The design ensures preheating of the air and a complete combustion with no visible smoke and only small amounts of ash.

Design of the SAVE80 may develop over time to increase the user friendliness of the stove. The SAVE80 system also comes with a heat retaining device (called Wonderbox), in which a pot can be transferred after the food reaches the boiling temperature, and where it will continue to simmer until it is well cooked. The Wonderbox allows important energy savings in addition to the savings by the Save80 stove. However, these energy savings will not be taken into account for calculating emission reductions which is increasing the overall conservativeness of the emission reduction calculations.

A.7 Public funding of PoA

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There is no public funding public from Annex I countries of the UNFCCC involved in the PoA.

[3] https://www.cia.gov/library/publications/the-world-factbook/geos/rw.html

[4] https://www.cia.gov/library/publications/the-world-factbook/geos/cm.html

[5] See manufactures specifications

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

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The proposed PoA is a voluntary coordinated action

The PoA is a voluntary coordinated action by atmosfair. There is no mandatory programme in Rwanda or Cameroon to foster the dissemination of Improved Cooking Stoves.

The proposed voluntary coordinated action would not be implemented in the absence of the PoA

The voluntary coordinated action would not be implemented in the absence of the PoA, due to the high financial barriers. The voluntary coordinated action is not financially viable in the absence of CDM. All external funding stems from CDM, other external funding is not available. Therefore, the programme would not have been implemented in the absence of CDM.

The additionality for the SSC-CPA does not need to be demonstrated by barrier analysis in line with EB 68, Annex 27, "Guidelines on the demonstration of additionality of small-scale project activities" (version 9) where it says as follows:

According to para 2 of the guidelines "Documentation of barriers […] is not required for the positive list of technologies and project activity types that are defined as automatically additional for project sizes up to and including the small-scale CDM thresholds (e.g. installed capacity up to 15 MW). The positive list comprises of:

[…]

(c) Project activities solely composed of isolated units where the users of the Technology / measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale CDM thresholds;"

As demonstrated under Section C, debundling check, it is obvious that under baseline scenarios 1-3 (ICS for households), the size of a unit cannot even exceed 1% of the SSC threshold.

As such, a CPA applying baseline scenarios 1-3 (ICS for households) is additional.

If a CPA applies scenario 4 (institutional stoves) and the calculation as for the debundling check reveals that a unit is larger than 5% of the SSC threshold, the additionality for the SSC-CPA needs to be demonstrated in the specific CPA-DD in line with either EB 68 Annex 27, para 1 or EB 68 Annex 26 and to be validated by a DOE before inclusion into the PoA-DD.

B.2. Eligibility criteria for inclusion of a CPA in the PoA

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NNr	Eligibility Criteria		Mean of proof	Supporting Monitoring Criteria (for cross checking)
	Description	Conditions to be met		
1	Technological requirements	The CPA consists of distribution of one type of new ICS only as defined in the CPA-DD, and hence small appliances involving the efficiency improvements in the thermal applications of non-renewable biomass as per AMS-II.G.	Specification of stove type and compliance with the requirements of AMS-II.G. in the specific CPA-DD to be added	Number of stoves monitored
2	Boundary and location of the CPA	The CPA is located within Rwanda or Cameroon.	Location and boundary is specified in the specific CPA-DD stating that the location is	User details (Name, place of

			limited to either Rwanda or Cameroon.	living, etc.) is recorded
3	Definition of CPA Baseline	1. if the CPA is only including ICS for household level (scenario 1) to 3) as defined in Part II - Section B.4 of this PoA-DD): The CPA applies the baseline fuel consumption as defined in this PoA-DD 2. if the CPA is only including institutional ICS (as defined in scenario 4) in Part II - Section B.4 of this PoA-DD): the baseline is to be defined in the specific CPA and validated by the DOE prior to CPA inclusion.	1. CPA states that only household ICS are to be implemented under the CPA 2. Baseline is defined in the specific CPA-DD according to the regulations specified in AMS-II.G. and validated by a DOE before inclusion into the CPA.	1. na 2. defined at CPA level
4	Efficiency of the ICS	The stove type disseminated under the CPA has a specified efficiency of at least 20%	Manufactures specifications will be the first option of choice. If not possible other options allowable by AMS-II.G. will be used	Efficiency of the ICS is monitored
5	SSC Limit for CPAs	The CPA will remain under the thermal threshold of 180 GWh thermal energy savings	The maximum number of ICSs will be determined in each CPA-DD. During verifications the DOE needs to assess, that the small scale limit (180 GWh per CPAs) was not exceeded at any time for any CPA.	Calculated using monitored parameters listed in Part II - B.7.1.
6	Monitoring	A unique numbering or identification system for the stoves disseminated is applied	The specific numbering or identification regime is included in the specific CPA-DD	Monitored
7	De-bundling	The CPA is exclusively bound to the PoA. Confirmation that the programme activity has not been and will not be registered either as a single CDM project activity or as a CPA under another PoA.	For CPAs applying ICS under scenario 1)-3): A statement is included in the CPA-DD that no ICS distributed under the specific CPA will be part of another single CDM project activity or CPA under another PoA For CPAs applying ICS under scenario 4) (institutional stoves) as defined under Part II - Section B.4 the necessity for a debundling check per system needs to be assessed before proposing the CPA for inclusion.	---
8	CER ownership	End users receiving ICS under the specific CPA contractually cede their rights to claim and own emission reductions under the Clean Development Mechanism of the UNFCCC to	The default ICS purchase contract for end users is including the provision that emission reductions generated by the stove are owned by the CME	---

		the CME of the PoA		
9	Additionality for ICS under scenario 4) only	The additionality of the CPAs including stoves as described under scenario 4) in Part II - Section B.4 can be demonstrated in the CPA	Proof of additionality to be demonstrated in the specific CPA-DD and to be validated by a DOE before inclusion into the PoA-DD	Defined at CPA level
10	Type of ICS	Each CPA is only including baseline stoves of either scenario 1) to 3) or scenario 4) as defined in Part II - Section B.4	The specific CPA-DD is specifying the type and model of the ICS which belongs to either scenario 1) to 3) or 4)	Type of stove monitored
11	Additionality of CPAs	Additionality is demonstrated as described in detail in Section B.1 of the PoA DD. Applying paragraph 2. (c) of EB 68 Annex 27 (Guidelines on the demonstration of additionality of small-scale project activities v.9.0)	For CPAs applying ICS under scenario 1)-3): Eligibility criteria 7) (debundling) needs to be fulfilled. For CPAs applying ICS under scenario 4) (institutional stoves) as defined under Part II - Section B.4. proof needs to be provided, that the energy savings of each institutional stove does not achieve 3,000 MWh of energy savings per year or 3,000 tonnes of emission reductions per year.	---
12	Start date of the CPA	Confirmation that the start date of any CPA is not, or will not be, prior to the commencement of validation of the programme of activities, i.e. the date on which the CDM-POA-DD is first published for global stakeholder consultation (14/05/2011)	Documentary evidence is provided to support the start date of the CPA. Date of first publishing for global stakeholder consultation is stated on the UNFCCC webpage	---
13	Compliance with applicability conditions of AMS-II.G.	The CPA is in compliance with all applicability conditions as stated in AMS-II.G.	The compliance of the CPA with the applicability conditions is demonstrated in the specific CPA-DD	---
14	Sampling requirements	The sampling requirements as stipulated in the monitoring plan of the PoA-DD (which is in line with the guidelines/standard from the EB pertaining sampling and surveys) are implemented.	The requirements for sampling as stipulated in the PoA-DD are reflected in the specific CPA-DD.	---
15	None diversion of ODA	Funding from Annex I parties for the implementation of the PoA, if any, does not result in a diversion of official development assistance (ODA)	A statement is provided that either no ODA is included in the financing of the CPA or a statement that the funding does not result in a diversion of ODA.	---

B.3. Application of technologies/measures and methodologies

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Title: Type II - Energy Efficiency Improvement Project
Reference: II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass
Version: 03, EB 60, (15 April 2011), valid since: 29/4/2011

The project activities in the PoA fall under a project of category II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass, as defined in the "SSC&MP".
The thermal energy savings of each CPA is below the qualifying limit under the small scale methodology AMS-II.G., by up to the equivalent of 180 GWh in any year of the crediting period (see also F-CDM-SSCwg version 01 SSC_233, 04 November 2008). Consequently, AMS-II.G. is applicable.

B.4. Date of completion of application of methodology and standardized baseline and contact information of responsible person(s)/ entity(ies)

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Date of completion of application of methodology: 23/06/2014
Contact information of responsible person for completion of application of methodology:
Xaver Kitzinger
CDM Project developer
atmosfair gGmbH
Zossener Strasse 55-58
Aufgang D – 6. OG
Berlin 10961
Germany
kitzinger@atmosfair.de

SECTION C. Management system

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Roles and responsibilities of personnel

atmosfair gGmbH is the Coordinating / Managing Entity (CME) for the PoA and is the overall in-charge for operational and management arrangements for the implementation of the PoA. Atmosfair or an entity assigned by atmosfair shall have the following responsibilities with respect to the implementation of the PoA:

- Creating PoA documentation (PoA-DD and CPA-DD forms)
- Check for compliance of CPAs with inclusion eligibility criteria
- Obtaining Letter of Authorization from host country
- Obtaining Letter of Approval from the Annex I party involved in PoA
- Coordinating and communicating with the validating/verifying DoE and the EB
- Drafting monitoring reports for all CPAs in accordance with the methodology outlined in the PoA-DD
- Requesting the UNFCCC to issue CERs into a registry account of the CER buyer(s)

Record keeping system for each CPA under the PoA

The CME will keep electronic files for each CPA under the PoA, which contains the following information per CPA[6]:

- Name and ID of the CPA
- Type of appliance (ICS type) deployed

[6] The record keeping system should collect as many information as necessary to facilitate the Verification of the CERs. At the current point of time the list of information seems ideal but may be extended or condensed. The collection of all the items is therefore not mandatory and additional information may be collected as well.

- Name and contact details of the registered IE's for the CPA
- Serial numbers (Stove-ID) of all systems belonging to the CPA
- Start of CPA crediting period
- CERs issued per verification period

This database will be updated as per the progress of the CPA.

The stove records database will contain specific information as outlined in section B.7.2.

Procedure to avoid double counting

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

To ensure this the record keeping system will cover the following information:

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

Procedure to check for debundling

According to the "Guidelines on assessment of debundling for SSC project activities, v03 (EB 54, Annex 13, par. 10) for determining the occurrence of debundling under a Programme of Activities (PoA)", if each of the independent subsystem/measures included in the CPA of a PoA is not larger than 1% of the small scale threshold defined by the methodology applied, than that CPA of PoA is exempted from performing de-bundling check, i.e. considered as being not a de-bundled component of a large scale activity.

The small-scale threshold defined by the methodology applied, AMS-II.G. , is 180 GWh thermal energy savings per year. Thus, 1% corresponds to 1.8 GWh thermal energy savings per year.

The corresponding in equation is:

$$1.8\frac{GWh}{year} > B_{old,appliance,i} \cdot \left(1 - \frac{\frac{\eta_{charcoal\_stove,2} \bullet NCV_{charcoal}}{f_{biomass/charcoal} \bullet NCV_{biomass}}}{\eta_{new}}\right) \cdot \frac{NCV_{biomass}}{3.6\frac{TJ}{GWh}}$$

Table: Parameters required for debundling check (Index i comprises four options according to the scenario 1)-4) illustrated in Part II - section B.4. Please note: if instead of index i specific scenarios are selected the scenario number is stated as subscript as follows: X_1 = parameter X refers to scenario 1 only, $X_{1,2}$ = parameter X refers to both scenarios 1 and 2)

Parameter	Unit	Description	Value applied	Source
$B_{old,appliance,i}$	T	Quantity of woody biomass used in the absence of the project activity in tonnes, per appliance	Calculated	Na
$\eta_{charcoal\_stove,2}$	%	Efficiency of the baseline system of scenario 2 being	20%	See Part II - Section B.6.2 ($\eta_{charcoal\_stove,2}$),

		replaced (fraction)[7]		
η_{new}	%	Efficiency of the system being deployed as part of the project activity (fraction)	100%	conservative assumption
$NCV_{biomass}$	TJ/t	Net calorific value of the non-renewable woody biomass that is substituted	0.015	IPCC (See Part II - Section B.6.2)
$NCV_{charcoal}$	TJ/t	Net calorific value of charcoal	0.0295	IPCC (See Part II - Section B.6.2)
$f_{biomass/charcoal}$	number	Conversion factor for wood to charcoal	9	See Part II - Section B.6.2

Applying the concrete values for the most conservative scenario (Scenario 2) for $B_{old,appliance,2}$, $NCV_{biomass}$ and $\eta_{charcoal\_stove\,2}$ and conservatively assuming a value of 100% for η_{new} [8] it is demonstrated that in order to exceed the maximum energy savings per improved cook stove - the 1% SSC threshold – the minimum quantity of woody biomass per appliance used in the absence of the project activity would be **451.74 t** per year.[9]

The maximum baseline per capita consumption of fuel wood in Rwanda is 1.62 t per year and in Cameroon is 0.6305 t per year (see Part II - Section B.6.3.: $B_{old,capita,2}$ for Rwanda and $B_{old,capita,3}$ for Cameroon).

It can therefore be shown that an ICS with a 100% thermal efficiency would need a household size of more than 279 people in case of Rwanda and 762 in case of Cameroon to exceed the SSC threshold. It is obvious that a household size of 279 or 762 people is unrealistic.

As the ICS are only intended for households under scenario 1) to 3) (as defined in Part II - Section B.4) each CPA applying household ICS is therefore exempted from the de-bundling check as a household cannot reasonably exceed the limit for the SSC threshold.

The necessity for a debundling check for stoves under scenario 4) (as defined in Part II - section B.4) will be determined in each CPA which is applying scenario 4) ICS.

Awareness and agreement of those operating a CPA on PoA subscription

Agreements with Implementing Entities will ensure that all parties involved in implementing the CPAs are aware and agree that the CPAs are subscribed to the PoA.

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

Arrangements for training and capacity development of personnel

[7] In order to calculate the amount of woody biomass the conversion factor for wood to charcoal needs to be taken into account (see section B.6.3. Step 1)

[8] Applying scenario 2 baseline stoves for the debundling check is the most conservative scenario as it results in the lowest energy savings of all three scenarios. This is because the lower the effective efficiency of an ICS the smaller are the biomass savings which can be achieved. Applying scenario 1) the minimum quantity of woody biomass per appliance used in the absence of the project activity would be 467,78 t per year and for scenario 2) 480,00 t per year.

[9] See ER calculation spreadsheet

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

Measures for continuous improvement

The CME will organize meetings with staff to review the performance of the PoA management system on a semi-annual basis to identify issues that needs to be addressed in order to obtain continuous improvements of the PoA management system. The minutes of the meeting will be kept on file for record.

