CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

Improved Cooking Stoves Programme of Activities in Africa
27/11/2012
Version 3.2

A.2. Description of the small-scale programme of activities (PoA):

1. General operating and implementing framework of PoA

The purpose of this Programme of Activities (PoA) is the dissemination of improved biomass cooking stoves (ICS) in a number of countries in Sub-Saharan Africa (SSA), starting with the countries listed in Section A.4.1.1[1]. The Programme will promote stove categories that replace existing less efficient cooking stoves using woody biomass (wood-fuel and/or charcoal).

The ICS to be distributed are more efficient in transferring heat from the fuel to the pot when compared to the stoves typically being used in SSA. By replacing inefficient stoves, the PoA will save on consumption of woody biomass (either wood or charcoal made of wood) which is the dominant fuel used for cooking in SSA countries. The ICSs applied in this PoA have been designed to match the traditional utensils and cooking habits of the people in SSA.

Following version 3.0 of the small-scale CDM methodology 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. Therefore, by reducing the amount of fuel required for cooking and thus the use of non-renewable woody biomass, the replacement of less efficient stoves with more efficient ICS reduces the amount of greenhouse gases (GHG) emitted into the atmosphere.

Envirofit International Ltd (Envirofit) is the coordinating/managing entity (CME) for this PoA. As such, it will coordinate the efforts of different Distribution Organizations (DOs) which will be contracted to distribute ICS in the boundary of the PoA and comply with the requirements of this PoA. DOs will act as CPA implementers. In the context of this PoA, DOs will not become project participants, as per Annex 38 to EB55 Report, paragraph 8, "the operators of individual CPAs are not required to be project participants". The inclusion of new CPAs to the PoA will be requested by the CME to the Designated Operational Entity (DOE) during the lifetime of the PoA.

Each DO will sell ICSs either directly or through technicians, entrepreneurs or other agents sub-contracted by the DO. If any such 3rd parties are engaged by the DO, the DO will be responsible for providing training and development of ICS technicians/entrepreneurs and ensuring that correct procedures are followed during distribution of ICS, including the correct recording of data required for monitoring activities. The CME will provide training and guidance documents on the correct distribution and monitoring procedures to each DO. Each DO will act individually, implementing the CPA(s) in accordance with local circumstances.

[1] Sub-Saharan Africa (SSA) is here defined as including 45 countries south of the Sahara as listed in UNDP, 2009: The Energy Access Situation in Developing Countries, A Review Focusing on the Least Developed Countries and Sub-Saharan Africa", plus Sudan and South Sudan, which are considered part of the Arab States of North Africa.

When purchasing an ICS, the customer will provide certain information that will be recorded along with the unique stove serial number to enable tracking of the stove during monitoring. This information will form part of the CPA Distribution Record. The customer will also release ownership of the carbon credits generated by the ICS to the CME. Accordingly, the CME will use the CER proceeds to reduce the costs of ICSs supplied to DOs and thus reduce the price charged to end users, which contributes to overcome the barrier of lacking affordability of ICS. The CER proceeds will also be used to recoup the associated costs incurred in the development and implementation of the PoA, such as for the training of DOs and for marketing of the benefits of ICS to overcome prevailing attitudes, as well as covering the costs of after sales services.

The data collected in each CPA Distribution Record will be transferred by the DO to the CME. The CME will be responsible for cross-checking data and entering it into a PoA Distribution and Monitoring Database. The PoA Distribution and Monitoring Database will also serve as the basis for the calculation of CERs and monitoring of CPAs under the PoA. The monitoring plan will be validated and verified by a DOE.

The parties (DOs and their contractors or any third parties working on their behalf) involved in the implementation of each CPA will be made aware of and will have agreed that their activity is being subscribed to the PoA.

Figure 1 below provides a graphic illustration of the overall PoA structure.

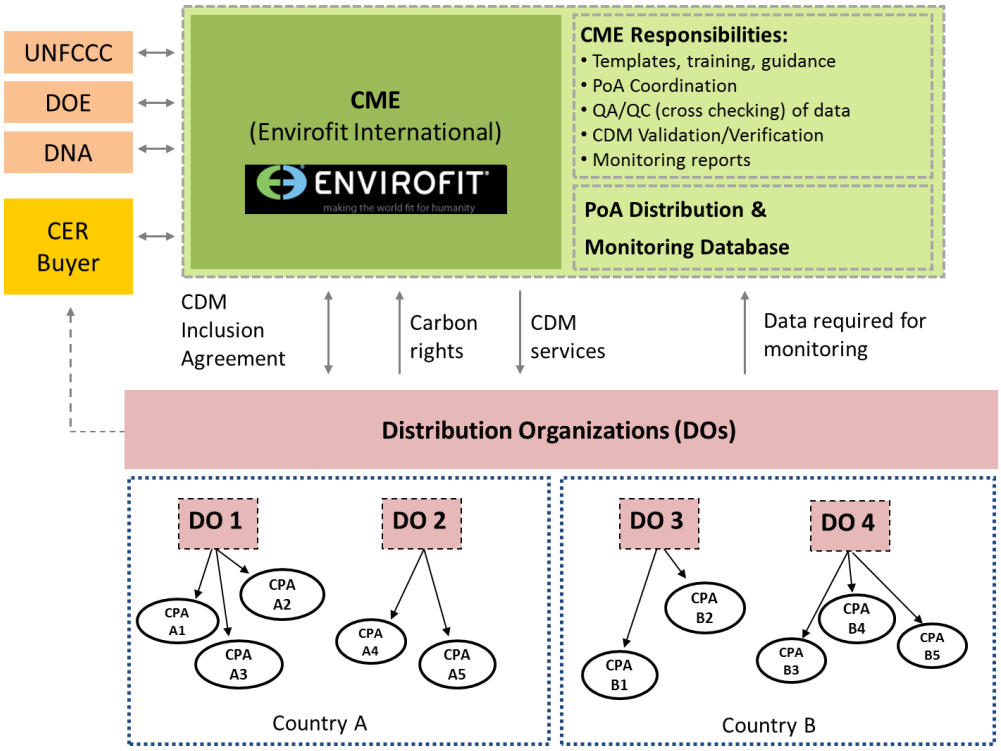

Figure 1: PoA structure

2. Policy/measure or stated goal of the PoA

The goal of the PoA is to enable the large-scale distribution of high efficiency biomass cook stoves in several SSA countries. The PoA will have multiple benefits of reducing global GHG emissions, reducing pressure on forests and woody biomass resources, reducing indoor air pollution associated with use of traditional stoves and freeing up income that can be used for other purposes by reducing the expenditures of end users on fuel for cooking.

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

There are no laws/policies mandating the adoption and/or dissemination of ICS in any of the countries within the PoA boundary. Therefore, the proposed PoA is a voluntary action by the CME (Envirofit International Ltd) and the participating DOs as CPA-developers.

A.3. Coordinating/managing entity and participants of SSC-POA:

The coordinating and managing entity of the PoA and the entity which communicates with the Executive Board is Envirofit International Ltd. Contact details are provided in Annex 1.

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
United Kingdom	Envirofit International Ltd (project participant)	No
Kenya (host)	Envirofit International Ltd (project participant)	No
South Africa (host)	Envirofit International Ltd (project participant)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

Republic of Kenya (Kenya) and Republic of South Africa (South Africa).

It is planned to expand this PoA to other countries in Sub-Saharan Africa.

A.4.1.2. Physical/ Geographical boundary:

The geographical area within which all CPAs included in this PoA will be implemented is the territorial boundary of the host countries included in the PoA boundary. The host countries included in the PoA boundary are listed in Section A.4.1.1 and indicated in the diagram below.

Figure 2: Countries included in PoA boundary

Each CPA will be limited by the territorial boundary of the host country in which it is located, and the physical location of the stoves distributed in that CPA will form the actual CPA boundary.

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

The PoA will be implemented using the approved methodology *AMS-II.G, version 3 - Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass.* This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of the improved cooking stoves produced by Envirofit. The stoves that will be distributed will burn either wood fuel or charcoal fuel and will replace less efficient stoves burning either wood fuel or charcoal fuel.

Below are pictures of Envirofit's current line of high efficiency cooking stoves.[2]

Figure 3. CH2200 (left) and CH4400 (right) Charcoal Stoves

Figure 4. G3300 (Left) and M5000 (Right) Portable Wood Stoves

Figure 5. Z3000 Built in Stove

All the stoves depicted above have been tested in accordance with the "Emissions and Performance Test Protocol", with emissions measurements based on the stove testing protocol developed by Colorado State University (available at www.eecl.colostate.edu). The average CO emissions results show a per cent improvement above 60% in all cases, compared to a metal stove (charcoal stoves) or three stone fire (wood fuel stoves).

Other wood and charcoal stoves produced by Envirofit and/or other manufacturers could be included in a CPA under the PoA as well. Inclusion of such stoves would be subject to the completion of appropriate tests to prove that stove efficiencies meet the requirements of the methodology and the eligibility criteria of the PoA as further specified in Section A.4.2.2.