SECTION D. Duration of PoA

D.1. Start date of PoA

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01/10/2012 or date of registration of the PoA whichever is later

D.2. Duration of the PoA

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28 years according to “Procedures for registration of a programme of activities as a single CDM project activity and issuance of certified emission reductions for a programme of activities” Para 6. h) EB55, Annex 38

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

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1. Environmental Analysis is done at PoA level ☑
2. Environmental Analysis is done at SSC-CPA level ☐

E.2. Analysis of the environmental impacts

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According to the standard regulation in Rwanda published on the website of the DNA of Rwanda no Environmental Impact Assessment (EIA) is required for the proposed programme and hence a typical CPA. Further, in Cameroon given the Decree n° 2013/0171/PM[10] of February 14th, 2013, setting the conditions and procedures for carrying out EIAs and the Order n° 0069/MINEP[11] of March 8th 2005, which defines the categories activities for which an EIA is required, it can be confirmed that an EIA is not required for a typical CPA.

Furthermore no Environmental Impact Assessment is required as no negative environmentally impacts are expected during dissemination and operation of the ICS.

No direct transboundary impacts can be envisaged. By applying paragraph 23. (c) of the methodology no leakage assessment has to be performed.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

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[10] http://www.minep.gov.cm/index.php?option=com_docman&task=cat_view&gid=114&Itemid=31&lang=en

[11] http://www.minep.gov.cm/index.php?option=com_docman&Itemid=84&lang=en

1. Local stakeholder consultation is done at PoA level ☑
2. Local stakeholder consultation is done at SSC-CPA level ☐

Stakeholder consultation details for Rwanda:

A stakeholder conference was held on Friday, 18th February 2011 at Kana Room at St. Famille Church in Kigali, Rwanda.

The objective of the conference was to explain the PoA to relevant stakeholders in Rwanda and to gather their comments on the programme.

Stakeholders were invited mainly by Email but also personally and by newspaper advertisement. The invited stakeholder represented a national cross section of stakeholder groups: National and local representatives, test users, DNA representatives and personal from national and international NGOs were present during the meeting. .

Detailed information on the stakeholder conference can be taken from the Gold Standard website where the stakeholder consultation report is publicly available.[12]

Stakeholder consultation details for Cameroon:

The stakeholder consultation for Cameroon was organized on 07/11/2013 at the Hotel Tou'ngou Etoa-Meki in Yaoundé. Personal invitations to the meeting were sent out to relevant stakeholders in Cameroon and the day before the meeting, a poster announcing the meeting was pasted at "Sous-Prefecture de Yaoundé " and the day of the consultation, another poster was pasted in front of the hotel.

The stakeholder consultation was attended by 41 people (16 female and 25 male).

The stakeholders attending the consultation can be categorised as follows:

- Local people impacted by the project or official representatives (13 attendees)
- Local policy makers and representatives of local authorities (19 attendees)
- Local non-governmental organisations working on relevant topics (9 attendees)

Mr. Foghab Patrick from the Ministry of Environment, Protection of Nature and Sustainable Development (MINEPDED), who represented the DNA, opened the meeting and welcomed the participants.

After the opening, Martin Zeh-Nlo from UNDP-Cameroon presented MDG Carbon, UNDP's corporate framework for Carbon finance, and Jean Claude Tsafack from Pro Climate presented the project participants atmosfair and Pro Climate International. Jean Claude Tsafack also explained the carbon markets and different accounting standards which enabled the participants to better understand the background of the project. Details of the on-going micro-scale project, information about sale of carbon credits and monitoring aspects of the project were provided. The Envirovit G3300 stoves, which has already been used by many users in Cameroon was presented. During the consultation another proposed stove type, the Save80 stove, was also introduced.

After the introduction of the project, a cooking demonstration was conducted with the Envirofit G3300. It could be shown that the stove boils water almost smoke-free and efficient (five litres of water with just three small pieces of wood). Many participants however expressed their scepticism whether a big pot can be used on the stove and thus, cooking with a big pot was also successfully demonstrated which convinced the audience. People also asked about the longevity of the stove. It was explained that the manufacturer gives a 5 years warranty on the stove.

A question and answer session Q&A) followed the cooking demonstration during which all questions could be answered to the full satisfaction of the stakeholders. The meeting was adjourned at 4:15 pm with the agreement that the improved cook stoves have significant positive impacts for the people of Cameroon.

[12]https://gs2.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=1023

The stakeholder consultation report with the Q&A will be uploaded to the Gold Standard registry and will be publicly available. Attendees, who left their email address, will be emailed the report. Attendees without email addresses will be provided hard copies of the report upon request.

F.2. Summary of comments received

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Stakeholder consultation details for Rwanda:

The general impression was very positive. Participants welcomed both the programme and the opportunity to exchange ideas about it at the conference.

Feedback about the consultation was requested and many participants pointed out that they found the meeting useful, educative and that they have benefited from the gathering.

The following table summarises the feedback received:

What is your impression of the meeting?	○ Successful ○ Stakeholders shared their views ○ Sustainable development matrix took too long ○ Too few people at the meeting
What do you like about the project?	○ Saves firewood ○ Very efficient technology ○ Will save money ○ Great opportunity ○ Useful new technology ○ Will help alleviate poverty
What do you not like about the project?	○ Too expensive for rural people ○ Access to firewood will be problematic
What would you suggest to improve about the project?	○ Reduce the cost of the stove

The stakeholder consultation was attended by 29 people (14 female, 15 male).

The stakeholders can be categorised as follows:

- Local people impacted by the project or official representatives (16 attendees)
- Local policy makers and representatives of local authorities (3 attendees)
- Official representative of the DNA of the host country of your project (4 attendees)
- Local non-governmental organisations working on relevant topics (6 attendees)

Stakeholder consultation details for Cameroon:

The general impression of the meeting was positive. Participants described the stakeholder consultation as interesting, professionally presented, understandable, interactive and with an impressive participation. All stakeholders welcomed the project activity and underlined its importance in the fight against global warming and towards sustainable development. Furthermore, social, economic and environmental co-benefits were recognized. Participants also welcomed that the presented stove emits almost no smoke, and thus has positive health impacts in particular for women and children. Participants appreciated the fact that the stove needs significantly less fire wood and reduces the burden for women to collect fire wood.

The main negative aspects stakeholders mentioned was the importation of the stove and some participants asked for a solution to produce the stove locally. One participant mentioned that the stove is still too expensive for very poor households and another stakeholder underlined that the stove might be too small for certain occasions. All comments received were taken into account and were discussed (see further details in section F.3).

The following table summarises the feedback received:

What is your impression of the meeting?	o Interactive, instructive and satisfying o Principles of the mechanism were explained well o Satisfaction that climate change mitigation actions are being promoted in Cameroon o All necessary stakeholders were involved o Awareness raising needs to be further extended to women and to the Savannah regions o Good introduction into efficient stove technologies
What do you like about the project?	o An initiative supported by young people o Responds to the major challenge: climate change o Technology transfer o Improvement of living conditions of users, in particular women o Protection of biodiversity o Demonstration of stoves o Quality of presentations o Information about deforestation
What do you not like about the project?	o Promotion of an imported technology o Relatively high costs for low income households o No sample stoves were distributed for further promotion in rural communities o Implementation timelines might be long

F.3. Report on consideration of comments received

>>

A summary of the most relevant comments received in Rwanda are provided below:

Stakeholder comment	Was comment taken into account (Yes/ No)?	Explanation (Why? How?)
Is the name of the Save80 based on cost savings or wood savings?	Yes	Wood savings
How will the Save80s be marketed?	Yes	ENEDOM will hold demonstrations of the stove at markets, in workshops and at umuganda (monthly community service). The Save80 will also be available for purchase at the ENEDOM office in Kigali
The products are coming from Germany. Can they be made locally?	No	As there are Save80 projects in other countries, there are ongoing discussions to produce them locally. However, at the moment, due to the high cost of material (particularly stainless steel), it is not technically feasible and wouldn't be cost effective to produce the stoves locally.
How will people get wood as most people in Kigali are used to using charcoal, which is readily	Yes	The wood availability needs to be organized. Jean Marie has begun drying wood in his workshop and he plans to

available?		sell it at charcoal kiosks and markets. If the demand is great enough, others will also begin to sell wood.
You mentioned the wood and cost savings from the cookstove but what are the energy savings?	Yes	For the user, fuel and cost savings are most relevant. However, approximately 80% of energy is saved, in comparison with a 3 stone fire.
Stove is not cheap	Yes	Trying to further reduce the price of the ICS by actively pursuing to get a duty and VAT exemption for imported ICS

The most relevant stakeholder comments received in Cameroon are summarized below:

Stakeholder comment	**Was comment taken into account (Yes/ No)?**	**Explanation (Why? How?)**
Possibility to produce the stove locally?	Yes	Participants were especially worried about the fact that the stove is imported and asked for possibilities to produce the stove locally. At the moment it is not possible to produce such a stove of a comparable quality and price within the country. As soon as locally produced stoves improve at the level of quality and quantity, these stoves will be used as well. In the long run, it will be further investigated how the stove can also be produced locally in order to create more employment and to generate income in Cameroon. It should further be noted that other stoves such as the Save80 which may be introduced in the PoA already have a large value creation component in host country due to production (bending) and assembly is done locally.
The stove is not affordable for very poor people.	Yes	This comment is a very important one and needs to be considered. However, the stove is already significantly subsidised and any further price reduction will be difficult to achieve and payments in instalments are also problematic as the bear a great risk for the local partner. Nonetheless, Pro Climate International and atmosfair will permanently assess all possibilities and opportunities to reduce the price of the stoves for end-users. This also includes the constant testing of more affordable stoves, which reach similar efficiency and life-time expectancy as the presented stove type.
Is the quality of the stove as good as the manufacturer promises?	No	The stoves were tested several times by Pro Climate and atmosfair in comparison

		with other stoves. Water boiling tests and cooking tests for some common local dishes were organized. Within a very short period, many households in the South West regions bought the stove and have been using it since, and the demand is still increasing. The first monitoring also confirmed that the performance of the stove is high and this will continue to be the reason for its success.
Is it possible to extend the size of the stove, especially for ceremonies or is it possible to purchase more than one stove per household?	No	The stove is not intended for cooking at bigger occasions. The target group for this stove are households up to 10 persons. Larger households with more than 8 persons can purchase two stoves. It is also possible to use the Envirovit stove together with other stoves of different sizes in the project.
Usage of improved cook stoves also for heating purpose possible?	No	The scope of the project activity is usage of improved stoves for cooking purposes. Emission savings from space heating cannot be considered under the project activity. However, the project participants know that people might use the efficient cook stoves also for space heating in certain areas, especially around Mount Cameroon.
Who are the beneficiaries of this carbon project?	No	This project aims at combating climate change by reducing carbon emissions through reduced consumption of non-renewable wood fuel through improved cook stoves. Furthermore, it also helps to preserve the existing forests due to reduced consumption of wood fuel. At the same time, the people of Cameroon benefit from the project as it reduces in-door smoke and hence health problems, and saves money by reducing the wood consumption.
Are there negative impacts on wood sellers due to a reduced demand for fire wood?	Yes	For the moment the project is not big enough to have impacts on wood sellers. Moreover, it is also not assumed that the project will, cause severe impacts on the wood sellers. . However, wood sellers might be involved in the marketing of cook stoves and can hence sell and distribute the stoves as well, which will diversify their source of income. Nonetheless, project proponents do not believe that the project will reach such a critical threshold that it will create severe negative impacts on wood sellers.
The stove is not available in the whole country, hence it is quite difficult to purchase one.	Yes	The stakeholder consultation was organised for the purpose of project extension. The PoA is a nationwide PoA and it will thus be possible to sell more

		stoves on a nationwide level in Cameroon. This process needs some time, but in the near future it is planned to sell the stoves across Cameroon.

SECTION G. Approval and authorization

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The Parties involved in the PoA are Rwanda and Cameroon and both are involved indirectly. A Letter of Approval from the Designated National Authority for Rwanda i.e. Rwanda Environment Management Authority (REMA) has been obtained. A Letter of Approval from the Designated National Authority for Cameroon has also been obtained.

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

>>

A typical CPA will be implemented by ENEDOM and/or other IEs, which gained access to technology and/or finance through the programme, enabling the IEs to disseminate, install and maintain ICS to households in Rwanda and Cameroon that are using biomass.

The IE may define the zones of intervention where the stoves of the CPA are disseminated. However, the geographical boundary of a CPA shall be Republic of Rwanda or Republic of Cameroon. The CPA is further limited by the SSC threshold of AMS-II.G., version 3 (if in the following AMS-II.G. is quoted, the version number of the methodology is always referring to version 3) , i.e. the maximum energy savings of the sum of all ICSs implemented under a specific CPA shall not exceed thermal energy savings of 180 GWh/ year

Once the maximum number of appliances under the threshold is reached (see Section B.2), the CPA shall be closed.

During the life of the SSC-PoA, the number of CPAs implemented will increase and be monitored according to the monitoring plan as described below.

Different CPAs may be implemented in the same areas in parallel. A stove record keeping system with a unique serial number or identification method for every ICS distributed will ensure that each ICS can be traced to one specific CPA to avoid double counting.

Dissemination strategy

Targeted users are those that use woody biomass for cooking. They will purchase the ICS at a reduced price, which is below the full costs of the stove and hence which is only possible as CDM revenues will cover the balance of costs.

Monitoring

All information obtained from the users through the user agreements are transferred to an electronic database. Hardcopies will be stored for at least 2 years beyond the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

SECTION B. Application of a baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology(ies) and standardized baseline(s)

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Title: Type II - Energy Efficiency Improvement Project
Reference: II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass
Version: 03, EB 60, (15 April 2011), valid since: 29/4/2011

The project activity falls under a project of category II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass, as defined in the "SSC&MP".
The thermal energy savings of each CPA is below the qualifying limit under the small scale methodology AMS-II.G., by up to the equivalent of 180 GWh in any year of the crediting period (see also F-CDM-SSCwg version 01 SSC_233, 04 November 2008). Consequently, AMS-II.G. is applicable.

B.2. Applicability of methodology(ies) and standardized baseline(s)

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Small-scale methodology II.G is applicable to a SSC-CPA as shown through the following criteria:

Technology/measure

1. "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[13] biomass fired cook stoves[14] or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers."

SSC-CPAs under this PoA consist of the dissemination of high efficiency biomass fired cook stoves, which are improving the efficiency compared to the existing stove in use and improving the efficiency by avoiding the inefficient conversion of wood into charcoal. Therefore each CPA will save non-renewable biomass which would otherwise be consumed by less efficient cooking appliances.
Single pot or multi pot portable or in situ cook stoves will have a specified efficiency of at least 20%

2. Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods.

Non-renewable biomass has been used since 31 December 1989.

Justification for Rwanda:

As demonstrated in section B.6.3 (Step 5 Determination of the share of Non-Renewable Biomass), the forest area is decreasing since 31 December 1989. 1990 is a turning point due to the Rwandan Civil War which resulted in widespread displacements resulting in a decrease of the forest area in Rwanda.
In addition to the decrease in forest resources the demand for wood fuel is steadily increasing resulting in an over utilization of the natural resources and thus it can be concluded that non-renewable biomass has been used since 31/12/1989. (See Figures in section B.6.3).

Justification for Cameroon:

According to FAO data the total forest cover in Cameroon has decreased since 1990. The Forest Resource Assessment Country Report for Cameroon (2010) revealed that the total forest area

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

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

declined by 18.1% between 1990 and 2010, as indicated in the table below. The annual deforestation rate of Cameroon accounts, according to the FAO, for 220.000 ha/an.[15]

Table: Cameroon's forest area

Hectares	1990	2000	2005	2010
Forest	24,316,475	22,116,475	21,016,475	19,916,475

Source: FAO country report 2010

Based on the findings above, one can reasonably assume that Non-Renewable Biomass has been used since 31/12/1989.

The annual energy savings resulting from efficiency improvements will not exceed 180 GWh_{th} in any year of the crediting period.

The maximum number of ICS eligible to be disseminated in each CPA under this PoA will be limited which will result in an annual energy savings below 180 GWh as shown below.

(In-)Equation:

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

Parameter	Unit	Description
$B_{old,,appliance,\ i}$	t	Quantity of woody biomass used in the absence of the project activity in tonnes, per appliance
$N_{i,y}$	-	Total number of appliances operational in period y
$\eta_{old,i}$	%	Efficiency of the baseline system/s being replaced (fraction)
η_{new}	%	Efficiency of the system being deployed as part of the project activity (fraction)
$NCV_{biomass}$	TJ/t	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, which is 0.004166667 GWh/tonne)

The Inequation above can be transformed into:

(In-)Equation:

$$N_{i,y} < \frac{180\,\frac{GWh}{year}}{\mathrm{B}_{\mathrm{old,appliance,i}} \cdot (1 - \frac{\eta_{old,i}}{\eta_{new}}) \cdot NCV_{biomass}}$$

Since $N_{y,i}$, $B_{old,appliance,i}$ and η_{new} are monitoring parameters whose values will be obtained during verification, an ex-ante estimated limit of stove numbers will be defined at CPA inclusion stage in order to qualify for small scale threshold, according to the equation above.

However, the real number of ICS deployed may be higher or lower and that therefore, once the limit of the SSC-CPA is reached, the CPA is closed and only those ICS included in the CPA up to the limit of the SSC-CPA limit shall be considered for the specific CPA.

B.3. Sources and GHGs

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[15] FRA (2010) : Evaluation des ressources forestières mondiales 2010. Rapport national Cameroun. S.9 ;25

As per the applied methodology AMS-II.G, paragraph 3: "The project boundary is the physical, geographical site of the efficient systems using biomass." The geographical area within which all small-scale CDM programme activities (SSC-CPAs) included in the PoA will be implemented is Republic of Rwanda. The assessment of sources and gases included in the SSC-CPA boundary is given below.

Table: Sources and gases included in the SSC-CPA boundary

	Source	Gas	Included ?	Justification/ Explanation
Baseline	Combustion of non renewable biomass for cooking, Emission Factor for combustion of fossil fuels for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Not required by methodology, only CO2 Emission Factor for fossil fuels is considered.
		N_2O	No	Not required by methodology, only CO2 Emission Factor for fossil fuels is considered.
Project activity	Combustion of non renewable biomass for cooking, Emission Factor for combustion of fossil fuels for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Not required by methodology, only CO2 Emission Factor for fossil fuels is considered.
		N_2O	No	Not required by methodology, only CO2 Emission Factor for fossil fuels is considered.

Please note: CO_2 emission factor for the substitution of non-renewable biomass by similar consumers must be used to calculate emission reductions according to the methodology AMS-II.G. This is a conservative assumption, as, compared to the emission factor for wood fuel of 112 t CO_2/TJ (see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, p. 2.23), only 72.8 % of the *de facto* emission reductions when using the improved cook stoves are taken into account.

B.4. Description of baseline scenario

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As per AMS-II.G., it is assumed that in the absence of the PoA, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs. Therefore, emission reductions are calculated by multiplying the thermal energy from annual biomass savings stemming from non-renewable biomass with an emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis.

As the programme will include 4 different scenarios, the baseline woody biomass consumption will be calculated according to the following scenarios 1)-4):

1) **Household users currently predominantly cooking with efficient charcoal stoves**
2) **Household users currently predominantly cooking with inefficient charcoal stoves**
3) **Household users currently predominately cooking with wood**
4) **Institutional users (such as schools and prisons) currently cooking with wood**

In order to increase the readability of the document, the description of the identified baseline scenario and the equations used for calculating emission reductions of a SSC-CPA are combined in section B.6.3.

B.5. Demonstration of eligibility for a generic CPA

>>

Assessment and demonstration of additionality for a typical SSC-CPA

For scenario 1) to 3) the following applies:

In accordance with EB55 Annex 38 para 6.g,[16] the assessment of additionality of each SSC-CPA to this PoA shall be evaluated on the basis that if the proposed SSC-CPA meet the key criteria and data stipulated in section B.6.3. below, the SSC-CPA shall be deemed additional. The additionality of the proposed PoA is demonstrated using the criteria outlined in the guidelines on the demonstration of additionality of small-scale project activities version 9.0 EB 68 Annex 27.

No barrier analysis needs to be performed since project type are defined as automatically additional according to Paragraph 2. (c) of EB 68 Annex 27.

The assessment of additionality is therefore done on PoA level and a typical SSC-CPA included under the SSC-CDM-PoA is therefore deemed to be additional in itself as long as the eligibility criteria as defined in Part I – Section B.2 are complied with.

For scenario 4) the following applies:

In the very unlikely event that the calculation performed for the debundling check reveals that a unit is larger than 5% of the SSC threshold, the additionality for the SSC-CPA needs to be demonstrated in the specific CPA-DD in line with either EB 68 Annex 27, para 1 or EB 68 Annex 26 and to be validated by a DOE before inclusion into the PoA-DD.

The additionality of the CPA is to be demonstrated at CPA level and will be checked by the DOE before the CPA is included into the PoA.

If all stoves of the CPA remain under the 5% SSC threshold, Paragraph 2. (c) of EB 68 Annex 27 (automatic additionality) applies and the assessment of additionality is done on PoA level and a typical SSC-CPA included under the SSC-CDM-PoA is therefore deemed to be additional in itself as long as the eligibility criteria as defined in Part I – Section B.2 are complied with.

Future SSC-CPAs should demonstrate additionality based on the following criteria:

It is assumed that all ICSs installations and hence all SSC-CPAs which are going to be included under the registered PoA are additional, provided they meet the eligibility criteria for inclusion of a SSC-CPA in the PoA.

Nr	Eligibility Criteria		Mean of proof	Monitoring Criteria	CPA situation
	Description	Conditions to be met			
1	Technological requirement	The CPA consists of distribution of one type of new ICS only as defined in the CPA-DD, and hence small appliances involving the efficiency improvements in the thermal applications of non-renewable biomass as per AMS-II.G.	Specification of stove type and compliance with the requirements of AMS-II.G. in the specific CPA-DD to be added	Number of stoves monitored	xxx
2	Boundary and location of the CPA	The CPA is located within Rwanda or Cameroon.	Location and boundary is specified in the specific CPA-DD stating that the location is limited either to Rwanda or Cameroon.	Locations of stoves monitored	x

[16]("definition of eligibility criteria for inclusion of a project activity as a CPA und PoA, which shall include, as appropriate, criteria for demonstration of additionality of the CPA and the type […] of information […] that […] shall be provided by each CPA in order to ensure its eligibility)

3	Definition of CPA Baseline	1. if the CPA is only including ICS for household level (scenario 1) to 3) as defined in section B.4 of this PoA-DD): The CPA applies the baseline fuel consumption as defined in this PoA-DD 2. if the CPA is only including institutional ICS (as defined in scenario 4) in section B.4 of this PoA-DD): the baseline is to be defined in the specific CPA and validated by the DOE prior to CPA inclusion.	1. CPA states that only household ICS are to be implemented under the CPA 2. Baseline is defined in the specific CPA-DD according to the regulations specified in AMS-II.G. and validated by a DOE before inclusion into the CPA.	1. na 2. defined at CPA level	xx
4	Efficiency of the ICS	The stove type disseminated under the CPA has a specified efficiency of at least 20%	Manufactures specifications will be the first option of choice. If not possible other options allowable by AMS-II.G. will be used	Efficiency of the ICS is also monitored	xxx
5	SSC Limit for CPAs	The CPA will remain under the thermal threshold of 180 GWh thermal energy savings.	ICSs will be determined in each CPA-DD. During verifications the DOE needs to assess, that the small scale limit (180 GWh) was not exceeded at any time for any CPA..	---	xxx.
6	Monitoring	A unique numbering or identification system for the stoves disseminated is applied	The specific numbering or identification regime is included in the specific CPA-DD	Monitored	xxx
7	De-bundling	The CPA is exclusively bound to the PoA. Confirmation that the programme activity has not been and will not be registered either as a single CDM project activity or as a CPA under another PoA.	For CPAs applying ICS under scenario 1)-3): A statement is included in the CPA-DD that no ICS distributed under the specific CPA will be part of another single CDM project activity or CPA under another PoA For CPAs applying ICS under scenario 4) (institutional stoves) as	---	xxx

			defined under section B.4. the necessity for a debundling check per system needs to be assessed before proposing the CPA for inclusion. In any case it needs to be shown if any ICS under scenario 4) may be larger than 5% of the SSC threshold		
8	CER ownership	End users receiving ICS under the specific CPA contractually cede their rights to claim and own emission reductions under the Clean Development Mechanism of the UNFCCC to the CME of the PoA	The default ICS purchase contract for end users is including the provision that emission reductions generated by the stove are owned by the CME	---	xxx
9	Additionality for ICS under scenario 4) only	The additionality of the CPAs including stoves as described under scenario 4) in Section B.4 can be demonstrated in the CPA	Proof of additionality to be demonstrated in the specific CPA-DD and to be validated by a DOE before inclusion into the PoA-DD	Defined at CPA level	xxx
10	Type of ICS	Each CPA is only including baseline stoves of either scenario 1) to 3) or scenario 4) as defined in Section B.4	The specific CPA-DD is specifying the type and model of the ICS which belongs to either scenario 1) to 3) or 4)	Type of stove monitored	xxx
11	Additionality of CPAs	Additionality is demonstrated as described in detail in Part I - Section B.1 of the PoA DD. Applying paragraph 2. (c) of EB 68 Annex 27 (Guidelines on the demonstration of additionality of small-scale project activities v.9.0)	For CPAs applying ICS under scenario 1)-3): Eligibility criteria 7) (debundling) needs to be fulfilled. For CPAs applying ICS under scenario 4) (institutional stoves) as defined under section B.4. proof needs to be provided, that the energy savings of each institutional stove does not achieve 3,000 MWh of energy savings per year or 3,000 tonnes of emission reductions per year.	---	xxx
12	Start date of the CPA	Confirmation that the start date of any CPA is not, or will not be, prior to the commencement of	Documentary evidence is provided to support the start date of the CPA	---	xxx

		validation of the programme of activities, i.e. the date on which the CDM-POA-DD is first published for global stakeholder consultation (14/05/2011)			
13	Compliance with applicability conditions of AMS-II.G.	The CPA is in compliance with all applicability conditions as stated in AMS-II.G.	The compliance of the CPA with the applicability conditions is demonstrated in the specific CPA-DD	---	xxx
14	Sampling requirements	The sampling requirements as stipulated in the monitoring plan of the PoA-DD (which is in line with the guidelines/standard from the EB pertaining sampling and surveys) are implemented.	The requirements for sampling as stipulated in the PoA-DD are reflected in the specific CPA-DD.	---	xxx
15	None diversion of ODA	Funding from Annex I parties for the implementation of the PoA, if any, does not result in a diversion of official development assistance (ODA)	A statement is provided that either no ODA is included in the financing of the CPA or a statement that the funding does not result in a diversion of ODA.	---	xxx

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

>>

According to AMS-II.G. it is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.

According to AMS-II.G. , methodological choices relevant at CPA level are:

Para 6:

Option 2 of paragraph 6 of AMS-II.G. is chosen to calculate the quantity of woody biomass that is saved: biomass savings are calculated by multiplying the quantity of woody biomass used in the absence of the project activity ($B_{old,i}$) with the efficiency gains ($1-\eta_{old}/\eta_{new}$) of the system being deployed as part of the project activity. The efficiencies of the new systems are measured by applying the Water-Boiling-Test (WBT) protocol.

Para 7:

We choose to apply approach (a) to determine B_{old}:

"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,"

Para 15:

*Monitoring shall consist of checking the efficiency of all appliances **or** a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating at the specified efficiency (η_{new}) or replaced by an equivalent in service appliance. Where replacements*

are made, monitoring shall also ensure that the efficiency of the new appliances is similar to the appliances being replaced.

and

Para 16:

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

A representative sample of the appliances disseminated under a CPA will be monitored to determine the share of appliances that are still operating or are replaced by an equivalent in service appliance. A representative sample will also be monitored to ensure that they are still operating at the specified efficiency. 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. Replacement of appliances is monitored and the replaced devices are considered with their related efficiency as applicable.

If an ICS gets replaced the efficiency of the new ICS can be compared to the average efficiency of ICS which are of the same vintage as the replaced ICS to determine if the efficiency of the replaced ICS and the new ICS is *similar*. It is not possible to replace an ICS with a different ICS type which has a lower efficiency.

The procedures for monitoring the share of operational appliances and their respective efficiency(ies) are laid out in section B.7.

Para 20:

Monitoring shall ensure that:

*(a) Either the replaced low efficiency appliances are disposed off 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 B_{old}

As monitoring of the proper disposal of old appliances is complicated (especially if the old appliances is just 3 random stones) and will potentially result in conflicts, we choose option (b). The continuous use of baseline appliances will be excluded from B_{old} by determining the average number of eaters for whom meals are prepared on the ICS during monitoring (parameter $N_{eaters\_project}$) (see Section B.7.1) and by introducing a cap for the maximum number of eaters possible per ICS type utilized (parameter *HH_CAP)* (see section B.6.2)

For explanation:

By determining the average number of eaters per new appliance (i.e. the specific ICS of the CPA), the continuous use of the baseline appliance is considered because the parameter $B_{old,\ appliance,\ i}$ is determined by multiplication of the per-capita consumption with the number of eaters for whom meals are prepared on the ICS only. (Please refer to the parameter $N_{eaters\_project}$ in the monitoring tables in Section B.7.1.):

Furthermore to increase the robustness of the concept, the maximum number of eaters per ICS is defined (see parameter ***HH_CAP*** see section B.6.2) . The value for the number of eaters will therefore always be equal or lower than the household cap of the ICS.
Therefore only the baseline consumption which is reduced by the project appliance is considered and if users are cooking with other (i.e. old) appliances in occasions such as, for example, a big family gathering, this will not be considered for the emission reduction calculations since the number of eaters per ICS is determined during monitoring.