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

Envirofit, as the PoA coordinating entity, shall verify that certain eligibility conditions are met before allowing a CPA to be included under the PoA. The eligibility criteria for the inclusion of a CPA in the PoA, which shall be stated and confirmed in each CPA-DD, are as follows:

No.	Eligibility criteria		Means of proof	Confirm-ation
	Description	**Conditions to be met**		
1.	Boundary and location of the CPA	The CPA is located within the boundary of one of the countries within the PoA boundary.	Location and boundary is specified in the specific CPA-DD and supported with GPS coordinates.	Yes/No
2.	Avoiding double counting	The CPA includes a means of uniquely identifying the stoves to be distributed and the end-users who will receive stoves. This shall ensure no double counting of stoves within the PoA and ensure that stoves can be identified as belonging to this PoA and not to a PoA managed by any other CME.	Photo or similar proof that stoves have a unique serial ID number or other means of identification. For first CPA, document to be provided: stove sales receipt ("CPA Distribution Record") showing CME and DO logos, end user details including name and address and stove ID number. For all subsequent CPAs, in addition to the sales receipt the programme logo shall be displayed on the stoves.	Yes/No
3.	Applicability of Methodology AMS-II. G - Technology type	The ICS uses one of the following fuel types: • Wood fuel • Charcoal	Technical specification of ICS provided	Yes/No
4.	Applicability of Methodology AMS-II. G – Minimum ICS efficiency/	The ICS has a minimum efficiency of 20% (AMS-II.G, V.3, para 1)	Technical specification of ICS provided (either from manufacturer's specifications or test results using the	Yes/No

	specifications of technology including the level and type of service		Emissions & Performance Test Protocol (EPTP)[3])	
5.	Start date of CPA	The start date of the CPA shall be after the PoA validation start date (i.e. not prior to 13 December 2011, which was the date the PoA was made available online on the UNFCCC website for global stakeholder consultation).	The start date of the CPA will be specified in each CPA-DD and an appropriate proof will be provided (e.g. this could include, but need not be limited to a document showing the stove shipping date, document showing date on which local assembly started or some other means such as the date of contract closure between the CME and DO).	Yes/No
6.	Applicability of Methodology AMS-II.G - Non-Renewable Biomass in use since Dec 1989	The first CPA in each country will demonstrate that non-renewable biomass has been in use since December 1989.	At least two of the factors listed in paragraph 10 of methodology AMS-II.G. v.3 are shown to exist in the country	Yes/No
7.	Additionality of CPAs	The CPA shall satisfy the latest version of the "Guidelines on the demonstration of additionality of small-scale project activities". Depending on whether the CPA is small scale or micro-scale, the CPA shall satisfy one of the two additionality tests below (test 1 is for micro-scale CPAs and test 2 is for small-scale CPAs):	The level of energy savings from the individual sub-systems and the overall CPA are estimated using an Excel sheet or similar tool; the location of the CPA is defined in the CPA-DD; the end	Yes/No

[3] Available at http://cdm.unfccc.int/filestorage/I/Z/X/IZX36AE84V1K5NOYQBSU0TWRHD2FGL/Stove%20Emissions%20and%20Performance%20Test%20Protocol.pdf?t=SnJ8bWU1N2V6fDCRpTWl-IHHWKJnPlObQUhM

		1. If the CPA size is below 60 GWh_{th}/year[4]: (a) The geographic location of the project activity is a LDC/SID or special underdeveloped zone of the host country as identified by the Government before 28 May 2010; or (b) The project activity is an emission reduction activity with both conditions (i) and (ii) satisfied; (i) Each of the independent subsystems/measures in the project activity achieves an estimated annual emission reduction equal to or less than 1.8 GWh_{th}/year; and (ii) End users of the subsystems or measures are households/communities/SMEs. 2. If the CPA size is between 60 and 180 GWh_{th}/year: (a) End users of the subsystems or measures are households/communities/SMEs; and (b) Each of the independent subsystems/measures in the project activity achieves an estimated annual emission reduction equal to or less than 9 GWh_{th}/year.	user groups are defined in the CPA-DD.	
8.	Official Development Assistance (ODA)	The CPA is either: a) not receiving any funding from Annex I parties; or b) the Annex I party funds do not result in a diversion of ODA.	a) Confirmation by the DO or CME b) Confirmed in the LoA of the host country	Yes/No
9.	End-user group	The CPA is either aimed at households, community organisations (e.g. schools) or small/medium enterprises.	The CPA-DD specifies the target end-user group and the appropriate baseline (also see EC#17). Supporting	Yes/No

[4] Note: a factor of 3 is used for the conversion of electric to thermal installed capacity and hence the energy output is expressed as 1.8GWh_{th}/year and the overall CPA limit is maximum thermal energy savings of 180 GWh per year. This approach was confirmed by the SSC-CDM Working Group with regard to the application of methodology AMS-II.G (Clarification F-CDM-SSCwg ver 01 SSC_233).

			documents could include but need not be limited to a copy of the CME's contract with the DO and/or agreements with distributors used by the DO.	
10.	Sampling	Sampling of stoves within the CPA must meet the requirements of AMS-II.G v.3 and the "Standard on Sampling and Surveys for CDM Projects and Programmes of Activities" (the Sampling Standard).	The CPA-DD either specifies that a) sampling will be undertaken as part of the PoA Sampling Plan, and in Section B.6.1 describes how the PoA Sampling Plan is to be applied; or b) if CPA-specific sampling is to be undertaken, a CPA-specific Sampling Plan must be provided and meet the requirements of AMS-II.G v. 3 and the Sampling Standard. The CPA-specific sampling approach shall follow the approach outlined in the PoA Sampling Plan except where the methodology AMS-II.G and/or the Sampling Standard call for a different approach.	Yes/No
11.	SSC Limit for CPAs	The annual energy savings of each CPA shall not go beyond the limits of 180 GWh_{th}/year over the entire crediting period. In the case of using option 1 to prove additionality under Eligibility Criteria 7, the limit shall be 60 GWh_{th}/year over the entire crediting period.	The maximum number of ICS will be determined in each CPA-DD depending on the technology used (excel sheet will be provided to show calculated energy savings). If a CPA exceeds the applicable limit in	Yes/No

			any year, the claimable emission reduction shall be capped based on the estimated GHG reductions in the CPA-DD[5]).	
12.	Exempted from de-bundling	Each ICS reduces energy consumption by less than 1.8 GWh_{th}/year[6].	Specific energy savings for the applied ICS estimated using Excel sheet or similar tool.	Yes/No
13.	Contractual agreement	In the case that the CME is not responsible for implementing the CPA, the organization responsible for CPA implementation, known as the Distributing Organisation (DO), has signed a contractual agreement with the CME to participate in the PoA. This agreement: • defines the ownership of the carbon emission reduction rights • covers the DO's distribution and monitoring related responsibilities • confirms that the ICS to be distributed under the CPA have not and will not be distributed under any other carbon project (CDM project, PoA or voluntary carbon market project) • cedes the DO's rights to the carbon credits generated from CPAs under the PoA to the CME	Contractual agreement in place between the DO and the CME including the CDM-specific responsibilities of the DO (e.g. in an Annex to the contract) If the CME is implementing the CPA itself, then this is not necessary.	Yes/No
14.	Local Stakeholder Consultation	A Local Stakeholder Consultation (LSC) must be conducted prior to inclusion of the CPA in the PoA. If a LSC has already been done at the national level for the first CPA in the	Copy of the report for the LSC that was conducted either for the first CPA in the country or for the	Yes/No

[5] As per EB 65, Annex 5, paragraph 83.

[6] 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, then that CPA of the PoA is exempted from performing de-bundling check, i.e. considered as being not a de-bundled component of a large scale activity.

		country, and the LSC covered the issues relevant to this CPA, then the LSC does not need to be done again.	particular CPA to be included in the PoA.	
15.	Environmental Analysis	An Environmental Analysis must be conducted prior to inclusion of the CPA in the PoA. If the Environmental Analysis has already been done at the national level for the first CPA in the country, and the analysis covered the issues relevant to this CPA, then the analysis does not need to be done again. Similarly, if an exemption has been obtained from a government agency exempting the CME from having to conduct an Environmental Impacts Assessment for the first CPA, then this shall count for all subsequent CPAs.	If required, a copy of the EIA or exemption that was obtained either for the first CPA in the country or for the particular CPA to be included in the PoA. If neither of these is required, then CPA-DD should indicate whether there has been any environmental analysis undertaken already for the first CPA. If not, then environmental analysis must be undertaken in the CPA-DD.	Yes/No
16.	CPA crediting period does not exceed PoA life	The duration of the crediting period of each CPA to be included in the PoA shall not exceed the end date of the registered PoA.	CPA-DD shall indicate the duration of the CPA crediting period, either for a single 10 year crediting period or a 7 year renewable crediting period. The final date for which CERs can be credited shall be no later than 28 years after the date of registration of the PoA.	Yes/No
17.	Baseline parameters to be established at CPA level	Each CPA shall demonstrate how the baseline parameters that are to be calculated at the CPA level have been determined, and shall do so applying the following the approaches: a) f_{NRB}: as per the approach outlined in detail in Annex 3 or using default values where	CPA-DD shall outline the approach and provide supporting documents including copies of any official government reports, statistics or literature sources used for	Yes/No

		available/approved by the host country DNA; b) B_{old}: as per the approach outlined in Section E.6.2, applying Option (a) of paragraph 7 of AMS-II.G v.3, using either historical data or a survey of local usage; c) n_{old}: as per the approach outlined in E.6.2, applying Option 2 of paragraph 6 of AMS-II.G v.3, using either national statistics, literature values or through representative sampling.	determining parameters. If local surveys or representative sampling are used then copies of questionnaires, sampling design etc shall be provided.	

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

In the following it is demonstrated that:

(i) The proposed PoA is a voluntary coordinated action;

None of the countries in the PoA have laws/policies mandating the adoption of ICS. This proposed PoA is a voluntary action by Envirofit, the CME.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

See below for the demonstration of how the action would not be implemented in the absence of the PoA.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

Not applicable.

(iv) If a mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable.

The PoA reduces the use and demand for fossil fuels and non-renewable biomass that would have been used in the replaced stove to achieve the same output (i.e. cooking daily meals and boiling water) with the ICS. This directly leads to reduced GHG emissions.

According to UNDP/WHO, the prevailing fuels used for cooking in SSA countries are wood and charcoal, with 69% of people relying on wood and 11% of people relying on charcoal.[7] The dominant technology for wood users in SSA countries is still the traditional "three-stone" fire and other conventional cooking stoves while the traditional metal charcoal stove is the most frequently used technology by charcoal users.[8] As is discussed in detail below, the penetration of improved stoves is still very low in the vast majority of SSA countries.

The wood collected or harvested to fire traditional stoves, or to be converted into charcoal for the same purpose, consists of a high percentage of non-renewable biomass. The substitution of traditional stoves with ICS saves fuel, with the amount saved depending on the efficiency of the ICS. According to the approved methodology, in the absence of the project activity, the assumed baseline scenario for the purposes of emissions reduction calculations would be the use of fossil fuel for the community to meet its energy need if the use of non-renewable biomass would be avoided. Therefore, by reducing non-renewable biomass consumption (i.e. fuel wood or charcoal), the PoA is reducing anthropogenic GHG emissions. According to AMS-II.G, the emission reductions are calculated based on the annual savings of non-renewable biomass multiplied by an emission factor for the fossil fuel mix.

Previous cook stove distribution programmes in SSA have been supported by donor funding, with mixed results. Programmes involving indirect subsidies tend to face market barriers to the introduction of new and affordable products, while programmes involving direct subsidies struggle with long term sustainability when funding runs out.[9] As a result, many donor-funded stove programmes have been rather limited in terms of size, and problems have resulted when funding has run out for maintaining quality levels and momentum. Negative perceptions of past stove programmes act as a barrier to the acceptance of new ICS among the end-users, which can only be overcome with high-quality products, a long-term programme design, and considerable effort and financial resources that are not available in the absence of carbon finance.

The CME has identified the key barriers and has developed a strategy for the implementation of a sustainable multi-country programme for the replacement of conventional or improved cook stoves burning wood or charcoal with higher efficiency improved stoves. As is demonstrated below, such a distribution programme would not be implemented in the countries listed in Section A.4.1.1 or in any of the SSA countries in the absence of the CDM PoA.

Assessment and Demonstration of Additionality of the Proposed PoA

The PoA allows for the inclusion of both micro scale and SSC CPAs. The additionality demonstration below is provided for the case of small-scale CPAs. In line with the Guidelines for Demonstrating Additionality of Microscale Project Activities (EB 63 Report, Annex 23, para 3), micro-scale CPAs would be considered additional if they satisfy the micro-scale additionality test specified in Section A.4.2.2 (Eligibility Criteria 6) regardless of the assessment below.

[7] Legros, G.; Havet, I.; Bruce, N.; Bonjour, S. (2009): The Energy Access Situation in Developing Countries; A review focusing on the least developing countries and Sub-Saharan Africa, UNDP/WHO, New York.

[8] In the methodology AMS-II.G v. 3 a conventional stove is defined as "one with no improved combustion air supply or flue gas ventilation systems, i.e. without a grate or a chimney".

[9] Gaul, M. (2009): Subsidy schemes for the dissemination of improved stoves, Experiences of GTZ HERA and Energising Development, GTZ, Eschborn.

The additionality of the proposed PoA is demonstrated using the criteria outlined in Attachment A to *Appendix B of the simplified modalities and procedures for small scale CDM project activities* (Version 8, EB 64). Outlined below are the key barriers which prevent the programme from being possible without the use of CER revenues.

Barrier due to prevailing practice

On average, only 6% of people in SSA who use solid fuels for cooking have access to an improved stove and many SSA countries have even lower penetration rates[10]. Even in Kenya, which is often seen as a success story, penetration rates of ICS in some regions are still relatively low after nearly three decades of donor support for stove distribution programmes (i.a. provided by the German Government through GTZ, the US, the Netherlands, and others). A national survey conducted by the company KAMFOR for the Kenyan Ministry of Energy in 2002 concluded that 47% of households relying on charcoal were using a Kenyan Ceramic Jiko (KCJ) or similar "improved" stoves (penetration of improved wood stoves was much lower – around 4%)[11]. A GTZ survey conducted in 2009, however, found that conventional charcoal stoves were still dominant in two of the three clusters of districts surveyed, and for wood users traditional three stone fires were still dominant in at least one of the three regions[12]. South Africa is also a case in point. Despite being one of the wealthiest countries in SSA, of the households relying on solid fuels in South Africa, only 32% use an improved stove according the UNDP[13]. A 2008 report prepared for the GTZ-funded Programme for Basic Energy and Conservation (ProBEC) found that many poorer households continue to rely on fuelwood and/or charcoal due to affordability constraints, even when they have access to electricity[14]. This highlights the challenges involved in changing cooking practices in SSA countries. If prevailing practices are hard to overcome in Kenya and South Africa, it is logical that the barriers will be even be higher in many other SSA countries which have seen far less activity on improved cook stoves and face even greater affordability challenges (see below for discussion on affordability).Many of the improved stoves that have been distributed in the past performed well in the laboratory or when first installed, but deteriorated quickly due to lack of quality control over local materials and manufacturing[15]. For example, a site visit to stove manufacturers in Nairobi in November 2011 showed that many local artisans manufacture KCJs using cheap scrap metal and low-grade liners which were not fired properly but simply painted to appear fired. This observation is supported by the Kenyan Ministry of Energy (2002), which noted: "An issue of concern, however, is the observed low quality of models of the KCJ available in the market. In particular, the ceramic lining that accounted for

[10] Legros et al. (2009), p 21 figure 14. The report states that adequate data was found in 30 of the 45 SSA countries assessed, and that this data was representative of 77% of the population (p. 20, table 6).

[11] Ministry of Energy (2002): Study on Kenya's energy demand, supply and policy strategy for households, small scale industries and service establishments, Final report prepared by Kamfor Company Ltd., Nairobi.

[12] Djedje, M.; Ingwe, A.; Wanyohi, P.; Brinkmann, V.; Kithinji, J. (2009): Results assessment. Survey on Impacts of the Stove Project in Transmara, Western and Central Cluster of Kenya. Conducted from October 2007 to January 2008. Final Report..

[13] Legros et al. (2009), p. 92.

[14] Damm, O.; Triebel, R. (2008): A Synthesis Report on Biomass Energy Consumption and Availability in South Africa. A report prepared for ProBEC.,.

[15]World Bank (2011): Household Cookstoves, Environment, Health, and Climate Change: A new look at an old problem, Washington, , p14.

increased cooking efficiency has almost been exclusively substituted by concrete moulds, which are less durable."[16]

As a result of these past experiences and the variable quality of ICS that have been distributed to date, there is a common perception amongst many people in SSA countries that improved stoves do not live up to expectations. For example, the negative experience with past stove programmes was identified by GTZ as the major barrier to the uptake of improved stoves in the FAFASO programme in Burkina Faso[17]. Financial resources are required to overcome these negative perceptions through education and awareness campaigns, stove use demonstrations and product promotions.

Another reason for negative perceptions is that past stove programmes have often been unable to build up to scale or maintain momentum over the long term. For example, a programme in Burundi funded by the World Bank's International Development Agency (IDA) resulted in the sale of just 1,700 improved stoves when funding ran out; firstly because manufacturing of local stoves was more profitable for local artisans and secondly because ongoing marketing efforts were needed beyond the allocated funding[18]. Similarly, there have been a number of stove projects in South Africa, but never a strong commitment from national government departments to support such interventions over the longer term[19]. The proposed PoA envisages the distribution of stoves on a large scale across multiple countries and covering both urban and rural areas.

Habitual use of conventional stoves and the legacy of problematic experiences with the older ICS distribution programmes present a significant barrier to the uptake of high efficiency, more expensive (i.e. generally unaffordable) stoves. A significant amount of awareness raising, marketing, demonstration and customer relationship building is required to overcome this barrier – particularly if momentum is to be maintained over the longer term. Under the proposed PoA, carbon finance is required to fund these activities because the costs of changing the prevailing practices cannot be recovered on a commercial basis due to investment barriers, as is demonstrated below.

Technology barrier

The technology contained in the stoves that would be distributed under this PoA would not be available to SSA countries without the financing provided by the CDM. To explain why, it is important to distinguish between the ICS which have typically been supported by donor-funding and the new-generation of biomass cook stoves such as those that will be distributed under the proposed PoA. The typical "improved" stoves found in SSA countries (the term "improved" here is as per the definition in AMS-II.G v. 3 para 6, Option 2) are made by local artisans with the support of donor agencies, using basic materials, but often without standards and with poor quality control. As a result, the locally made stoves tend to have varying thermal efficiencies. As per the methodology, an improved stove would typically have an efficiency of 20% compared with 10% for a three stone fire or traditional metal coalpot. The newer or "advanced" improved stoves on the other hand are being produced using modern production techniques

[16] Ministry of Energy (2002), p. 57

[17] GTZ (2007): Energising Development, FAFASO Final technical report, Ouagadougou.

[18] Hakizimana, G. (2008): EAC Strategy to Scale up access to modern energy services, Burundi Country Baseline Report and Workplan, Bujumbura, p. 43

[19] Shackleton, C.;., Buiten, E.; Annecke, W.; Banks, D.; Bester J.; Everson, T.; Fabricius, C.; Ham, C.; Kees, M.; Modise, M.; Phago, M.; Prasad, G.; Smit, W.; Twine, W.; Underwood, M.; von Maltitz, G.; Wenzel, P. (2008): Fuelwood and poverty alleviation in South Africa: Opportunities, constraints and intervention options,, p 19.

and advanced materials and can achieve efficiencies in the range of 30-40% (see below for an example). Hence, the World Bank uses the term "*Advanced biomass cookstove*" to refer to the new generation of high quality, factory-manufactured stoves, which are based on higher levels of technical research to achieve higher safety, efficiency, emissions, and durability standards[20].These stoves also have higher production costs and hence would need to be sold at higher end user prices which are unaffordable for the typical end user in SSA. Affordability is discussed further below in the *Investment Barrier* section.

Two of the stoves that would be distributed as part of a typical CPA under the PoA include the Envirofit CH2200 and the CH4400 (see pictures above in Section A.4.2.1). These stoves have been developed over several years with the specific intention of maximizing thermal efficiency while simultaneously minimizing the production of toxic emissions. While many interrelated factors need to be considered in order to achieve these goals, two primary aspects of stove performance were explored during the development of the stoves: 1) charcoal surface temperature and 2) thermal sinks. In order to maximize temperature, the combustion chamber shape, fuel amount, and air flow through the stove all need to be considered and correctly coordinated. In order to use the available thermal energy in the most efficient manner possible, specific stove geometry and configuration choices were made, including reducing stove thermal mass and minimizing heat flux through the sides and bottom of the stove. The other element is correctly positioning the cook piece in relationship to the stove. This was essential in order to establish the correct radiation view factor and gas flow path needed for optimum heat transfer. As a result of this work, the CH2200 stove has an average thermal efficiency of 38.2%, making it one of the most efficient charcoal stoves in the world, and it reduces carbon monoxide emissions by around 63%, making it highly beneficial from a health perspective[21]. The CH4400 destroys 80% of the carbon monoxide that would be seen in a typical charcoal stove making it even cleaner than the CH2200 from a health perspective, and has a thermal efficiency of 31.4%. In order to achieve the very low carbon monoxide emissions, it is critical to get the inside of the stove to a very high temperature to destroy the carbon monoxide. By making the chamber of the CH4400 hotter, more energy is lost through parasitic losses to the stove body, which is also significantly bigger. This is why the efficiency of the CH4400 is lower compared with the CH2200, despite being highly efficient when compared with the charcoal stoves typically used in SSA.