B.6.2. Data and parameters fixed ex-ante

>>

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

Data / Parameter:	$f_{biomass/charcoal}$
Data unit:	Number
Description:	conversion factor wood to charcoal
Source of data:	See Step 1 section B.6.3 PoA-DD
Value(s) applied:	Rwanda: 9 Cameroon: 6
Choice of data or Measurement methods and procedures:	See section B.6.3 PoA-DD
Purpose of data	Calculation of baseline emissions
Additional comment:	

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

Data / Parameter:	$\eta_{charcoal\_stove,1,2,}$
Data unit:	%
Description:	Efficiency of the baseline system being replaced
Source of data:	See section B.6.3 PoA-DD
Value(s) applied:	Scenario 1= 30% (efficient charcoal stove with clay) Scenario 2= 20% (inefficient charcoal stove without clay)

Choice of data or Measurement methods and procedures:	Scenario 1= literature value (see Part II - Section B.3) Scenario 2= literature value (see Part II - Section B.3)
Purpose of data	Calculation of baseline emissions
Additional comment:	

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

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/t
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data:	IPCC
Value(s) applied:	0.015
Choice of data or Measurement methods and procedures:	This is the IPCC default value for wood fuel as provided by AMS-II.G, par. 6
Purpose of data	Calculation of baseline emissions
Additional comment:	NCV for wood fuel

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

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	tCO_2/TJ
Description:	Emission factor for the substitution of non-renewable woody biomass by similar consumers
Source of data:	AMS-II.G. default value

Value(s) applied:	81.6
Choice of data or Measurement methods and procedures:	According to AMS-II.G., the emission factor for the substitution fuel likely to be used instead of non-renewable woody biomass a value of 81.6 t CO_2/TJ is to be taken.
Purpose of data	Calculation of baseline emissions
Additional comment:	

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

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

B.6.3. Ex-ante calculations of emission reductions

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According to AMS-II.G. emission reductions shall be calculated using the following equation:

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

Parameter	Unit	Type	Description
ER_y	tCO_2	Calculated	Emission reductions of the project activity in period *y*
$B_{y,savings}$	t	Calculated	Quantity of woody biomass that is saved by the CPA in period y. $B_{y,savings}$ comprises three options according to the scenario 1) to 4) illustrated in section B.4.

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

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

$$B_{y,savings} = \sum_{i=1}^{4} B_{old,i} \cdot \left(1 - \frac{\eta_{old,i}}{\eta_{new,y}} \right)$$

Index i comprises four options according to the scenario 1)-4) illustrated in section B.4

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

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

The efficiency testing is based on thermal efficiencies of the baseline and project appliances in terms of share of the energy content of the biomass fuel that is converted into cooking energy. The Water Boiling Test (WBT) protocol (BerkeleyAir Monitoring Group Water Boiling Test (WBT) v.3.0 [17]) is used to determine the efficiency of the appliances.

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

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

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

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

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

The method to determine the baseline consumption and the baseline consumption for scenario 4) will be established at time of writing a scenario 4) CPA. Either approach A) Historical Data or B)

[17] See for a description of WBT protocol for example: http://www.berkeleyair.com/publications/cat_view/42-publications (dated 14/10/2010)

Survey of Local Usage may be used to determine the baseline in the CPA for institutional stoves (scenario 4). The baseline consumption will be checked by the DOE at time of inclusion of the CPA to the PoA.

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

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

Index i comprises four options according to the scenario 1)-4) illustrated in section B.4.

Parameter	Unit	Type	Description
$B_{old,\ i}$	t/year	Calculated	Quantity of woody biomass used in the absence of the project activity
$B_{old,appliance,i}$	t/year	Calculated using monitored parameters	Average annual consumption of woody biomass per appliance $B_{old,appliance,i}$ ecomprises four options according to the scenario 1) to 4) illustrated in section B.4
$N_{i,y}$	-	Monitored	Total number of appliances deployed in period y
DO_y	%	Monitored	Statistically adjusted drop out from total population of appliances in period y
mp_{length}	days	Monitored (implicitly, no extra parameter)	Length of monitoring period y
L_y	-	Fixed	0.95 default value

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

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

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

At last the share of Non-Renewable biomass ($f_{NRB,y}$) needs to be determined in order to calculate the emission reductions (Step 4).

Table: Steps for the determination of the baseline woody biomass consumption

Step	Description	Data sources	Derived Parameters	Type
1	Determination of quantity of woody biomass used in the absence of the project activity in tonnes, per appliance	Option a under Para 7 of AMS-II. G. is used: Historical Fuel Consumption Data for scenario 1) to 4) as defined in section B.4	$B_{old,appliance,i}$	Monitored
2	Estimation of the number of	CPA	$N_{i,\ y}$	Monitored

	new ICS deployed and drop-out rate	Implementation Schedule	DO_y	Monitored
3	Leakage	Fixed applying the default leakage factor of AMS-II. G. Para 13 (a) and 23 (c)	L_y	Fixed
4	Determination of the efficiency of the (a) replaced system and the (b) deployed ICS for calculation of biomass savings per user for scenario 1) and 2) $\eta_{old,\ 1,2\ is}$ derived from $\eta_{charcoal\_stove\ 1,2}$ and $NCV_{charcoal}$	See Step 4) Table B.6.3.1.	$\eta_{old,\ i}$ η_{new}	(a) Fixed (b) Monitored
5	Determination of the share of Non-Renewable biomass	Official data	$f_{NRB,y}$	Fixed

Index i comprises four options according to the scenario 1)-4) explained in Section B.4

Step 1:Determination of quantity of woody biomass used in the absence of the project activity in tonnes, per appliance

$B_{old,appliance,i}$ needs to be established separately for scenarios 1)-3):

Furthermore $B_{old,appliance,i}$ is determined by multiplying the quantity of woody biomass used in the absence of the project activity in tonnes, per capita ($B_{old\ capita,i}$) with the average number of eaters (monitored parameter: $N_{eaters\_project}$)

Determination quantity of woody biomass used in the absence of the project activity in tonnes, per capita for scenario 1)-2) ($B_{old\ capita\ 1,2}$):

To determine the baseline woody biomass consumption for households currently cooking with charcoal, two factors need to be considered:

a) charcoal consumption
b) conversion factor for wood to charcoal (i.e. how much wood is needed to produce the amount of charcoal consumed) ($f_{biomass/charcoal}$)

a) charcoal consumption ($B_{old\ capita,\ charcoal\ 1,2}$)

Rwanda:

The average annual charcoal consumption of a household using charcoal as primary fuel for cooking depends on the type of stove used. In general there are two categories of charcoal stoves used in Rwanda:
Scenario 1: Efficient charcoal stoves including clay lining (often called Canamake)
Scenario 2: Inefficient all metal stoves without clay (often called Congolese stove)

About 60% of all households cooking with charcoal still use an inefficient charcoal stove.[18]
In order to account for the different baseline consumptions, users will be asked at time of purchasing the ICS which stove is currently in use most of the time (see section B.7.2 monitoring plan for details).

Two different studies are used to demonstrate the charcoal consumption for scenario 1) and 2).
One study is from 1991 (conducted by ESMAP on behalf of UNEP and the World Bank) and the second one from 2007 (conducted by Winrock on behalf of USAID). Both studies, which are completely independent from each other, give very similar results; this shows that charcoal

[18]Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, WINROCK for USAID, 2007. page 4

consumption is a very stable factor in Rwanda hardly affected by the political happenings, population growth, economic and technological development.

In order to double check the data quality of these studies, atmosfair has commissioned yet another baseline check which also come to very similar results and therefore affirms the data.

The results are:

Scenario 1): Charcoal consumption per head (Household users currently predominantly cooking with efficient charcoal stoves)

0.328 kg per head per day · 365 / 1000 = 0.11972 t/y per head [19](Winrock 2007)
0.330 kg per head per day · 365 / 1000 = 0.12045 t/y per head [20](ESMAP 1991)

To be conservative the lower value of 0.11972 t per head per year for improved charcoal stove users is taken.

Scenario 2): Charcoal consumption per head (Household users currently predominantly cooking with inefficient charcoal stoves)

0.492 kg per head per day · 365 / 1000 = 0.17958 t/y per head [19] (Winrock 2007)
0.510 kg per head per day · 365 / 1000 = 0.18615 t/y per head[20] (ESMAP 1991)

To be conservative, the lower value of 0.17958 t per head per year for inefficient charcoal stove users is taken.

Average charcoal consumption (for cross checking)

According to the baseline check conducted on behalf of atmosfair which included both efficient and inefficient charcoal stoves users the average consumption of charcoal is 0.5 kg per head per day[21]. Even so the number of households interviewed is small it is still helpful to confirm the data from the other studies as the result of the survey is very much in line with the studies quoted above.

It is therefore reasonable and conservative to use the charcoal baseline data as stated above.

Cameroon:

Wood is the main fuel used in Cameroon for cooking. 73.5% of the households use wood for cooking followed by gas/electricity/kerosene that is used in 21.4% of the households. Only 1.7% of the households use charcoal[22].

According to a report from the Center for International Forestry Research on the economic and social importance of the wood energy sector in Cameroon, the annual total charcoal consumption in urban areas of the country is 376.530 tons[23]. Based on the results from the latest national population census in 2010, the overall population in Cameroon living in urban areas is 10.091.172[24]. The report by CIFOR also states that '*[…] Surveys on this type [charcoal] of energy form are mostly focusing on urban areas.*[23]

[19]Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, WINROCK for USAID, 2007. p 55

[20]Commercialization of Improved Charcoal Stoves and Carbonization Techniques, ESMAP, 1991. p 5

[21]Charcoal Usage Baseline Report. C. Blodgett. 2010. page 5

[22] Improved cookstove as an appropriate technology for the Logone Valley (Chad – Cameroon): Analysis of fuel and cost savings by Vaccari et al (http://www.sciencedirect.com/science/article/pii/S0960148112002492)

[23] CIFOR, 2013. Étude de l'importance économique et social du secteur forestier et faunique au Cameroun. Page 102 and 118 (http://afrique-centrale.cirad.fr/content/download/4439/34072/version/1/file/Etude+importance+%C3%A9co+secteurs+for%C3%AAts+faune+au+Cameroun.pdf)

[24] Republique du Cameroun, 2010. La population du Cameroun en 2010. Page 8. (http://www.statistics-cameroon.org/downloads/La_population_du_Cameroun_2010.pdf)

Consequently, a national value of charcoal consumption can only be calculated based on data for urban areas but charcoal is traditionally also a fuel which is almost exclusively used in urban areas since it needs to be purchased. Furthermore, since there is no reliable data on the abundance of efficient and inefficient charcoal stoves in Cameroon, it is conservatively assumed that all households using charcoal are cooking on efficient appliances. Hence, only the first scenario is applicable.

The results are:

Scenario 1: Charcoal consumption per head (Household users currently predominantly cooking with efficient charcoal stoves)

$$B_{old,capita,1} = \frac{\text{Charcoal consumption by households in urban areas}}{\text{Population living in urban areas}}$$

$$B_{old,capita,1} = \frac{376{,}530 \ \frac{\text{t}}{\text{year}}}{10{,}091{,}172}$$

$$B_{old,capita,1} = 0.03731 \ \frac{\text{t}}{\text{year}}$$

Scenario 2: Charcoal consumption per head (Households users currently predominantly cooking with inefficient charcoal stoves)

$$B_{old,capita,2} = 0 \ \frac{\text{t}}{\text{year}}$$

b) conversion factor wood to charcoal ($f_{\text{biomass/charcoal}}$)

In order to determine the quantity of woody biomass used in the absence of the project it needs to be determined how much wood is necessary to produce the amount of charcoal used under Scenarios 1) and 2) i.e. the conversion factor for wood to charcoal.

The charcoal used in Rwanda is produced in simple earth kilns and therefore the conversion to wood is very inefficient. Several studies have assessed the average efficiency of producing charcoal in Rwanda and come to the following conclusion:

"In Rwanda, charcoal production yields are particularly low, requiring nine kilograms of wood to produce one kilogram of charcoal (Global Environment Facility 2005)"[25]

"… the Project has measured the performance of approximately 80 traditional charcoal kilns and concluded that the average efficiency of the carbonization process in Rwanda is between 5 and 9%. …"[26]. This calculates into between 11 and 20 kilograms of wood being required for 1 kg of charcoal.

[25]Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, WINROCK for USAID, 2007.

[26]Commercialization of Improved Charcoal Stoves and Carbonization Techniques, ESMAP, 1991.

"the average resulting charcoal efficiency is 10%"[27] i.e. 10 kg of wood is necessary to produce 1 kg of charcoal.

It is therefore correct and conservative to state that in Rwanda, 9kg of wood input per kg of charcoal output is necessary.
The conversion factor of wood to charcoal used to calculate the baseline woody biomass consumption in Rwanda is therefore 9.

($f_{biomass/charcoal}$ = 9)

For Cameroon, no data could be found on the conversion factor of wood to charcoal. Hence, in order to be conservative, the IPCC default value of 6 is applied.[28]

($f_{biomass/charcoal}$ = 6)

Determination of average woody biomass consumption per year per household ($B_{old,\ appliance\ 1,2}$):

In order to determine the average woody biomass consumption for scenario 1) and 2) the average number of eaters for whom meals are prepared on the ICS (monitored parameter: $N_{eaters\_project}$) and the maximum numbers of eaters per ICS (HH_Cap) as specified in each CPA-DD for the applied ICS needs to be taken into consideration. This step is also necessary to account for the continuous use of baseline appliances (see Section B.7).

$$B_{old,appliance,1,2} = B_{old,capita,1,2} \cdot f_{biomass/charcoal} \cdot N_{eaters\_project}$$

$$N_{eaters\_project} = \begin{cases} N_{eaters\_project}, & N_{eaters\_project} < HH\_Cap \\ HH\_Cap, & N_{eaters\_project} \geq HH\_Cap \end{cases}$$

Results for Rwanda:

$$B_{old,appliance,1} = 0.11972\ t/y \cdot 9 \cdot N_{eaters\_project}$$

$$B_{old,appliance,1} = 1.077481 t/year \cdot N_{eaters\_project}$$

$$B_{old,appliance,2} = 0.17958\ \text{t/y} \cdot 9 \cdot N_{eaters\_project}$$

$$B_{old,appliance,2} = 1.61622 t/year \cdot N_{eaters\_project}$$

Results for Cameroon:

$$B_{old,appliance,1} = 0.03731\ \ t/y \cdot 6 \cdot N_{eaters\_project}$$

$$B_{old,appliance,1} = 0.22386\ \ t/y \cdot N_{eaters\_project}$$

$$B_{old,appliance,2} = 0\ t/y \cdot 6 \cdot N_{eaters\_project}$$

$$B_{old,appliance,2} = 0\ t/year \cdot N_{eaters\_project}$$

Baseline woody biomass consumption for scenario 3) ($B_{old,\ capita,3}$) (Household users currently predominately cooking with wood)

Rwanda:

The United Nations Statistics Division has published fuel wood consumption figures for households in Rwanda [29]. The most recent data available in its energy statistics database is from 2008

[27] Biomass Energy Strategy, Ministry of Infrastructure, 2009. Vol3 P. 25

[28] http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf Page 1.45

[29] http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW%3btrID%3a1231, last accessed on 07.11.2011

According to the UN Statistics Division, fuel wood consumption of all Rwanda households was 6,940,000 m³ (equal to 6,246,000 t [30]).