To manufacture high quality products such as these to a consistent standard and in order to minimize costs, factory-scale production is unavoidable. That is why Envirofit currently manufactures its stoves for the world market in China, where low cost, high quality, high volume production can be achieved. In addition, the combustion chambers of the Envirofit stoves are made up of a proprietary metal alloy not available within SSA. Envirofit worked with U.S. based Oak Ridge National Laboratory's High Temperature Materials Lab (one of the most prominent high temperature material labs in the world) for over a year to evaluate and tailor various alloys to be able to handle the rigorous conditions within a cookstove while still maintaining a low cost. With these alloys Envirofit can design features into the combustion chamber such as changing the orientation of the air supply holes in the chambers to minimize parasitic losses. These kinds of design features would be impractical with clay chambers. Because of the specific composition of the alloy it is typically only made in highly specialised foundries, of which there are a limited number internationally. As a result, it is not feasible for these stoves to be fully

[20] World Bank (2011)

[21] Certified test results from testing conducted by the Engines and Energy Conversion Laboratory at Colorado State University available at http://www.envirofit.org/products/?sub=cookstoves

manufactured by local artisans[22] and without the support of carbon finance the introduction of this technology to SSA countries at scale would not be possible.

Investment barrier

As stated, past stove distribution projects in SSA have been funded through grants and other forms of donor support. A recent report by the World Bank outlines the history of donor involvement[23]. Starting as far back as the 1970s initial support came from UN agencies including the Food and Agriculture Organisation (FAO) and the Energy Sector Management Assistance Program. Around the same time, the German Government through GTZ (now GIZ) started supporting various programs, usually in cooperation with local governments and more recently in cooperation with the Dutch Government under the EnDev Programme. Specific examples of GTZ programmes[24] in SSA include:

- Kenya – aside from the KCJ distribution programmes, the German-Dutch partnership has also supported the establishment of businesses manufacturing Rocket mud stoves and Jiko Kisasa stoves - by June 2010 more than 2,780 private businesses with an average production of 337 Jiko Kisasa liners per producer per month
- Uganda - the distribution of 250,000 Rocket Lorena stoves in Bushenyi and Rakai and dissemination of improved charcoal stoves in Kampala in 2005 and 2006;
- Ethiopia – the distribution of over 200,000 Mirt stoves since 1999;
- South Africa – market testing of 2,000 StoveTec rocket stoves;
- Malawi – distribution of 4,200 Rocket Stoves for institutional kitchens in 2004-7;
- Mali – the dissemination of over 15,000 stoves in 2005-7 under the FAMALI programme; and
- Burkina Faso- 45,000 stoves distributed since 2008 under the FAFASO programme.

Other international donor organisations include the World Health Organization (WHO), the United Nations Development Programme (UNDP), and the World Bank/IDA – see for example a programme in Tanzania in 1988-92 which established a local production capacity of 5,000 improved stoves per month[25]. A number of US agencies have also been involved, including the US Environmental Protection Agency–founded Partnership for Clean Indoor Air (PCIA), and the United States Agency for International Development (US AID), which has supported stove programmes in Kenya, Uganda, and Sudan.

The recently launched Global Alliance for Clean Cookstoves (GACC) under the United Nations Foundation (2010) provides a way of facilitating the efforts of donor organisations and others involved in ICS programmes such as private sector foundations.

There are also a number of SSA stove programmes that rely on carbon finance (CDM or voluntary Gold Standard credits). Examples include the "Efficient wood fuel stoves for Nigeria" SSC-CDM project and the recently registered PoAs "Improved Cooking Stoves for Nigeria Programme of Activities" and

[22] Assembly and manufacture of some other components is realistic, and is currently being planned for Kenya on the back of the proposed PoA.

[23] World Bank (2011).

[24] Multiple sources available on the GIZ website http://www.gtz.de/en/index2.htm accessed in Oct-Nov 2011

[25] World Bank (1996): Rural Energy and Development Improving Energy Supplies for 2 Billion People: A World Bank Best Practice Paper, Washington.

"Efficient Cook Stove Programme: Kenya", the "CDM Lusaka Sustainable Energy Project" in Zambia and the Ugastove Gold Standard project in Uganda, which was supported by a US Environmental Protection Agency grant during its start-up. At the time of writing there were also a number of other PoAs using AMS II.G. under development in SSA countries according to the UNFCCC CDM website.

Without donor support or carbon finance, private capital is not available from either domestic or international capital markets for the multi-country ICS distribution programme proposed to be undertaken by the CME in SSA. This is especially due to the high quality standards of the ICS used and the higher production costs of the ICS compared to the currently available stoves in the local market. The need for carbon finance to overcome this barrier is clearly demonstrated in a letter to the Envirofit CEO from the Director of the Shell Foundation, dated 16 November 2011.

Two main factors are responsible for the lack of finance for large scale commercial ICS distribution programmes:

- Risk associated with investing in SSA countries that make finance either unavailable or too expensive; and
- Inability to recover costs of the distribution programme due to high ramp-up costs and low ability of local people in SSA countries to pay for high efficiency stoves.

Investment barrier due to real and perceived risks associated with investment in SSA countries.

Past stove distribution programmes in SSA countries have relied on donor funding. Finance for investments in SSA countries is often not available from the market due to a number of country risks which are briefly described below. If they are willing to provide finance, financiers will attach a risk premium to investment in any country where there is significant uncertainty about the ability to recover investment – this premium typically makes such investments unattractive to the private sector.

According to the UN Economic Commission for Africa (UNECA), while a wide range of factors have played a role in discouraging direct investment in Africa, uncertainty manifests itself primarily in three ways[26]:

- Political instability evidenced by the high incidence of wars, frequent military interventions in politics, and religious and ethnic conflicts. (For example, the Kenyan military is currently engaged in a conflict with the al-Shabab terrorist organization on the Somalian border).
- Macroeconomic instability evidenced by the high incidence of currency crashes, double digit inflation, and excessive budget deficits; (For example, between June and November 2011 the Kenyan Central Bank increased the Central Bank Rate from 6.25% to 16.5% in a bid to control inflation[27]) and
- Lack of policy transparency, which is due in part to the high frequency of government as well as policy changes in the region and the lack of transparency in macroeconomic policy.

[26] Dupasquier, C.; Osakwe, P. (2005): Foreign Direct Investment in Africa: Performance, Challenges and Responsibilities, Economic Commission for Africa, Addis Ababa.

[27] Rates are available online at http://www.centralbank.go.ke/

A major barrier to obtaining finance for investment in even relatively more stable countries is that the real and perceived interdependence of African economies affects investors' assessment of risk in all African countries, regardless of which country the investment is targeted at. As the UNECA states:
"Because of imperfect information, foreign investors associate the outbreak or occurrence of risk in one country with the likelihood of similar risks in other countries in the region. Consequently, for the most part, they do not differentiate between countries in the region—a phenomenon known as statistical discrimination"[28].

The result is that it is either not possible to obtain finance for a SSA stove distribution programme at all, or the risk premium that would be required by private financiers would render such a programme not commercially viable – regardless of the specific countries being targeted. Even if finance were able to be obtained, the costs would need to be factored into the ICS selling price which is already too high for end users to bear unless carbon finance can be used to subsidize the price. This is especially due to the high quality and hence high production costs of the ICS used, compared to the stoves available in the local markets.

Investment barrier due to inability to recover costs through the sale of stoves

Due to the low level of market development, the legacy of past stove distribution programmes, poor infrastructure and the range of country risks discussed above, significant financial resources need to be spent by the CME and the DOs before it is clear whether people are actually willing to purchase the stoves and hence any revenues be generated from the sale of stoves. There is high level of risk that the cost of this initial investment would never be recovered because of the inability of local people in SSA countries to pay the full cost of the stoves. Put simply, the private sector rarely funds stove development as it is not viewed as an attractive investment proposition[29].

Aside from the cost of manufacturing Envirofit's stoves, the distribution programme involves a host of associated costs including:

Costs borne by the CME:

- Search costs to assess opportunities in SSA countries;
- Costs of developing the business model and identifying suitable DOs in each country;
- Cost of shipping stoves from the current manufacturing facilities outside of Africa – in the case of finished end products being imported into the target countries;
- Costs associated with the establishment of a local assembly plant – in the case of such plants being part of a CPA;
- Costs of establishing local manufacturing operations – in the case of such operations being part of a CPA;
- Training of staff involved in local assembly and/or manufacturing;
- Training of DOs to ensure correct procedures are followed during distribution;

[28] Dupasquier, C. and Osakwe, P., 2005, page 17

[29] Rai, K.; McDonald, J. (2009): Cookstoves and Markets: Experiences, Successes and Opportunities, GVEP International.

- Training of parties involved in monitoring activities; and
- Costs associated with the measurement of key parameters required under the monitoring plan

Costs borne by the DO:

- Costs of recruiting and training personnel involved in the distribution and maintenance of stoves;
- Costs of developing, implementing and maintaining systems for the tracking of customers and stoves, software, databases etc;
- Marketing and awareness raising activities, promotional campaigns (radio and print advertising);
- Educating stove users on correct use of stoves and providing after sales services to maintain customer relationships;
- Taxes and duties paid on any imported components or on final products in the case of countries where local manufacturing is not feasible. In particular, the combustion chamber is likely to be imported even if there is local manufacturing of some components and local assembly;
- Storage costs and in-country transportation costs;
- Margins required by third party retailers and any financial institutions involved in the provision of loans to customers in target countries.