In 2008, according to official census figures, Rwanda's population was estimated to be 9,831,501people. The average fuel wood consumption per capita is hence 0.6353t per year (see equations below). The figures are summarised in the table below)

Table: Fuel Wood Consumption in Rwanda

	People	Fuel wood consumption by Households ('000 m³)	Fuel wood consumption by Households total (t)	Fuel wood consumption per capita in tonnes
2008	9,831,501	6,940	6,246,000	0.63530482
Source	Population Projection 2007-22, Rwanda Institute for Statistics, 2009	UN Data	Calc.	Calc.

$$B_{old,capita3} = \frac{\text{Fuelwood consumption by households}}{\text{Population}}$$

Applying the values from the sources described above, $B_{old,\ capita,\ 3}$ computes as:

$$B_{old,\ capita,3} = \frac{6{,}246{,}000\ \frac{t}{year}}{9{,}831{,}501}$$

$$B_{old,capita3} = 0.6353\ \frac{t}{year}$$

Cameroon:

The United Nations Statistics Division has also published fuel wood consumption figures for households in Cameroon[31]. The most recent data available in its energy statistics database is from 2010 and the reported fuel wood consumption of all Cameroon households was 17,359,000 m³ (equal to 12,585,275 t [32]).

In 2010, according to UN data, Cameroon's population was estimated to be 19,958,000 people[33]. The average fuel wood consumption per capita is hence 0.63058 t per year (see equations below). The figures are summarised in the table below)

Table: Fuel Wood Consumption in Cameroon

	People	Fuel wood consumption by Households ('000 m³)	Fuel wood consumption by Households total (t)	Fuel wood consumption per capita in tonnes
2010	19,958,000	17,359	12,585,275	0.63058798
Source	UN Data	UN Data	Calc.	Calc.

[30] Conversion factor for wood used: 0,9t/m3 Source: Commercialization of Improved Charcoal Stoves and Carbonization Techniques, ESMAP, 1991 page 4.

[31] http://data.un.org/Data.aspx?q=fuelwood&d=EDATA&f=cmID%3aFW [Accessed 16.09.2013]

[32] Conversion factor for wood used: 0.725 t/m³. Source: FAO-WISDOM

[33] United Nations Population Division, http://www.un.org/esa/population/publications/population-hiv2010/population-hiv2010chart.pdf

$$B_{\text{old,capita3}} = \frac{\text{Fuelwood consumption by households}}{\text{Population}}$$

Applying the values from the sources described above, $B_{old,\ capita,\ 3}$ computes as:

$$B_{old,capita,3} = \frac{12{,}585{,}275\ \frac{t}{year}}{19{,}958{,}000}$$

$$B_{old,capita,3} = 0.63058\ \frac{t}{year}$$

Woody biomass (directly as fuel wood or converted into charcoal) is the main source of household energy for more than 90% of the population in Rwanda[34] and more than 70% in Cameroon[35]. It is however important to note that the woody biomass consumption per capita as determined above is an average value for all Rwandan/Cameroonian households, whether they are using woody biomass or not. The real consumption among woody biomass users is therefore even higher as the number of none woody biomass users is included in the calculations for $B_{old,\ capita,\ 3}$. Woody biomass users are the target group for the ICS, however, as none woody biomass users have been included in the calculations $B_{old,\ capita,\ 3,}$ already, it is not necessary to explicitly exclude users not using woody biomass from the programme.

Determination of average woody biomass consumption per year per household ($B_{old,appliance,3}$):

In order to determine the average woody biomass consumption for scenario 3) the average number of eaters for whom meals are prepared on the ICS (monitored parameter: $N_{eaters\_project}$) and the maximum numbers of eaters per ICS (HH_Cap) as specified in each CPA-DD for the applied ICS needs to be taken into consideration. This step is also necessary to account for the continuous use of baseline appliances (see Section B.7).

Consequently, $B_{old,appliance,3}$ is calculated using the following equation:

$$B_{old,appliance,3} = B_{old,capita,3} \cdot N_{eaters\_project}$$

$$N_{eaters\_project} = \begin{cases} N_{eaters\_project}, & N_{eaters\_project} < HH\_Cap \\ HH\_Cap, & N_{eaters\_project} \geq HH\_Cap \end{cases}$$

For Rwanda:

$$B_{old,appliance,3} = 0.6353\ t/year \cdot N_{eaters\_project}$$

For Cameroon:

$$B_{old,appliance,3} = 0.6305\ t/year \cdot N_{eaters\_project}$$

Baseline woody biomass consumption for scenario 4) (Institutional users (such as schools and prisons) currently cooking with wood)

Baseline fuel consumption for scenario 4) will be determined in the applicable CPA and will be checked at time of inclusion into the PoA.

[34] Environmental Review Rwanda, REMA, 2009page 94

[35] Improved cookstove as an appropriate technology for the Logone Valley (Chad – Cameroon): Analysis of fuel and cost savings by Vaccari et al (http://www.sciencedirect.com/science/article/pii/S0960148112002492)

Step 2: Ex-ante calculation of emission reductions: Estimation of the number of systems in place ($N_{i,y}$) and Drop-Out rate (DO_y)

The emission reduction per systems $B_{i,,y,\ appliance}$ (separately for each scenario1) to 4)) is multiplied with the number of systems for each scenario operating in the CPA(s).

The actual calculation of emission reductions of each SSC-CPA will be based on the number of systems operating and their start of operation (defined as delivery date to user). The number will be adjusted according to the share of users found not to use the project appliance (Drop-Out Rate DO_y).

Step 3: Leakage

A) Diversion of non-renewable woody biomass saved by the project activity

According to AMS-II.G. para 13 (a) the default net to gross adjustment factor of 0.95 is applied to account for leakage and therefore surveys are not required.

B) Leakage assessment for PoAs

According to AMS-II.G. para 23 c) the default net to gross adjustment factor of 0.95 is applied to account for PoA leakage and therefore para 23 a) and b) do not apply.

C) Transfer of Equipment

"If equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered."

This leakage source can be ruled out since all stoves deployed under the program will be new stoves.

Step 4: Determination of the efficiency of the (a) replaced system and the (b) deployed ICS for calculation of biomass savings per user

According to option 2 para 6 of AMS-II.G. , biomass savings are calculated by multiplying the quantity of woody biomass used in the absence of the project activity ($B_{old,i}$) with the efficiency gains ($1-\eta_{old}/\eta_{new}$) of the system being deployed as part of the project activity.

The efficiencies of the new systems are measured by applying the Water-Boiling-Test (WBT) protocol. If more than one type of system is being introduced weighted average values will be used.

Note that η_{new} is a monitored parameter, and values derived from efficiency tests conducted ex-post shall be used to estimate emission reductions only.

Efficiency gain $\Delta\eta$ of the system deployed is calculated as:

$$\Delta\eta = (1-\frac{\eta_{old}}{\eta_{new}})$$

For scenario 3) the traditional fuel wood cook stoves used are conventional cooking systems lacking improved combustion air supply mechanism and flue gas ventilation system i.e. without a grate or a chimney. As predefined in AMS-II.G., the efficiency of 0.1 default value can be used for $\eta_{old,3}$.

For Rwanda:

For baseline scenario 1) and 2) (household users currently predominantly cooking with charcoal stoves), we need to transform the efficiency of the charcoal stoves to the efficiency of a fuel wood stove to derive the efficiency $\eta_{old,1,2}$

There are two types of stoves currently used in Rwanda:

Literature on stove efficiencies gives the following efficiency values for charcoal stoves types also used in Rwanda:

Table: Efficiencies of charcoal stoves in Rwanda

Source:	Commercialization of Improved Charcoal Stoves and Carbonization Techniques, ESMAP, 1991 p 5	Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, WINROCK for USAID, 2007. p 29	Overview Cook Stoves Worldwide, GTZ, 1995. p,. 139	**Most conservative value chosen**
Efficient charcoal stoves	15% to 25%	28.97%	30%	30%
Inefficient charcoal stoves	8 % to 20%	--	13 – 18%	20%

For Cameroon:

For Cameroon, hardly any data on the efficiency of charcoal stoves is available. According to a publication by SNV and CED in 2012, the Kenya Ceramic Jiko is an improved charcoal stove which is already disseminated in Cameroon.[36] This specific stove has an efficiency of 30%. Considering the data from Rwanda and Cameroon as well as the general reports on charcoal stove efficiencies, it is therefore conservatively assumed that the efficiency of efficient charcoal stoves in Cameroon is 30%. No data could be found on the efficiency of charcoal stoves under scenario 2. Therefore, a default value of 0,2 or 20% as per para 12 of AMS-II.G has been considered for inefficient charcoal stoves.

Hence, the results for Rwanda and Cameroon are:

Scenario 1): efficient charcoal stoves, with an average thermal efficiency of: $\eta_{charcoal\_stove,1}$=30%

Scenario 2): inefficient charcoal stoves, with an average thermal efficiency of: $\eta_{charcoal\_stove,2}$=20%

We need to transform the efficiency of the charcoal stove to the efficiency of a fuel wood stove to derive the efficiency $\eta_{old,1,2}$:[37]

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

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

[36] SNV and CED, 2012. Etat des lieux des foyers ameliorés au Cameroun. Page 19.

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

Step 5: Determination of the Share of Non-Renewable Biomass

A) Assessment of Non-renewable woody biomass in Rwanda

According to AMS-II.G. , Non-renewable woody biomass (NRB) is the quantity of woody biomass used in the absence of the project activity (B_{old}) minus the Demonstrably renewable woody biomass (DRB) component, so long as at least two of the following supporting indicators are shown to exist:

1. *Trend showing increase in time spent or distance travelled by users (or fuel-wood suppliers) for gathering fuel wood or alternatively trend showing increase in transportation distances for the fuel wood transported into 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 price indicating scarcity;*
4. *Trends in the type of cooking fuel collected by users, suggesting scarcity of woody biomass.*

For Rwanda, Indicators 2 and 3 will be used:

2: Depleting of carbon stock in Rwanda:

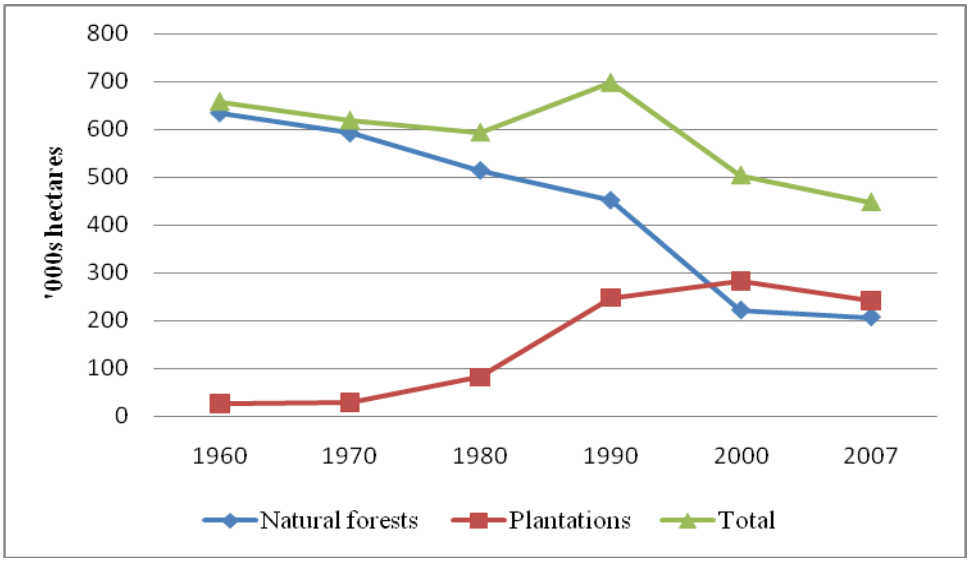
Various renowned studies[38] clearly show that the carbon stock is depleting as a result of demand for fuel wood surpassing the sustainable production capacity in Rwanda.
The FAO conducted a comprehensive study on the spatial analysis of wood fuel production and consumption in Rwanda (WISDOM) in 2011 with the following conclusion:

"There is no doubt that the demand for fuel wood and charcoal is greater than today's sustainable wood production. It is also clear that in the short and medium term wood, complemented by farm residues, will remain the only affordable fuel for the majority of Rwandese population."WISDOM Study Rwanda, FAO, 2011. page 1

[38] See: WISDOM Study Rwanda, FAO, 2011. page 1, Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, WINROCK for USAID, 2007. page 2, Creating an enabling business environment for a sustainable charcoal chain in Rwanda, IS Academy, 2010 page 12, Biomass Energy Strategy, Ministry of Infrastructure, 2009. page 19, Rwanda Environmental Threats and Opportunities, Assessment (ETOA) 2008 Update. page 45

Evolution of Forest Areas in Rwanda

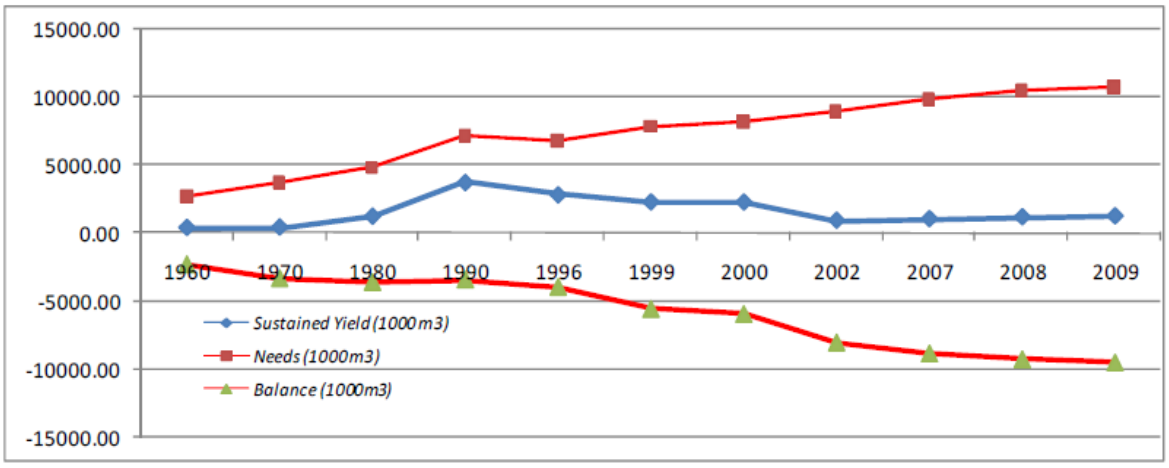
Figure: Evolution of Forests in Rwanda



Source: Biomass Energy Strategy, Ministry of Infrastructure, 2009. Vol 2 page 19

The National Forest Policy 2010 shows that the trend is continuing and the gap between sustainable production and demand for wood is increasing:

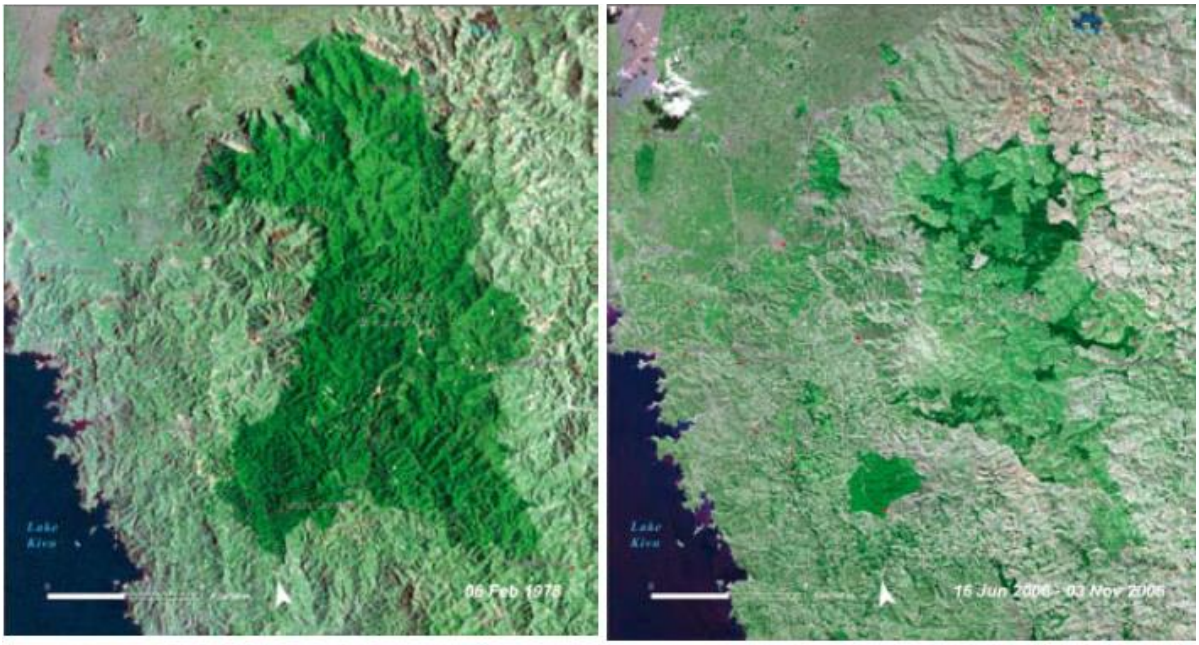
Figure: Sustainable fuel wood production in Rwanda



Source: National Forestry Policy, MINIFOM, 2010. page 8

As a result the area with forest cover is also decreasing:

Figure: Change in Forest Cover



The 1978 satellite image shows the Gishwati Forest Reserve as a dark-green carpet of dense forest nearly covering the entire protected area
The 2006 image shows that most of the forest has been cleared and what is left is in degraded condition

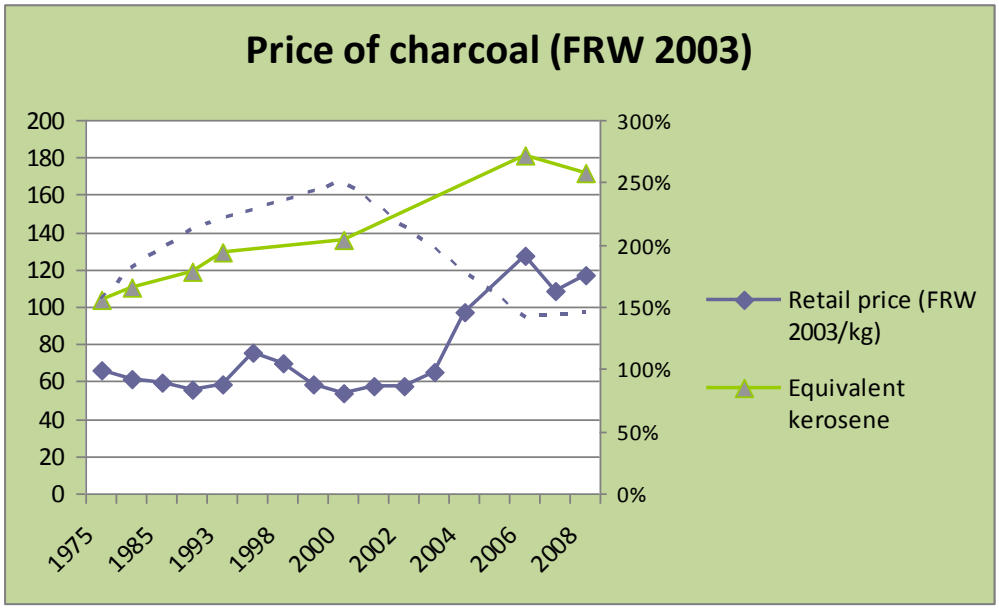
Source: Environmental Review Rwanda, REMA, 2009. page 101

It is therefore obvious that the carbon stocks are depleting in Rwanda.

3: Increasing trends in fuel wood price indicating scarcity;

Charcoal as well as fuel wood (if purchased) prices are increasing as a result of demand outstripping supply:

Figure: Price of charcoal development



Source: Biomass Energy Strategy, Ministry of Infrastructure, 2009. Vol 2. page 31

The costs for firewood are also increasing:

"In the past, firewood was considered as a "free" good which is available in random supply. But now firewood is like any other source of energy which is economically costly […] firewood is either expensive or hard to obtain. The scarcity is confirmed by the increase of firewood selling activities even in the rural areas" CASE Project Baseline Report, CARE, 2008 p. 43.

It should also be noted that firewood and charcoal users depend on the same resource (firewood). The prices for charcoal and for firewood are therefore associated with each other.

Therefore, B_{old} minus the DRB component can be used to determine NRB.

B) Assessment of Demonstrably Renewable woody biomass in Rwanda

According to AMS-II.G. woody biomass is "renewable" if one of the following two conditions is satisfied:

I. The woody biomass is originating from land areas that are forests where:
   (a) The land area remains a forest; and
   (b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
   (c) Any national or regional forestry and nature conservation regulations are complied with.

II. The biomass is woody biomass and originates from non-forest areas (e.g., croplands, grasslands) where:
   (a) The land area remains as non-forest or is reverted to forest; and
   (b) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
   (c) Any national or regional forestry, agriculture and nature conservation regulations are complied with.

The woody biomass is classified as renewable if all of the following three statements hold true:

a) The Land remains a forest or remains as non-forest or is reverted to forest:

The Rwanda Environment Management Authority indicates that in 1993 forests covered 26% of Rwanda's land area, while by 2004 it only covered 19%. This shows a decrease of 7% of forest area in 11 years. [39]

The same institution also shows in their report that in 1960 forest covered 659.000 ha of the land area whereas in 2007 this rate only represented 240.476 ha. This means that the annual average deforestation rate between 1960 and 2007 was then about 1.3% per year, which indicates a loss of approximately 64% of forested landscape.[40]

The main reason for the deforestation is resettlement activities following the civil war in the 1990s. It could also be noted that following the massive deforestation there were reforestation attempts especially to prevent erosion. Today it can be seen that these efforts reached the maximum effect a while ago and today it can be observed that forested landscapes are decreasing again.[41]

It should also be noted that there is no land available which could be reverted to forest in order to produce sufficient amounts of biomass: "*It is estimated that in order to fill the gap between demand and supply of wood, it will require planting additional more than 400,000ha and increasing the forest productivity up to an average of 15m3/ha/year. Such land is not available in Rwanda and productivity is very low" National Forestry Policy, MINIFOM, 2010. Page 10.*

Statement a) therefore doesn't hold true.

b) Sustainable management practices are undertaken on these lands to ensure that carbon stocks do not decrease systematically

A systematic decrease of carbon stocks is the main challenge for Rwanda's wood supply and in effect also for the agricultural sector.

[39] Environmental Review Rwanda, REMA, 2009 Page 59.

[40] Environmental Review Rwanda, REMA, 2009 Page 80.

[41] Biomass Energy Strategy, Ministry of Infrastructure, 2009.Vol 2 page: 22.

Rwanda is facing a huge deficit in term of annual demand for fuel wood and sustainable production potential. The national supply/demand balance, according to current situation shows a deficit of 9,553,000 m^3 of wood in 2009.[42]

The result are very well summarised by the following statement:

"Non-sustainable use of wood means that the demand for wood products exceeds the total annual growth or increment of the entire tree stock in the country. As a result, harvesting rotations are shortened, trees are cut and not replaced fast enough, and the total stock of trees will be reduced. The demand will therefore in the future need to come from a smaller tree stock, and this future damages will be even larger." Biomass Energy Strategy, Ministry of Infrastructure, 2009. Vol 2 page: 68

Statement b) therefore doesn't hold true.

c) Any national or regional forestry and nature conservation regulations are complied with

There is a national forestry policy in effect since 2004 which has different objectives like the increase and diversification of national forest resources as well as the improvement of forest resource management.

Nonetheless, the adopted forest policy is not fully enforced and the declared objectives not fulfilled. The management of the forest resources is on a poor level and although harvesting is not allowed, in practice it was observed that 80% of all forest resources showed signs of exploitation.[43] This means that the regulations are not fully complied with and the forestry economy is not based on a sustainable basis. In fact the Ministry of Forestry and Mines states the following:

"Forest harvesting is poorly done and law enforcement is more of an exception than the rule"[44]

It should also be noted that there are several protected areas in Rwanda. Due to a lack of management, control and unclear borders, these reserves are also threatened due to the high demand for fuel wood. [45]

Furthermore, charcoal production often happens clandestinely and not according to administrative requirements. This not only shows that regulations are not always complied with but it also explains at least partially why the conversion from wood to charcoal is so inefficient in Rwanda; char coalers working clandestinely also work under time pressure which has negative effects on the charcoaling efficiency[46]. According to the biomass strategy for Rwanda illegal exploitation of wood resources happens frequently[47].

The following statement best summarises the situation in Rwanda: "*At the moment, the 2004 adopted forest policy is not fully enforced*" Biomass Energy Strategy, Ministry of Infrastructure, 2009. Vol 1 page 48.

Statement c) therefore doesn't hold true

<u>As a conclusion it could be demonstrated that 0% of the woody biomass can be considered as DRB.</u>

Equation 4 from the Methodology AMS-II.G., can be transformed into:

[42] National Forestry Policy, MINIFOM, 2010. Page 7.

[43] Biomass Energy Strategy, Ministry of Infrastructure, 2009.Vol 4.Page 48.

[44] National Forestry Policy, MINIFOM, 2010. page 9

[45] Rwanda Environmental Threats and Opportunities, Assessment (ETOA) 2008 Update. page 43

[46] CASE Project Baseline Report, CARE, 2008. page 51 and Biomass Energy Strategy, Ministry of Infrastructure, 2009. Vol 3 page 21

[47] Biomass Energy Strategy, Ministry of Infrastructure, 2009.vol 1 page 21

$$f_{NRB,y} = \frac{B_y - DRB}{B_y}$$

Parameter	Unit	Type	Description
$f_{NRB,y}$	%	Calculated	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
B_{old}	T	Fixed	Quantity of woody biomass used in the absence of the project activity
DRB	T	Fixed	Quantity of Demonstrably Renewable Biomass

Applying the values for B_{old} and DRB, $f_{NRB,y}$ computes as:

$$f_{NRB,y} = \frac{B_{old} - 0}{B_{old}} = 1.00$$

However to be more conservative the default value provided by the UNFCCC on http://cdm.unfccc.int/DNA/fNRB/index.html will be applied:

Default Value fNRB Rwanda: 98%

For Cameroon, the fNRB value of 70%, as contained in annex 14 to the report of the 37th meeting of the SSC WG and approved by the Board in EB 68, will be applied. The calculation is done applying the formulae as contained in Annex 22 to the report of the 67th meeting of the CDM Executive Board, and the forestry data as contained in annex 14 to the report of the 37th meeting of the SSC WG and approved by the Board in EB 68.

Step 5: Leakage

A) Diversion of non-renewable woody biomass saved by the project activity

According to AMS-II.G. para 13 (a) the default net to gross adjustment factor of 0.95 is applied to account for leakage and therefore surveys are not required.

B) Leakage assessment for PoAs

According to AMS-II.G. para 23 c) the default net to gross adjustment factor of 0.95 is applied to account for PoA leakage and therefore para 23 a) and b) do not apply.

C) Transfer of Equipment

"If equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered."

This leakage source can be ruled out since all ICS deployed under the program will be new stoves.

Ex-ante calculation of emissions reductions for generic CPA

For ex-ante estimation of the emission reductions, the following assumptions for monitoring parameters are applied:

$N_{eaters\_project}$ = x [48]

Type of stove predominately used before purchasing the ICS:

Scenario 1 ICS: xx%
Scenario 2 ICS: xx%
Scenario 3 ICS: xx%

[48] Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, WINROCK for USAID, 2007. Page: 16

η_{new} = xx%

Σ $N_{i,y}$ =

20xx	20xx	20xx	20xx	20xx	20xx	20xx	20xx	20xx	20xx
x	X	X	X	X	X	X	X	X	x

DO_y = x%

Emission Reductions are calculated as:

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

Parameter	Unit	Type	Description
ER_y	tCO_2	Calculated	Emission reductions of the project activity in period *y*
$B_{y,savings}$	t	Calculated	Quantity of woody biomass that is saved by the CPA in period y. $B_{y,savings}$ comprises three options according to the scenario 1) to 4) illustrated in section B.4.
$f_{NRB,y}$	%	Fixed	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass
$NCV_{biomass}$	TJ/t	Fixed	Net calorific value of the non-renewable woody biomass that is substituted (IPCC: 0.015TJ/t)
$EF_{projected\_fossilfuel}$	tCO_2/TJ	Fixed	Emission factor for the substitution of non-renewable woody biomass by similar consumers: 81.6tCO_2/TJ

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

$$B_{y,savings} = \sum_{i=1}^{4} B_{old,i} \cdot \left(1 - \frac{\eta_{old,i}}{\eta_{new}} \right)$$

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

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

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

The efficiency testing is based on thermal efficiencies of the baseline and project appliances in terms of share of the energy content of the biomass fuel that is converted into cooking energy. The

Water Boiling Test (WBT) protocol (Berkeley Air Monitoring Group Water Boiling Test (WBT) v.3.0 [49]) is used to determine the efficiency of the appliances.

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

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

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

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

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

The method to determine the baseline consumption and the baseline consumption for scenario 4) will be established at time of writing a scenario 4) CPA. Either approach A) Historical Data or B) Survey of Local Usage may be used to determine the baseline in the CPA for institutional stoves (scenario 4). The baseline consumption will be checked by the DOE at time of inclusion of the CPA to the PoA.

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

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

Index i comprises four options according to the scenario 1)-4) illustrated in section B.4.

Parameter	Unit	Type	Description
$B_{old,i}$	t/year	Calculated	Quantity of woody biomass used in the absence of the project activity
$B_{old,appliance,i}$	t/year	Monitored	Average annual consumption of woody biomass per appliance $B_{old,appliance,i}$ e comprises four options according to the scenario 1) to 4) illustrated in section B.4
$N_{i,y}$	-	Monitored	Total number of appliances deployed in period y
DO_y	%	Monitored	Statistically adjusted drop out from total population of appliances in period y
mp_{length}	days	Monitored (implicitly, no extra parameter)	Length of monitoring period y
L_y	-	Fixed	0.95 default value

Applying the procedures outlined in section B.6.3 of the PoA-DD the value $B_{old,appliance,i}$ is derived from per capita woody biomass consumption ($B_{old,\ capita,\ i}$), (Step 1), multiplied with the average number of eaters per ICS as determined during monitoring ($N_{\ eaters\_project}$) (Step1), multiplied by total

[49] See for a description of WBT protocol for example: http://www.berkeleyair.com/publications/cat_view/42-publications (dated 14/10/2010)

number of appliances deployed ($N_{i,y}$) times an adjustment factor for drop out (DO_y) as found during sampling (Step 2).

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

Further more in order to determine Quantity of woody biomass that is saved ($B_{y,savings}$) the efficiency of the replaced and deployed appliances needs to be determined (Step 4).
At last the share of Non-Renewable biomass ($f_{NRB,y}$) needs to be determined in order to calculate the emission reductions (Step 5).

Results for Rwanda:

Scenario 1):

$$B_{old,appliance,1} = 1.077481 t/year \cdot N_{eaters\_project}$$

Scenario 2):

$$B_{old,appliance,2} = 1.61622 t/year \cdot N_{eaters\_project}$$

Scenario 3):

$$B_{old,appliance,3} = 0.6353 t/year \cdot N_{eaters\_project}$$

Results for Cameroon:

Scenario 1):

$$B_{old,appliance,1} = 0.22386\ t/year \cdot N_{eaters\_project}$$

Scenario 2):

$$B_{old,appliance,2} = 0\ t/year \cdot N_{eaters\_project}$$

Scenario 3):

$$B_{old,appliance,3} = 0.6305 t/year \cdot N_{eaters\_project}$$

For say a small scale CPA replacing a total of 4,000 charcoal and non-efficient wood stoves in Rwanda, the ex-ante estimation of the emission reductions for one year would be done as follows:

$N_{eaters\_project}$ = 5.76 [50]

Type of stove predominately used before purchasing the ICS:
Scenario 1 ICS: 30%
Scenario 2 ICS: 60%
Scenario 3 ICS: 10%

***Σ $N_{i,y}$* = 4,000**

Efficiency of the new device deployed η_{new} = 40%

Statistically adjusted drop out from total population of appliances in the year DO_y = 14%

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

[50] Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, WINROCK for USAID, 2007. Page: 16

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

For scenario 1:

$$B_{old,appliance,1} = 1.077481 t / year \times N_{eaters\_project}$$

$$B_{old,1} = 1.07748 \cdot 5.76 \cdot 30\% \cdot 4{,}000 \cdot (1 - 14\%) \cdot \frac{365}{365} \cdot 0.95 = 6{,}084.64\ t / year$$

$$h_{old,1} = \frac{h_{charcoal\_stove,1,2} \cdot NCV_{charcoal}}{f_{biomass/charcoal} \cdot NCV_{biomass}} = \frac{30\% \times 0.0295}{9 * 0.015} = 6.56\%$$

For scenario 2:

$$B_{old,appliance,2} = 1.61622 t / year \times N_{eaters\_project}$$

$$B_{old,2} = 1.61622 \cdot 5.76 \cdot 60\% \cdot 4{,}000 \cdot (1 - 14\%) \cdot \frac{365}{365} \cdot 0.95 = 18{,}253.92\ t / year$$

$$h_{old,2} = \frac{h_{charcoal\_stove,1,2} \cdot NCV_{charcoal}}{f_{biomass/charcoal} \cdot NCV_{biomass}} = \frac{20\% \times 0.0295}{9 * 0.015} = 4.37\%$$

For scenario 3:

$$B_{old,appliance,3} = 0.6353\ t / year \cdot N_{eaters\_project}$$

$$B_{old,3} = 0.6353 \cdot 5.76 \cdot 10\% \cdot 4{,}000 \cdot (1 - 14\%) \cdot \frac{365}{365} \cdot 0.95 = 1{,}195.87\ t / year$$

$$h_{old,3} = 10\%$$

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

$$B_{y,savings} = \sum_{i=1}^{4} B_{old,i} \cdot \left(1 - \frac{\eta_{old,i}}{\eta_{new}}\right)$$

$$B_{y,savings,1} = 6{,}084.64 \cdot \left(1 - \frac{6.56\%}{40\%}\right) = 5{,}087.44\ t / year$$

$$B_{y,savings,2} = 18{,}253.92 \cdot \left(1 - \frac{4.37\%}{40\%}\right) = 16{,}259.51\ t / year$$

$$B_{y,savings,3} = 1{,}195.87 \cdot \left(1 - \frac{10\%}{40\%}\right) = 896.90\ t / year$$

Emission reductions will be calculated as:

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

$$ER_y = (5{,}087.44 + 16{,}259.51 + 896.90) \times (0.98 \cdot 0.015 \cdot 81.6\cdot)$$

$$ER_y = 26{,}682\ tCO_2 / annum$$

B.7. Application of the monitoring methodology and description of the monitoring plan

B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter:	$N_{eaters\_project}$
Data unit:	Number
Description:	Average number of eaters for whom meals are prepared on the ICS
Source of data:	Primary data collection: dedicated monitoring team; database maintenance: CME
Value(s) applied	Xx
Measurement methods and procedures:	Monitoring of the statistically adjusted average number of eaters for whom meals are prepared on the ICS will be performed by either monitoring all appliances or a sample thereof, and will in the latter involve two steps: Step 1: Sample survey amongst ICS deployed under the CPA as specified in section B.7.2 Step 2: Calculation of the average number of eaters at 90% confidence level and 10% precision (annual inspections) or 95% confidence level and 5 precision (biennial inspections) following the statistical standard approach for a homograde test of independent units that have a standard normal distribution. The average number of eaters will be either determined through monitoring recording sheets by the users themselves, or through interviews performed by a dedicated monitoring team according to the sampling procedure described in section B.7.2. Interviews will be conducted using a questionnaire. Interviews are conducted with the aim to achieve the required precision of 10% (annual inspections) or 5% (biennial inspections) for this parameter. All questionnaires and information gathered during the sampling by the monitoring team are handed over to the CME that takes care of entering the information to an electronic database and updating sample databases where appropriate. By determining the average number of eaters for whom meals are prepared on the ICS, the continuous use of the baseline appliance is considered as only the baseline consumption which is reduced by the ICS is considered.
Monitoring frequency:	The CME may decide to do annual or biennial inspections
QA/QC procedures:	All formulae applied to determine the statistical precision used are standard formulae. Furthermore, according to AMS-II.G., par.22 the sampling error has to be deducted (*"...the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen…"*) in the event that 90/10 or 95/5 precision could not be achieved because of a small sample size. No deductions have to be made if 90/10 or 95/5 precision is achieved by sampling an appropriate number of appliances. Data will be collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	Type of stove predominantly used before purchasing the ICS
Data unit:	1) to3)
Description:	The type of stove used before the purchase of the ICS needs to be determined in order to allocate the user to a specific scenario (1)-3))
Source of data:	Primary data collection: to be recorded on the ICS purchase contract
Value(s) applied	Scenario 1) xx% Scenario 2) xx% Scenario 3) xx%
Measurement methods and procedures:	The kind of stoves which was used before the ICS was purchased will be recorded on the purchase contracts. In order to separate between scenario 1) and 2) the general rule will be used, that all stoves including clay will be determined as scenario 1) and traditional all metal stoves will be allocated to scenario 2). If there is doubt and to be conservative users will be allocated to scenario 1) if it can not be clearly determined which type of charcoal stove was predominantly used before purchasing the ICS. In order to determine which stove was used predominantly, users will be asked to determine which stove they are cooking most of the meals on.
Monitoring frequency:	Once at the time of purchase of ICS
QA/QC procedures:	Data will be collected using the standard procedures and will be stored for the CPA crediting period and an additional two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. The validity of the purchase contract showing the baseline stove will be checked during sampling.
Purpose of data	Calculation of baseline emissions
Additional comment:	Type of stove predominantly used before purchasing the ICS is recorded permanently as part of the on-going sales documentation.

Data / Parameter:	η_{new}
Data unit:	% (efficiency value of ICS using biomass)
Description:	Adjusted average efficiency of the system being deployed as part of the CPA
Source of data:	Primary data collection: dedicated monitoring team; database maintenance: CME
Value(s) applied	x%

Measurement methods and procedures:	Monitoring of the statistically adjusted average efficiency involves two steps: Step 1: Sample survey and efficiency testing amongst appliances deployed under the CPA as specified in section B.7.2 Step 2: Calculation of the adjusted average efficiency at 90% confidence level and 10% precision (annual inspections) or 95% confidence level and 5 precision (biennial inspections) following the statistical standard approach for a heterograde test of independent units that have a standard normal distribution. η_{new} is determined following the Water Boiling Test (WBT) protocol, performed by a dedicated monitoring team according to the sampling procedure described in section B.7.2. and following the WBT protocol. Tests will be reported in spreadsheet templates. All equipment used will fulfil the requirements of EB 61 Annex 21 Paragraph 17. (c) i.e. the equipment will be recalibrated at appropriate intervals according to manufacturer specifications but at least once in three years. Checks are conducted with the aim to achieve the required precision (10% or 5%) for this parameter. The CME has the option to establish a dedicated monitoring team itself or to outsource the monitoring of η_{new} to a qualified third party.
Monitoring frequency:	The CME may decide to do annual or biennial monitoring of the parameter.
QA/QC procedures:	All formulae applied to determine the statistical precision are standard formula. Furthermore, according to AMS-II.G., par.22 the sampling error has to be deducted (*"...the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen…"*) in the event that 90/10 or 95/5 precision could not be achieved because of a small sample size. No deductions have to be made if 90/10 or 95/5 precision is achieved by sampling an appropriate number of appliances. Data will be collected using the standard procedures and will be stored for the CPA crediting period and an additional two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. A traceable "identity check" of the appliances visited during sampling shall be performed and recorded (e.g. a picture of the appliance clearly showing its serial no., etc.). Cross-checks: The monitoring team will cross-check results with literature values, or specifications from manufacturer, if available.
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$N_{i,y}$
Data unit:	n/a
Description:	Adjusted total number of appliances deployed until period y
Source of data:	Stove Records Database
Value(s) applied	To be completed in any specific CPA-DD

Measurement methods and procedures:	***The total number of appliances deployed until period y is calculated based on information monitored through the stove records database.***

$$N_{i,y} = \sum_{j=1}^{y} n_{i,j} \cdot OT_{adjusted,i,j,y}$$

Parameter	Description
$n_{i,j}$	Number of ICS deployed in period j per baseline scenario i as reported in the stove records database
$OT_{adjusted,i,j,y} = \begin{cases} 1 & , j < y \\ \frac{d_{average,i,y}}{mp_{length}} & , j = y \end{cases}$	Adjustment factor for reduced operational time of appliances deployed in period y per baseline scenario i
$d_{average,i,y}$	Average number of days that appliances deployed in period y have been operational in period y as determined by respective deployment dates of appliances counted for n_y . Delivery dates are determined mutatis mutandis as in the context of n_j above.
mp_{length}	Length of monitoring period y

Monitoring frequency:	The CME may decide to do annual or biennial monitoring of the parameter.
QA/QC procedures:	Data will be collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. $N_{i,y}$ is recorded permanently as part of the on going sales documentation.
Purpose of data	Calculation of baseline emissions
Additional comment:	y= current monitoring period, j= term for monitoring period, i= comprises the four options according to the scenario 1)-4) illustrated in section B.4.

Data / Parameter:	DO_y
Data unit:	%
Description:	Statistically adjusted drop out from total population of appliances under scenario 1) to 3) in period y
Source of data:	Primary data collection: dedicated monitoring team; database maintenance: CME
Value(s) applied	x%

Measurement methods and procedures:	Monitoring of the statistically adjusted drop out will be performed by either monitoring all appliances or a sample thereof, and will in the latter involve two steps: Step 1: Sample survey amongst appliances deployed under the CPAs as specified in section B.7.2 Step 2: Calculation of the adjusted drop out rate at 90% confidence level and 10% (annual inspections) or 95% confidence level and 5% precision (biennial inspections) following the statistical standard approach for a homograde test of independent units that have a standard normal distribution. The Drop outs will be either determined through monitoring recording sheets by the users themselves, or through interviews where it will be checked if the appliances are still operational, performed by a dedicated monitoring team according to the sampling procedure described in section B.7.2. Interviews will be reported in a questionnaire. Checks are conducted with the aim to achieve the required precision (10% or 5%) for this parameter. All questionnaires and information gathered during the sampling by the monitoring team are handed over to the CME that takes care of entering the information to an electronic database and updating sample databases where appropriate.
Monitoring frequency:	The CME may decide to do annual or biennial inspections.
QA/QC procedures:	All formulae applied to determine the statistical precision used are standard formula. Furthermore, according to AMS-II.G., par.22 the sampling error has to be deducted (*"...the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen…"*) in the event that 90/10 or 95/5 precision could not be achieved because of a small sample size. No deductions have to be made if 90/10 or 95/5 precision is achieved by sampling an appropriate number of appliances. Data will be collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. A traceable "identity check" of the appliances visited during sampling shall be performed and recorded (e.g. a picture of the appliance clearly showing its serial no., etc.).
Purpose of data	Calculation of baseline emissions
Additional comment:	As each CPA is only including one type of ICSs DOy does not need to be calculated separately for scenarios 1) to 4)

B.7.2. Description of the monitoring plan for a generic CPA

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According to AMS-II.G. *"Monitoring shall consist of checking the efficiency of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating at the specified efficiency (ηnew) or replaced by an equivalent in service appliance."*

Database records

Electronic database(s) will be operated and maintained by the CME or IEs appointed by the CME to ensure completeness and accuracy of monitoring information:

Stove records database:

The following information is collected for every ICS distributed[51]:

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

Database management

The information in this database will be updated continuously for every ICS distributed. Original copies of the sales invoices or sales receipts (or whatever format is used to collect the data required) will be kept and maintained by the monitoring team of the CME or monitoring team of IEs appointed by the CME and kept for two years after the end of the crediting period. There will be data back-up of the electronic database on CME level.

The CME will appoint a monitoring manager responsible for overseeing the database management and for assigning a monitoring team responsible for all monitoring obligations.

Sampling Plan:

The Sampling Plan outlined below is in accordance with Appendix 3 of the standard for sampling and surveys for CDM project activities and programme of activities (EB65 Annex 2).

1. Sampling Design

a. Objective and Reliability Requirements

i. Objective of the sampling effort

Due to the high number of appliances to be deployed an annual check of all appliances may not be economically feasible and therefore a sample may be monitored to ensure that all the appliances deployed are still operating or to record end of operation and/or replacement of the appliances in order to determine the statistically adjusted annual or biennial value for drop out (***DO_y***).

Sampling methods may also be applied to determine the annual or biennial value for the efficiency of the ICSs (η_{new},) and the annual or biennial value for the average number of eaters for whom meals are prepared on the ICS ($N_{eaters\_project}$).

Where replacements are made, monitoring shall also ensure that the efficiency of the new appliances is similar to the appliances being replaced.
Therefore data for the following parameters will be compiled as a result of conducting the survey:
$N_{eaters\_project}$, η_{new} and $DO_{y,}$

ii. Timeframe

The time frame for the parameters, i.e. annual or biennial, depends on selected inspection frequency which is at discretion of CME provided confidence/precision requirements are met, according to AMS-II.G., para 15 and 16. All of the sampled parameters will be monitored in the same frequency, i.e. either annually or biennially.

iii. Estimated parameter values

The estimated parameter values are as per the values used for ex-ante calculation of emission reductions (please refer to Section B.7.1).