In SSA it is not feasible to pass on these costs to the end user by simply adding a margin to the retail sales price. Take the Envirofit G3300 wood stove for example, which has an ex-works price of around US$30 when produced in the factory[30]. Once shipping, import duties, local distributor margins and retailer margins have been added, the fully-costed retail price per stove is likely to be between 50-100% higher than this, or around US$45-60. The specific price will vary from country to country depending on import duties, costs of transportation etc. It is anticipated that carbon revenues are the only feasible way to fill the gap between the affordable end-user price and this fully-costed retail price.

To assess the gap between the price of the Envirofit stoves and an affordable price in the PoA host countries, we would like to note that in LDCs[31] the full cost of the G3300 stove would represent a full month's income or even more for the average person[32]. But even in non-LDC circumstances, the affordability barrier remains relevant. For example, Kenya, while not classified as an LDC, has a GNI per capita of just US$780[33], suggesting the average Kenyan's monthly income is just US$65 or slightly less than the fully-costed price of the stove in the example above[34]. By comparison, the prices for the improved wood stoves currently available in Kenya vary from around US$1.5–3 for Jiko Kisasa stoves, $2.5–3 for one-pot Rocket Mud Stoves, and $3–6.5 for two-pot Rocket Mud Stoves[35]. The two main improved stoves manufactured in Kenya with the support of GTZ in recent years are sold around US$3.30

[30] A confidential annex providing a detailed breakdown of the costs can be provided.

[31] A list of LDCs is available at http://www.unohrlls.org/en/ldc/25/). 33 SSA countries were listed as LDCs at the time of writing.

[32] All LDCs have less than US$905 Gross National Income (GNI) per capita. Calculated using the World Bank's Atlas method (World Bank, 2011) http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf

[33] Income is just one of the elements of defining an LDC.

[34] World Bank (2011)

[35] World Bank (2011), p. 61

to US$8.80[36]. The gap affordability gap is thus estimated at around 90-95% of the full retail cost of the Envirofit stove.

Even in the case of South Africa, which is a relatively wealthy country by comparison (average GNI per capita of US$6,100), many households, and especially the poorer ones, would be unable to pay the fully-costed retail price of a high efficiency stove. For example, a recent feasibility study for a stove distribution project in South Africa funded by GTZ suggested willingness to pay for the StoveTec Rocket woodfuel stoves of around R100 – R200 (US $12 – 25)[37]. Even taking the conservative upper end of this range into account, this suggests that the willingness to pay (WTP) is well below that required to recover the full cost of a stove when the distribution costs are factored in; the gap would still reach about 40-50%. Thus, South Africa provides an indication of the upper bound of the WTP for improved cook stoves in SSA countries. Carbon finance is required to bring the retail price down to the affordability threshold.

It must also be remembered that in reality the people who are dependent on biomass for their energy needs are considerably worse off than is suggested by official GNI per capita figures, since these figures tend to be skewed by the income disparity between the elite wealthy minority and the average citizen in SSA countries (often due to the control these minorities exert over the income generated by key resources such as oil, minerals, diamonds etc). In SSA countries it is typical that access to modern energy supplies is negatively correlated with poverty, as is shown in the graphs below from UNDP/WHO (2009)[38].

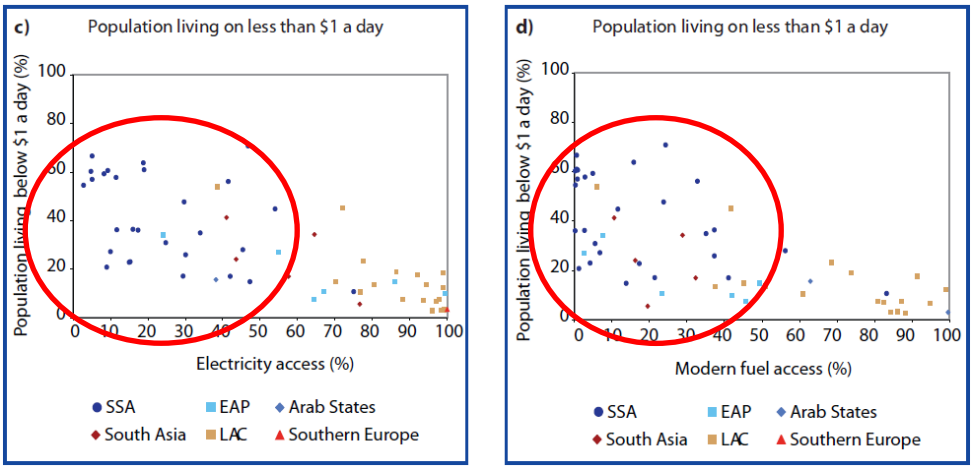

Figure 6. Correlation between income poverty and lack of access to modern energy (source: UNDP/WHO, 2009)

The graphs clearly show that the predominant situation in SSA countries (the blue dots) is that up to 70% of people are living on less than US$1 per day and less than 50% of people have access to electricity or modern fuels. Thus the people who are dependent on woodfuel and charcoal can be expected to face significantly greater affordability challenges than is suggested by official GNI per capita figures.

Conclusion and CDM consideration

The CDM has been identified as the only realistic and adequate source of finance to overcome the existing barriers to the implementation of the proposed stove distribution programme. Carbon finance is

[36] EnDev (2010)

[37] Restio Energy, StoveTec Stoves (2009): A distribution Framework. Final report prepared for GTZ. Somerset West

[38] Legros et al. (2009)

needed in order to successfully develop, promote and implement the programme, to reach the intended scale and to provide customers with high quality products at an affordable price, whilst ensuring customer satisfaction over the long term.

None of the CPAs to be included in the PoA "Improved Cooking Stoves Programme of Activities in Africa" will start prior to the commencement of validation of the PoA.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

The detailed steps involved in the operational, management and monitoring plan for the proposed PoA are described below. The numbering of the steps corresponds with the diagram provided below the text.

A.4.4.1. Operational and management plan:

Figure 5 below provides an overview of the distribution and monitoring activities involved in each CPA under the PoA. Each numbered step has a corresponding descriptive paragraph. Steps 1-7 are described under the sub-heading ***Procedures for distribution of ICS.*** Steps 8-13 are described in Section A.4.4.2 under the sub-heading ***Procedures for the monitoring of emissions reductions***.

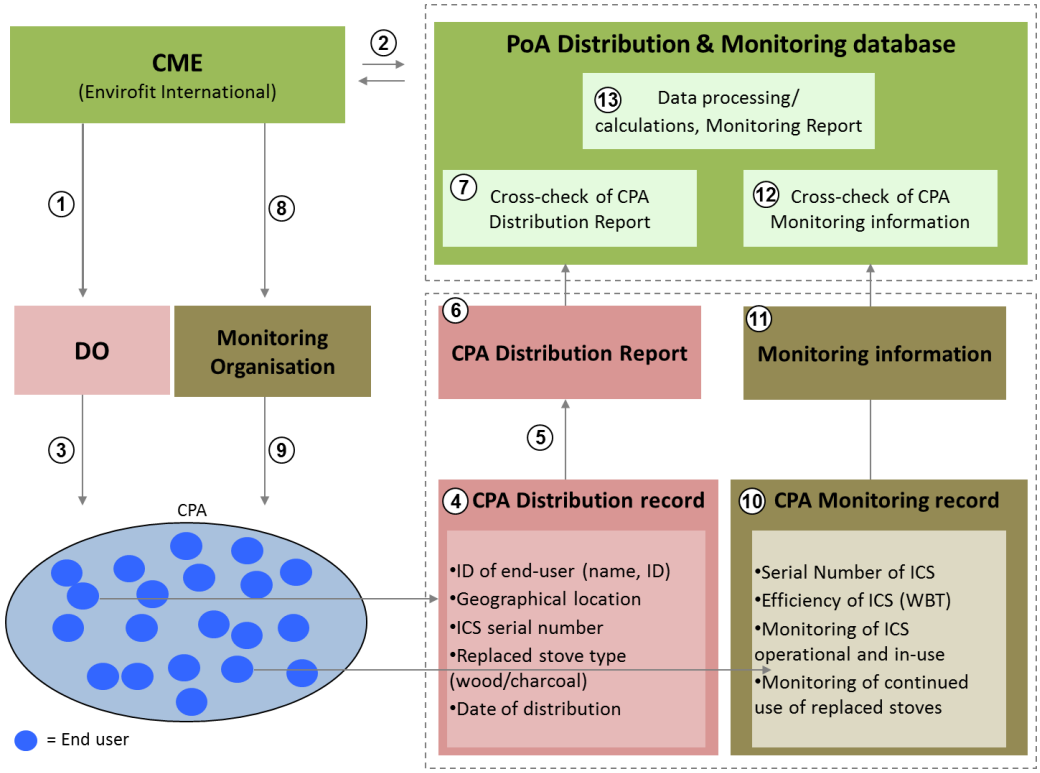

Figure 7. ICS distribution and monitoring plan

Procedures for distribution of ICS

1. The CME will coordinate the activities to be undertaken by each DO involved in the PoA. As part of the inclusion of a CPA under the PoA, a legally-binding contractual agreement will be signed by the DO and the CME. Under the agreement, the roles and responsibilities of the CME and the DO will be clearly spelled out. Further, the DO will ascribe its activity to the PoA as part of entering into this

agreement. Any parties the DO contracts in its role as the CPA developer will also be required to enter into a contractual agreement with the DO, similarly ascribing their activities to the PoA. Suitable training will be conducted for DOs taking part in new CPAs to make them aware of the rules of the CDM and the PoA and their requirements in terms of distribution and data collection. Guidance will be provided to each DO on the correct procedures to be followed during distribution. The agreement will also define carbon ownership rights.

2. The CME will keep a record of the serial numbers of the ICS units distributed by each DO. This will enable cross-checking of the individual units claimed to have been distributed by each DO during the proposed PoA, thus helping to avoid double counting and improve accountability.

3. The DO will be responsible for the implementation of the distribution programme within a specific CPA or CPAs. Stoves will be distributed to end users by the DO directly or via technicians, retailers, agents or other third parties that are sub-contracted by the DO. Any such third parties will be trained by the DO which will be responsible for ensuring correct procedures according to the PoA are fulfilled, as will be required of the DO by its agreement with the CME. The third parties will be required to sign a training record to confirm their participation. This record will then be provided by the DO to the CME to prove that those third parties actually took part in the training.