[51] The record keeping system should collect as many information as necessary to facilitate the Verification of the CERs. At the current point of time the list of information seems ideal but may be extended or condensed. The collection of all the items is therefore not mandatory and additional information may be collected as well.

Data / Parameter	DO_y
Unit	%
Description	Statistically adjusted drop out from total population of appliances under scenario 1) to 3) in period y
Value(s) applied	Xxx %
Additional comments	xxx

Data / Parameter	η_{new}
Unit	%
Description	Adjusted average efficiency of the system being deployed as part of the CPA
Value(s) applied	xxx%
Additional comments	xxx

Data / Parameter	$N_{eaters\_project}$
Unit	number
Description	Average number of eaters for whom meals are prepared on the ICS
Value(s) applied	xxx
Additional comments	xxx

iv. Sampling requirements as per sampling standard and applicable methodology

Precedence of methodology

Para 4 of the Sampling Standard, EB 65, Annex 2 clarifies that "[…] any requirements specified in the applicable methodologies having precedence".

Coverage of sampling requirements in the applicable methodology:

As per applicable methodology AMS-II.G. Para 22, *"when biennial inspection is chosen a 95% confidence interval and a 5% margin of error requirement shall be achieved for the sampling parameter. On the other hand when the project proponent chooses to inspect annually, a 90% confidence interval and a 10% margin of error requirement shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/5 precision is not achieved, the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/5 precision"*.

Additional requirement for PoAs as per sampling standard

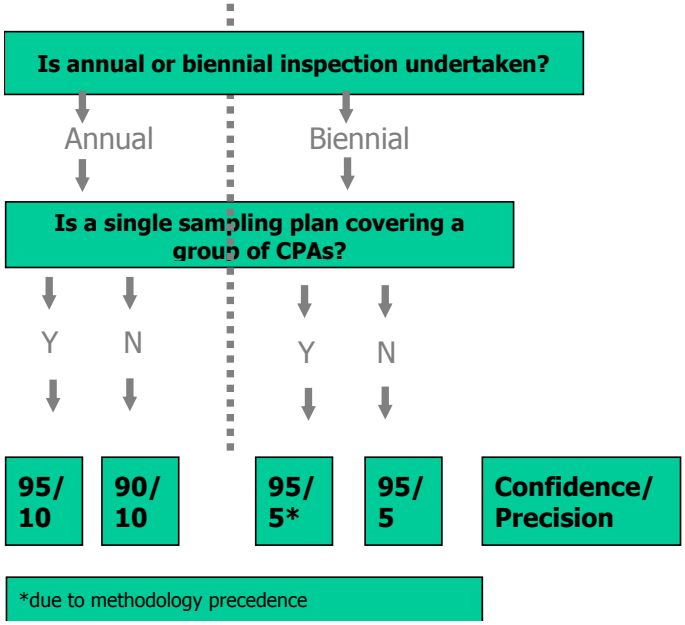
In case a single sampling plan for more than one CPA is used, "parameter values shall be estimated by sampling in accordance with the requirements in the applied methodology separately and independently for each of the CPAs included in a PoA except when a single sampling plan covering a group of CPAs is undertaken applying 95/10 confidence/precision for the sample size calculation", as per para 19 of the sampling standard, EB 65, Annex 2.

Furthermore, as per para 285 of Standard: Clean development mechanism project standard Version 07, CME can prepare two separate monitoring reports whereby the two monitoring reports shall contain two mutually exclusive batches of CPAs. Accordingly, CME will have a separate batch for CPAs in Rwanda and a separate batch for CPAs in Cameroon.

Sampling may therefore be across a country's CPAs and hence a single sample plan may be applied, but only if the CPAs are deploying the same ICS type, i.e. the same stove type such as SAVE80, to reduce monitoring efforts.

v. Confidence/precision criteria to be met

As mentioned above, according to AMS-II.G., Para 22, confidence/precision criteria to be met is determined as follows:



Note: As per para 22 of AMS-II.G. the lower bound can also be used instead of repeating the survey efforts to achieve the required confidence/precision level

b. Target Population

i. Definition

For the monitoring parameters DO_y and n_{new};

All ICS which are included up to the specific monitoring period.

For the monitoring parameter $N_{eaters\_project}$:

All ICS which are included up to the specific monitoring period however stoves which are found to qualify as drop outs (DO_y) will not be considered to determine $N_{eaters\_project}$.

ii. Description of particular features associated with it (if applicable)

There are no particular features associated with the target population.

c. Sampling method

i. Description and justification of selected sampling method

The sampling procedure is a simple random sampling process which randomly samples households across all the CPAs deploying the same ICS type.

To reduce monitoring efforts a single sample is drawn from the stove records database based on which all of the parameters shall be monitored. (As already stated above, if different CPAs deploy the same ICS type, the database may include stoves from several CPAs and a sample may be drawn across CPAs), in accordance with footnote 6 EB 65 Annex 2 which says that the largest number for the sample size can be chosen for the sampling effort with one common survey. However this does not imply that for each of the parameters the same number of users/appliances has to be monitored during sampling. The CME will determine the number of users/appliances monitored during sampling for each of the parameters separately. The reason is that the variation within the values obtained will be different for each parameter. Since the precision of a sampled parameter depends on the variation of its values, the necessary number of users/appliances to be monitored in order to achieve the confidence/precision as mentioned above will also depend on the variation of values. Therefore, although the monitoring team will undertake monitoring of various parameters simultaneously and on the same sample group, the CME may decide to stop

monitoring of a particular parameter during the campaign once the required precision for this parameter is achieved. The monitoring team will continue to monitor appliances in the sample with respect to the remaining parameter(s) until again the required precision for these parameters is achieved.

Random distribution

The method of selecting users to be included in the sample databases for deployed appliances will be random using simple random sampling. All random selections will be stored for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. Therefore, providing traceability of the selection.

ii. Identification of strata or clusters if applicable

Not applicable since only single stage sampling will be done

d. Sample size: Estimated target number of units and justification

The following assumptions are applied to calculate the sample size for the different sampling options. Please note: The assumptions are valid at time of submitting the PoA-DD for registration and the specific CPA-DD for inclusion. If at the time of sampling more up to date figures or information is available (e.g. from previous monitoring campaigns or from other projects applying the same technology or updated guidance or best practice examples by the EB) which can be applied to do a more accurate sampling these may be used to determine the sample size and justification will be provided to the verifying DOE.

Parameter of interest	Expected value	Source	Estimated standard deviation	Source
DO_y	xx% (p.a.)	See tables under 1. a. iii. above	Not applicable since the parameter is a proportion	Not applicable
η_{new}	xx%	See tables under 1. a. iii. above	xxx%	xxx
$N_{eaters\_project}$	Xxx	See tables under 1. a. iii. Above	xxx	xxx

Estimated sample size for different sampling options[52]:

Simple Random Sampling

	Annual Sampling / Sampling per CPA (90/10)	Annual Sampling / Sampling across CPA (95/10)	Biennial Sampling / Sampling per CPA (95/5)	Biennial Sampling / Sampling across CPA (95/5)
DO_y	Xx	Xx	Xxx	Xxx
η_{new}	Xx	Xx	Xx	Xx
$N_{eaters\_project}$	Xx	Xx	Xx	xx

Note: Response rate is assumed to be xx%.

For subsequent monitoring periods, the values determined during the previous monitoring period will be used for calculation of sample sizes for each monitoring period.

[52] The calculations spread sheet is provided to the DOE. Since no approved formulae for sample size calculation is available by the EB at the time of requesting registration the formulae applied to calculate the sample size is taken from standard formula for statistics, http://edis.ifas.ufl.edu/pdffiles/PD/PD00600.pdf and http://wps.pearsoned.co.uk/wps/media/objects/10721/10978811/Ch_08/levine-smume6_topic_08-07.pdf

However in order to be conservative, minimum sample sizes will apply in all of the 4 sampling options if the calculated sample size for the specific parameter and sampling option (which depends on the expected value and the estimated standard deviation) is lower than the minimum sample size thresholds below. Therefore the sample size in each sampling option will be as calculated or the minimum sample size, whichever is higher.

Minimum sample sizes for each sampling option (only applicable if the calculated sample size is lower):
η_{new} : 10
DO_y: 60
$N_{eaters\_project}$:30

e. Sampling Frame

i. Identification or description of sampling frame

The sampling frame is the list containing all ICS which were included up to the specific monitoring period.

ii. List of sampling frame (if known)

The full list of all ICS included will only be available after the end of the specific monitoring period. At time of submitting the PoA for registration and the specific CPA for inclusion there is no complete list available since full roll-out of stove deployment will only happen after PoA registration.

Example of the sampling frame:

Type of appliance (ICS type) deployed	Serial number (Stove-ID) of system	Delivery date of appliance (to user)	User details (Name, Address, etc.)	Administrative unit
Save80	1	xx/xx/2xxx	XXX	XXX
Save80	2	xx/xx/2xxx	XXX	XXX
Save80	3	xx/xx/2xxx	XXX	XXX
…	…	…	…	…

The serial number (Stove ID) serves as the unique code in the sampling process. I.e. as a result of the sampling a list of serial numbers is determined which are allocated to the specific stoves. Those stoves will be monitored according to the procedures described in this section.

2. Data to be collected

a. Field Measurement

i. Identification of all variables to be measured

The following variables are measured for determining the parameter values of:

Parameter	Description
$\boldsymbol{DO_y}$	Statistically adjusted drop out from total population of appliances in period y
η_{new}	Adjusted average efficiency of the system being deployed as part of the CPA
$N_{eaters\_project}$	Average number of eaters for whom meals are prepared on the ICS

ii. Determination of appropriate timing

In general (under normal circumstances), measurements will be conducted at the latest 6 months after the end of the specific monitoring period.
Therefore:
In general (under normal circumstances), the measurement will be conducted at the latest 12 + 6 months after the start of the specific monitoring period (annual monitoring) or at the latest 24 + 6 months after the start of the specific monitoring period if biennial inspection is chosen.

iii. 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. However, this does not imply that every household can only be contacted once (see below).

iv. Demonstration that parameter of interest is not subject to seasonal fluctuations if measurements are conducted only during limited time periods or demonstrate that selected time period is conservative or corrections are applied

DO_y: Drop outs are recorded when users are found to not use the stove any longer. It is expected that the chance a stove is no longer in use is increasing over time for various reasons however seasonal effects will have no impact on the general stove usage. DO_y is determined by asking the user a yes or no question.

η_{new} : The WBT protocol is applied to measure the efficiency of the ICS deployed. The WBT protocol is taking seasonal effect such as variations of wood moisture in the different seasons into consideration by calculating the efficiency of the stove depending on the actual wood moisture.

$N_{eaters\_project}$

$N_{eaters\_project}$ is determined by asking the user about average number of eaters for whom meals are prepared on the ICS during the specific monitoring period. This question does not depend on the season when the survey is conducted. The average number of eaters will change over time due to changes in family size. However the former is not affected by seasonal fluctuations.

v. Description of measurement methods

DO_y

Drop outs will be either determined through monitoring recording sheets by the users themselves, or through interviews where it will be checked if the appliances are still operational. Interviews will be reported in a questionnaire.

η_{new}

η_{new} is determined applying the Water Boiling Test (WBT) protocol (see E.7.1). Tests will be reported in spreadsheet templates. All equipment used will fulfill the requirements of EB 61 Annex 21 Paragraph 17. (c).

$N_{eaters\_project}$

The average number of eaters for whom meals are prepared on the ICS will be either determined through monitoring recording sheets by the users themselves, or through interviews. Interviews will be conducted using a questionnaire.

b. Quality Assurance/ Quality Control

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

Data collected and processed by the field staff will be checked regularly by the CME or a person dedicated by the CME.

Training of field personnel

All personnel involved in the monitoring will be trained to ensure that each of them undertakes an appropriate monitoring assignment according to the Monitoring Plan. Any personnel involved in the monitoring will be trained by the CME or by or a person dedicated by the CME before performing any monitoring activities. Only people who are trained are qualified to be involved in the monitoring.

Provisions for maximizing response rates

Documentation of out-of-population cases, refusals, other sources of non-responses

- 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 and decide whether or not the refusal is due to a likely non-use of the ICS. If the CME decides that the refusal is due to a likely non-use of the ICS, this ICS will count 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.

In case of non-respondent the household will be replaced by another household in the survey (See above, xx% estimate of non-response).

ii. Procedure for defining outliers and under what circumstances outlier data/measurements may be excluded and/or replaced

CME will apply the "3 sigma rule": All values outside 3 standard deviations of the mean will be excluded.

See also: http://en.wikipedia.org/wiki/68-95-99.7_rule

Other appropriate measures to define and exclude outliers may also be used.

c. Analysis: Describe how the data will be used

Data will be used to calculate emission reductions achieved during the specific monitoring period according to the equations provided in Section B.6.3 of the PoA-DD. The CME is responsible for preparing the Monitoring Report.

3. Implementation Plan

a. Schedule for implementing the sampling effort

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

b. Skills and resources required for data collection and the analyses, general description of qualifications and experience

The CME will assign the people, entities or qualified third parties responsible for the data collection. The CME will ensure that the qualification and experience of the person or entity involved is adequate for the specific tasks to be performed by the person or entity.

Other sampling methods which may be more practical and cost effective may alternatively be used, while considering the most recent standard and best practice examples for sampling and surveys for small-scale CDM project activities. If this is the case, the DOE will have to verify at verification stage that the sampling method was statistically sound and as robust as the approaches presented in this PoA-DD.

As a result of the sampling effort the results will be transferred to the Sample Database by the CME or a entity appointed by the CME:

The Sample Database includes the following information for the ICS which are part of the monitoring sample:

- Continuous operation of appliance (yes/no), and/or
- Average Number of eaters per ICS ($N_{eaters\_project}$), and/or
- Efficiency tested (η_{new})
- Date of the check

The information in this database will be updated for every Monitoring period.

Appendix 1. Contact information of coordinating/managing entity and responsible person(s)/ entity(ies)

CME and/or responsible person/ entity	☒ CME ☒ Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA
Organization	atmosfair gGmbH
Street/P.O. Box	Zossener Str.55-58
Building	
City	Berlin
State/Region	Berlin
Postcode	10961
Country	Germany
Telephone	+49 30 627 3550-25
Fax	+49 30 627 3550-29
E-mail	info@atmosfair.de
Website	www.atmosfair.org
Contact person	Xaver Kitzinger
Title	CDM Project Developer
Salutation	Mr
Last name	Kitzinger
Middle name	

Appendix 2. Affirmation regarding public funding

Appendix 3. Applicability of methodology(ies) and standardized baseline(s)

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

Appendix 5. Further background information on the monitoring plan

Appendix 6. Summary of post registration changes

The following changes have occurred after registration of the PoA:

- The boundary of the registered PoA has been changed to include an additional host party i.e. Cameroon.

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