4. During the distribution itself, each DO shall make sure that necessary data is correctly obtained from the customer and recorded in the CPA Distribution Record, firstly to avoid double counting and secondly to enable tracking of the ICS for monitoring purposes. This data will include:

   - **Name/Identification of end user that will be using the stove**
   - **Geographical location of stove**, which could be determined by a fixed address/location if applicable, or by using GPS data.
   - **Stove unique serial ID number**
   - **Type of old stove which the ICS is replacing**, i.e. the fuel type – wood or charcoal.
   - **Stove distribution date**

   Additional information will be recorded in the case of each individual CPA if deemed necessary to ensure effective tracking of stoves, accurate emissions reduction calculations and effective monitoring procedures under the particular circumstances of that CPA (for example, where applicable a phone number will also be collected). The CME's logo will be clearly displayed on each CPA Distribution Record, with a copy retained by the customer on-site and additional copies retained by the CME and DO. Thus it is possible to identify that each stove with its unique serial ID number has been distributed under this PoA managed by the CME, Envirofit. This avoids the potential for other PoAs to claim emissions reductions associated with the stoves to be distributed under this PoA.

   At the time of distribution, the DO will also obtain the customer's approval to exclusively assign carbon rights to the CME.

5. The DO is responsible for ensuring that the data contained in each individual CPA Distribution Record is provided in the correct format and is complete and accurate. Incentive structures will be put in place by the CME and the DO as part of the operation and management plan to ensure the accuracy of the data to be compiled in a CPA Distribution Report. This Report will be compiled in an appropriate format (current design is an Excel spread sheet in order to be compatible with the PoA

Distribution and Monitoring Database, but this may change over time as the CME makes improvements to the data management system).

6. The DO will provide a CPA Distribution Report to the CME on a regular basis. Either the originals of the CPA Distribution Records or scanned copies of each Record will also be provided to the CME. The DO will maintain archives of past CPA Distribution Records.

7. The CME will perform cross-checks on the distribution information received from each DO. The CME will be responsible for maintaining a secure database, the PoA Distribution and Monitoring Database, covering the CPAs within the PoA. The unique serial number linked to each stove and the unique CPA ID number eliminates any risk of double-counting of ICSs between CPAs. Each ICS unit will be listed in the PoA database as belonging to one CPA only - the same ID number cannot be entered twice under the same CPA or different CPAs. Therefore, it is possible to uniquely identify each CPA based on the CPA ID number, the meta-data relating to the CPA (name of the DO, country etc) and the data linked to each of the stoves listed under that CPA in the database (as listed above).

A.4.4.2. Monitoring plan:

Procedures for the monitoring of emissions reductions

8. The CME will also coordinate all ex-post monitoring activities in the PoA. It will be responsible for implementing the monitoring plan, ensuring the quality of data obtained and the use of this data for emissions reduction calculations. However, the actual field measurements to be conducted during monitoring (e.g. testing of ICS selected during sampling) will most likely be performed by third parties contracted to the CME. In the case of using contractors, however, the CME will still be responsible for setting the procedures and providing oversight and training to the contractors. The choice between conducting the actual monitoring activities itself or employing another organization (for example, local marketing firm, university etc) will depend on locational, operational factors and financial factors. In any case, a local partner will be important for providing local insight in questionnaire design, interview technique and for gaining physical access to households to obtain accurate results during monitoring. Given the multi-country nature of the PoA, the CME will use different contractors with the appropriate experience and cultural awareness suited to each country and/or region. For this reason, in Figure 5 above and in the text below the organisation conducting the monitoring activities is simply referred to as "Monitoring Organisation".

9. Monitoring activities will involve selecting a sample of stoves from the PoA Distribution and Monitoring Database and visiting the premises where these stoves are located to monitor the required parameters as part of the PoA Sampling Plan (see Section E.7.2).

10. During monitoring, the individuals carrying out the monitoring activities on behalf of the CME will follow the instructions provided during training, to check and record the following key parameters in a document referred to as the CPA Monitoring Record, which will be provided in a standardised format by the CME (the terms used in Section E.7.1 for each parameter is in brackets):

    - **Efficiency of project stoves** (η_{new})
    - **Check if project stoves are operational and in use** (SOF)
    - **Check fraction of end users continuing to use replaced stoves** (f_{old})
    - **If replaced stoves are being used, the consumption accounted for by the old stoves** (u_{old}) **will be excluded from B_{old}**

11. The Monitoring Organisation is then responsible for ensuring that the data contained in each individual CPA Monitoring Record is provided to the CME by collating the data and uploading it in an Excel spread sheet or similar format provided by the CME. Either the originals of the individual CPA Monitoring Records or scanned copies of each Record will also be provided to the CME to prove the authenticity of the data. The CME will maintain archives of past CPA Monitoring Records and make these available during verification.

12. The CME will perform cross-checks on the data provided to it by the Monitoring Organisation to ensure that the PoA Sampling Plan has been followed. This data will be contained in a secure database that will form part of the PoA Distribution and Monitoring Database, which will be maintained by the CME.

13. The PoA Distribution & Monitoring Database will provide the necessary data for emissions reduction calculations and will provide the outputs which will form the basis of the Monitoring Report to be produced by the CME at the end of each monitoring period. The data contained in the database will be made available to the DOE during verification.

A.4.5. Public funding of the programme of activities (PoA):

No public funding from Parties included in Annex I is involved in the development or implementation of this PoA. In the case that any sources of public funding from Annex I Parties are received for a specific CPA to be included under the PoA, then the CPA-DD will specify the sources of such funding and, unless otherwise stated in the LoA, the CME shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties. Such affirmation will be provided in Annex 2 of the CPA-DD.

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

13/12/2011.

The starting date of the PoA is the date of publication of the PoA-DD for global stakeholder consultation (EB 70, Annex 2, para 159 (b)).

No CPA to be included in the PoA shall start prior to the date on which the PoA commenced validation (EB 55, Annex 38). The start of validation is the date on which the PoA-DD was first published for global stakeholder consultation, which was 13 December 2011.

B.2. Length of the programme of activities (PoA):

28 years

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

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

Due to its overall positive environmental benefits, it is unlikely that the proposed distribution of efficient ICS will result in any negative environmental impacts. However since the PoA is intended to cover multiple countries, and the laws of those countries may differ, the environmental analysis will be undertaken at the CPA level.

If an Environmental Impact Assessment (EIA) were to be required by a DNA, then this would be conducted for the first CPA in that country, but not for subsequent CPAs unless specifically required by the DNA. Subsequent CPA that are similar in terms of technology, distribution model, and potential environmental impacts would include the results of the initial EIA in their CPA-DDs when being put forward for inclusion in the PoA. Similarly, if an exemption from an EIA is required by the DNA, then this would be obtained for the first CPA in that country. The subsequent CPA-DDs would simply include a confirmation that exemption from conducting an EIA has been obtained.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Not applicable – done at CPA level.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

No record from any national regulations implemented in the countries currently listed in Section A.4.1.1 was found to require either an Initial Environmental Examination or an Environmental Impact Assessment (EIA) for the installation of ICS.

If required by a specific country included within the PoA, an EIA will be conducted.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

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

Since the PoA boundary consists of more than one host country, a local stakeholder consultation (LSC) would need to be conducted once per host country participating in the PoA. Therefore, a national-level LSC will be conducted in conjunction with the first CPA to be included in each host country, ensuring that the issues covered and stakeholder comments invited are representative of the country. It is not

envisaged that a separate LSC would be held for each subsequent CPA. Rather, for subsequent CPAs, the CPA-DDs will include the results of this initial national-level LSC.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Done at CPA level for the first CPA in each country.

D.3. Summary of the comments received:

Done at CPA level for the first CPA in each country.

D.4. Report on how due account was taken of any comments received:

Done at CPA level for the first CPA in each country.

SECTION E. Application of a baseline and monitoring methodology

This section shall demonstrate the application of the baseline and monitoring methodology to a typical SSC-CPA. The information defines the PoA specific elements that shall be included in preparing the PoA specific form used to define and include a SSC-CPA in this PoA (PoA specific CDM-SSC-CPA-DD).

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

AMS-II.G, version 3: Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

AMS-II.G, version 3 requirements	SSC-CPA qualification justification
1. This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency[39] biomass fired cook stoves[40] or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers.	As stated in the Eligibility Criteria (EC3 and EC4) in Section A4.2.2., the CPAs to be included in this PoA will involve the introduction of high efficiency cook stoves burning either wood or charcoal. Technical specifications of each stove to be deployed in a CPA for the first time will be provided to show a minimum stove efficiency of 20%. Subsequent CPAs involving the deployment of the same stoves will be assumed to meet this requirement. An appropriate standards body or an appropriate certifying agent recognized by it shall certify the efficiency levels. Alternatively

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

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

	manufacturer's specifications may be used.
2. Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	The first CPA of a country will provide sufficient evidence to show the use of NRB since 31 December 1989. Any CPA following the inclusion of the first CPA in the same country will not have to do so. At least two of the following supporting indicators are shown to exist for the first CPA in each country: • A trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area; • 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; • Increasing trends in fuel wood prices indicating a scarcity of fuel-wood; • Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass. Subsequent CPAs in the same country will be assumed to meet this requirement.

E.3. Description of the sources and gases included in the SSC-CPA boundary

According to the methodology, the gas included is carbon dioxide in the baseline as well as in the project activity.

Specifically, and according to AMS-II.G (v. 03) an emission factor of 81.6 tCO_2/TJ will be used, which represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50% weight is assigned to coal as the alternative solid fossil fuel (96 tCO_2/TJ) and a 25% weight is assigned to both liquid and gaseous fuels (71.5 tCO_2/TJ for Kerosene and 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG).

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

According to the applied methodology, 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.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA):

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

In accordance with EB60 Annex 26, paragraph 4, CPAs do not require a full additionality assessment. The confirmation of CPA additionality would be by means of meeting the eligibility criteria for inclusion in the PoA as stated in Section E.5.2. If the proposed CPA meets the key criteria stipulated in section E.5.2, the CPA shall be deemed additional.

The PoA could include either small-scale or micro-scale CPAs. In the case of micro-scale CPAs these will be considered additional provided they satisfy the micro-scale additionality requirements specified in Section A.4.2.2 (EC7, test 1). In the case of small-scale CPAs, these will be considered additional provided they satisfy the small-scale additionality requirements specified in A.4.2.2 (EC 7, test 2).

As has been demonstrated in section A.4.3, the CDM is clearly required in order to overcome the barriers that are faced by the CME and the DOs in the implementation of the proposed PoA. Donor funding has been involved in past ICS distribution programmes in SSA countries. Despite this, and partly due to the limitations of such programmes, the enduring prevailing practice in SSA is using inefficient stoves for cooking. In addition, the type of stoves envisaged to be distributed under the proposed PoA utilise technology that is not available to SSA countries at present. Finally, it is concluded that a large-scale "advanced" ICS distribution programme in SSA countries is only possible with carbon finance since the market is unable to supply finance at competitive rates due to country risk in SSA countries and the inability to recover the full costs of developing and implementing such a programme due to the affordability gap.

It can be assumed that a CPA that is eligible for inclusion in the PoA would face similar barriers to those being faced by the PoA, and without the PoA, no CPA would be implemented. Hence, assessment of additionality is done on PoA level and a typical CPA implemented by the CME under the PoA is deemed to be additional if it meets the criteria outlined in section E.5.2.

Even in the case of Kenya and South Africa, which have relatively higher penetration rates of improved stoves, and – in the case of South Africa at least – relatively higher income per capita, the barriers prevent the proposed PoA from going ahead without carbon finance. Thus it can be assumed that the barriers must also apply to other countries in SSA in which the population is relatively worse off and the prevailing practices involving traditional cooking methods are even stronger.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

A CPA which is to be included under the registered PoA is considered to be additional, provided that:

1. The CPA meets the eligibility criteria for inclusion of a CPA in the PoA as set in section A.4.2.2.

2. The CPA is consistent with the current mandatory laws and regulations in the Host Country at the time of inclusion.

In case of small-scale CPA:

For small-scale CPAs, the requirements of the latest "Guidelines on the demonstration of additionality of small-scale project activities" shall be met. At the time of writing, the relevant guidelines were EB 68, Annex 27. As per Paragraph 2 (c) of EB 68, Annex 27, demonstration of barriers is no longer necessary for project activities solely composed of isolated units such as cook stoves, provided that certain conditions are met.

A CPA limited to energy savings of between 60 GWh and 180 GWh of thermal energy savings per year is additional if:

a. The users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs); and

a. The energy savings of each unit is no larger than 5% of the small-scale threshold (i.e. no larger than 9 GWh_{th}/year).

In case of micro-scale CPA:

The CPA is considered additional if it satisfies the latest micro-scale additionality requirements. According to the Guidelines for Demonstrating Additionality of Microscale Project Activities (EB 63 Report, Annex 23, para 3):

A CPA that is limited to energy savings of no more than 60GWh of thermal energy savings per year is additional if:

a. The geographic location of the project activity is a LDC/SID or special underdeveloped zone of the host country as identified by the Government before 28 May 2010; or

b. The project activity is an emission reduction activity with both conditions (i) and (ii) satisfied;

i. Each of the independent subsystems/measures in the project activity achieves an estimated annual emission reduction equal to or less than 1.8 GWh_{th}/year; and

ii. End users of the subsystems or measures are households/communities/SMEs.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

A typical CPA under the PoA consists of the distribution of multiple ICS units, which by definition are small appliances providing energy efficiency improvements in the thermal applications of non-renewable biomass, in accordance with AMS-II.G, v. 3. In accordance with the methodology, 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. A number of choices have been made in applying specific options provided for in the methodology, as is described below in the equations to be used for calculation of emissions reductions.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

The emissions reductions of a CPA will be calculated by application of the approved methodology AMS-II.G v. 3, by using the following equations (equation number from methodology AMS-II.G v. 3 indicated in brackets):

$$ER_y = B_{y,savings} \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected\_fossilfuel} \quad (1)$$

Where:

ER_y	Emission reductions during the year *y* in tCO_2e
$B_{y,savings}$	Quantity of biomass that is saved in tonnes
$f_{NRB,y}$	Fraction of biomass saved by the project activity in year *y* that can be established as non-renewable biomass using survey results, national or local statistics or other sources of information.
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable biomass by similar consumers. Use a value of 81.6 tCO_2/TJ.

Where:

$$f_{NRB,y} = \frac{NRB}{NRB + DRB} \quad (6)$$

Following the methodology (paragraph 10), Non-renewable woody biomass (NRB) is the quantity of woody biomass used in the absence of the project activity (B_{old}) minus the DRB component, as long as at least two of the following indicators are shown to exist:

- A trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel wood suppliers) or alternatively, a trend showing an increase in the distance the fuel wood is transported to the project area;
- 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;
- Increasing trends in fuel wood prices indicating a scarcity of fuel wood;
- Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass.

Woody biomass is demonstrably renewable (DRB) if one of the following conditions is satisfied (paragraph 9 of the methodology):

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.

Annex 3 provides a detailed description of the approach to be applied for establishing f_{NRB} in CPAs to be included in the PoA, including both CPAs in LDCs and non-LDCs. Where DNAs have approved f_{NRB} default values as per decision EB 67, annex 22, these will be used instead.

$B_{y,savings}$ is estimated using **option 2** of the methodology:

$$B_{y,savings} = B_{old} \cdot (1 - \frac{\eta_{old}}{\eta_{new}}) \quad (3)$$

Where:

B_{old}	Quantity of biomass used in the absence of the project activity in tonnes/year
η_{old}	Efficiency of the system being replaced. According to the methodology, a default value of 0.1 can be used if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney; for other types of systems a default value of 0.2 can be used. Weighted average values will be used if more than one type of system is being replaced.
η_{new}	Efficiency of the system being deployed as part of the project activity (fraction) as determined by using Water Boiling Test (WBT) protocol. Weighted average values will be used if more than one type of system is being introduced by the project activity.

B_{old} is calculated using **option (a)** of paragraph 7 of the methodology: calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of biomass per appliance (tonnes/year) as derived from historical data/local consumption survey. In addition, after monitoring the value of B_{old} is adjusted for the proportion of stoves still operating during the monitoring period (paragraph 16 of the methodology), leakage (paragraphs 13 (a) and 23 (c) of the methodology), the average operating time of stoves, the continued use of replaced stoves and exclusion of such use from B_{old} if baseline stoves are not disposed of (paragraph 20 (b) of the methodology).

Thus,

$$B_{old} = LAF \cdot N_{all} \cdot SOF \cdot (Q_{biomass} - (\frac{\mu_{old}}{1000} \cdot f_{old})) \cdot Stove_{year}$$

Where:

LAF	Net to gross Adjustment factor (0.95) applied in accordance with paragraph 13 and 23 of AMS-II.G V.3
N_{all}	Total number of stoves installed (number)
$Q_{biomass}$	Average annual biomass consumption per appliance (tonnes/ year)
SOF	Stove Operation Fraction (SOF) (% of stoves operating or replaced by equivalent in-service appliance). The parameter SOF is applied to meet the requirements of the methodology as outlined in its paragraph 16 and will be measured ex post using survey/ user feedback in each monitoring period. The CME will select a sample of stoves from the PoA Distribution and Monitoring Database and visit the premises which received these stoves.
μ_{old}	Average amount of woody biomass consumption that is consumed through the continued use of old stoves (kg/year) (to be established through sampling). This value is divided by 1000 to convert kg/year to tonnes/year
f_{old}	Fraction of end users that are still using their replaced stoves during the monitoring period (established through sampling)
$Stove_{year}$	Calculated average stove operation years in the monitoring period (years). If stoves have been operating for 365 days then $Stove_{year}$ = 1.0. If less than 365 days, then $Stove_{year}$ is represented as a fraction of 365 (eg. 180 days= 0.5).

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Data / Parameter:	$Q_{biomass}$
Data unit:	Tonnes/year
Description:	Annual average biomass consumption per appliance
Source of data used:	Historical data or survey of local usage, as required by the methodology
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	Requirements as per methodology AMS-II.G V.3.
Any comment:	Used for calculation of B_{old} as per paragraph 7 (a) of methodology. The approach for setting B_{old} values will be to use either historical data or a local consumption survey at the CPA level in each country to determine the average annual consumption of biomass per appliance for each fuel type – i.e. wood and charcoal. If possible, this will be done by utilizing national statistics or publicly available field studies. Where national statistics or literature values do not allow for a reliable determination of the amount of biomass consumption per appliance, the approach will be to make an assumption at the CPA level about the number of stoves per household/institution/SME. This way, it is possible to use the estimates of household/institution/SME-level biomass consumption. The actual

	number of stoves being used in a household/institution/SME can then be confirmed during monitoring of the continued use of baseline stoves and monitoring of N_{all} as outlined in Section E.7.1. National studies can also be complemented by undertaking local field studies if necessary. If the value established in the first CPA is only limited to one fuel type (e.g. charcoal), then a baseline value will also need to be established for the other fuel type (e.g. wood) for any subsequent CPAs replacing stoves that burn the other type of fuel (i.e. wood). If credible new data becomes available after having established the baseline values in the first CPAs (either on the basis of literature values or surveys), then future CPAs shall use such updated data to define the baseline consumption value.

Data / Parameter:	$f_{NRB,y}$
Data unit:	Fraction
Description:	Fraction of biomass saved by the project activity in year *y* that can be established as non-renewable biomass using national or local statistics, survey results, studies, maps or other sources of information, such as remote-sensing data
Source of data used:	Default value as specified by EB 67, Annex 22 if approved by the DNA. Otherwise, FAO data will be used wherever possible, complemented with IPCC data if necessary. Where no FAO data exists, or where deemed more appropriate, survey results, national or local statistics or other sources of information will be used.
Value applied:	This value will be established at the CPA level for the first CPA in each country.
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	The approach will be to set $f_{NRB,y}$ for the first CPA in each country, using default values if approved by the DNA at the time of CPA inclusion, FAO data wherever possible, complemented with IPCC data, or using, or by an alternative means (eg. survey) if deemed more appropriate. The specific approach will be stated in the first CPA-DD in a particular country. For subsequent CPAs in that country, the $f_{NRB,y}$ value established in the first CPA shall apply, unless the default value has changed. In case of changes in the default value, the new value is to be applied. In case no default value is available, 10 years after the addition of the first CPA in the country, the $f_{NRB,y}$ value has to be updated according to the latest data available.

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/tonne

Description:	Net calorific value of the non-renewable biomass that is substituted
Source of data used:	AMS-II.G v.3, page 2
Value applied:	0.015
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as prescribed by methodology applied
Any comment:	-

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	tCO_2/TJ
Description:	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data used:	AMS-II.G v.3, page 2
Value applied:	81.6
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as prescribed by methodology applied
Any comment:	This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50% weight is assigned to coal as the alternative solid fossil fuel (96 tCO_2/TJ) and a 25% weight is assigned to both liquid and gaseous fuels (71.5 tCO_2/TJ for Kerosene and 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG)).

Data / Parameter:	η_{old}
Data unit:	Efficiency
Description:	Efficiency of the system being replaced
Source of data used:	AMS-II G v.3
Value applied:	This value will be established at the CPA level for the first CPA in each country by determining the penetration of improved stoves based on national statistics or literature data, and using the default values of 0.1 for conventional stoves and 0.2 for improved stoves. 10 years after the addition of the first CPA in the country, the penetration rate shall be reassessed according to the latest data available.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default values are taken from the methodology AMS-II.G v. 03. A default value of 0.1 will be used if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney; for other types of systems a default value of 0.2 will be optionally used. If both conventional and improved stoves are to be used, then a weighted average of 0.1 and 0.2 will be

	applied, based on the estimated penetration rate of conventional and improved stoves using literature values where available. If no literature values are available a baseline survey may be undertaken.
Any comment:	-

Data / Parameter:	η_{new}
Data unit:	Efficiency
Description:	Efficiency of the system being deployed as part of each CPA.
Source of data used:	The efficiency will be based on manufacturer's specifications for the purposes of ex-ante emissions reduction calculations. During monitoring, the efficiency will be determined on the basis of sampling, using the Water Boiling Test (WBT) protocol.
Value applied:	The efficiency of the different ICS systems to be distributed will be included in each CPA-DD.
Justification of the choice of data or description of measurement methods and procedures actually applied :	All the stoves manufactured by Envirofit International have been tested in accordance with the "Emissions and Performance Test Protocol", with emissions measurements based on the stove testing protocol developed by Colorado State University (available at www.eecl.colostate.edu).
Any comment:	During monitoring, WBTs will be carried out for a sample of installed ICSs that are in operation during each monitoring period. The WBTs will be conducted in line with the guidance provided by the CME and according to a methodology supported by an appropriate international body such as PCIA.

Data / Parameter:	LAF
Data unit:	Fraction
Description:	Net to gross adjustment factor to account for leakages
Source of data used:	AMS-II. G v.3
Value applied:	0.95
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as prescribed by methodology applied
Any comment:	-

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	η_{new}
Data unit:	Efficiency
Description:	Efficiency of the system being deployed as part of the project activity
Source of data to be used:	As determined through sampling by performing WBTs
Value of data applied for the purpose of	The efficiency of the different ICS systems to be distributed will be included in each CPA-DD.

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	WBTs will be carried out for a sample of installed ICSs in operation in line with the PoA Sampling Plan.
QA/QC procedures to be applied:	WBTs will be conducted in line with the guidance provided by the CME and according to a methodology supported by an appropriate body such as PCIA.
Any comment:	Each WBT conducted will be matched with a specific serial ID number of the stove tested. Hence, the stove type (i.e. fuel type and specific laboratory efficiency) can be clearly identified allowing an extrapolation of the sample to all stoves of the same type, distributed within the PoA.

Data / Parameter:	N_{all}
Data unit:	Number
Description:	Total number of stoves installed
Source of data to be used:	Record of all installations and date of each installation as per ICS serial ID numbers contained in the PoA Distribution and Monitoring Database
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The CME maintains a record of all stove ID numbers supplied to the DO for distribution as part of the CPA. Each DO shall maintain CPA Distribution Records which will provide the data used to calculate this parameter. During monitoring, the CME or its representative will confirm the value of N_{all} is representative of the number of ICS actually being used per household/institution/SME. If necessary, the CME will exclude additional ICS from the emissions reduction calculations. The approach will be defined at the CPA level. For example, if at the CPA-level it is assumed ex-ante that there is only one baseline stove being used per household, but a second ICS is found during monitoring, one of the two ICS will be excluded from the database. This way there will be no double-counting of emissions reductions.
QA/QC procedures to be applied:	The CME will supervise the activities of each DO, and provide training, guidelines and distribution templates to facilitate accurate record keeping during the ICS distribution. The CME will also maintain a record of the stove serial numbers supplied to each DO, and will be able to cross-check these against the CPA Distribution Reports it receives back from the DO.
Any comment:	-

Data / Parameter:	SOF
Data unit:	Fraction
Description:	Stove Operation Fraction – used to determine the share of distributed stoves that are still operating, measured ex-post through survey/ user feedback
Source of data to be	Survey of end user behaviour as part of PoA sampling plan

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	An assumed value will be used in each CPA-DD for estimating emissions reductions ex-ante. The results of monitoring will be considered to determine whether this assumed value should be adjusted for the purposes of ex-ante estimation in subsequent CPAs.
Description of measurement methods and procedures to be applied:	The actual value to be applied for emissions reduction calculations and request for issuance of CERs will be measured ex-post by investigation of the number of ICS installations within the sampled ICS which are operational. If for example 90% of the sample is only found to be operational, then SOF is 90%.
QA/QC procedures to be applied:	The CME will provide training, guidelines and monitoring templates to ensure that the DO or another contracted party responsible for monitoring follows appropriate procedures.
Any comment:	-

Data / Parameter:	μ_{old}
Data unit:	kg/year
Description:	The amount of woody biomass consumption that is consumed through the continued use of old stoves
Source of data to be used:	Survey of end user behaviour combined with the same source of data as used for $Q_{biomass}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5	An assumed value will be applied at the CPA level for the purpose of estimating emissions reductions ex-ante. Depending on the results of monitoring, the CME may adjust the assumed value for future CPAs.
Description of measurement methods and procedures to be applied:	The actual value to be applied for emissions reduction calculations and request for issuance of CERs is measured ex-post by estimation of a representative sample of end users using the deployed ICS, as conducted in line with the PoA Sampling Plan. The survey will be done on the basis of a visual inspection and a questionnaire with the stove user involving the end user's estimation of the number of meals that are typically cooked during a day/week/month using the baseline stove during the monitoring period compared with the situation pre-distribution. This amount will be used to adjust the total amount of wood or charcoal consumed per annum in the baseline. Further detail on the approach is provided in the PoA Sampling Plan in Section E.7.2
QA/QC procedures to be applied:	The CME will provide training, guidelines and monitoring templates to ensure that the DO or another contracted party responsible for monitoring follows appropriate procedures for the survey.
Any comment:	-

Data / Parameter:	f_{old}
Data unit:	Fraction
Description:	The fraction of end users that are still using baseline (replaced) stoves
Source of data to be	Survey of end user behaviour as part of PoA Sampling Plan

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	An assumed value will be applied at the CPA level for the purposes estimating emissions reductions ex-ante. Depending on the results of monitoring, the CME may adjust the assumed value for future CPAs.
Description of measurement methods and procedures to be applied:	The actual value to be applied for emissions reduction calculations and request for issuance of CERs is measured ex-post by estimation of a representative sample of households using the deployed ICS, as conducted in line with the PoA Sampling Plan. The survey will be done on the basis of a visual inspection of the household and if necessary an interview with the stove user to confirm whether they are still using a baseline stove or not. Sampling will estimate the value of this parameter through one of two approaches: A. Monitoring the fraction of end users using baseline stoves (f_{old}) B. Monitoring the fraction of end users *not* using baseline stoves ($f_{non,old}$), where: $f_{old} = 1 - f_{non,old}$ The decision to apply either Option A or Option B will be made by the CME based on the expected proportion of end users continuing to use baseline stoves in the group of CPAs that are being sampled as part of the PoA Sampling Plan (see Sampling Plan for discussion of cross-CPA sampling approach). In cases where it is anticipated that the majority of end users will stop using baseline stoves once they have started using the ICS, then Option B will be applied.
QA/QC procedures to be applied:	The CME will provide training, guidelines and monitoring templates to ensure that the DO or another contracted party responsible for monitoring follows appropriate procedures for the survey.
Any comment:	-

Data / Parameter:	$Stove_{year}$
Data unit:	Years
Description:	Calculated average stove operation years in the monitoring period. If stoves have been operating for 365 days then $Stove_{year} = 1.0$. If less than 365 days, then $Stove_{year}$ is represented as a fraction of 365 (eg. 180 days= 0.5).
Source of data to be used:	PoA Distribution and Monitoring Database
Value of data applied for the purpose of calculating expected emission reductions in section B.5	An assumed value will be applied at the CPA level for the purposes estimating emissions reductions ex-ante.
Description of measurement methods and procedures to be applied:	Each ICS entered into the PoA Distribution and Monitoring Database will be linked to a distribution date (recorded during distribution). Thus for any monitoring period it is possible to calculate the period of time that the stoves included in the emissions reduction calculations for that period have been

	operating.
QA/QC procedures to be applied:	The CME is responsible for overseeing the collection of data by DOs during distribution, training the DOs in correct data recording practices, maintaining a secure Database, and back up of files contained in the Database.
Any comment:	

E.7.2. Description of the monitoring plan for a SSC-CPA:

Following the methodology AMS-II.G v. 3 and applying the equations outlined in Section E.6.2, the monitoring plan consists of monitoring the following parameters:

1. η_{new} (fraction)

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.
(AMS-II.G. v.3, paragraph 15)

2. SOF (fraction)

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.
(AMS-II.G. v. 3, paragraph 16)

3. u_{old} (kg)

Monitoring shall ensure that:
(a) Either the replaced low efficiency appliances are disposed of and not used within the boundary or within the region; or
(b) If baseline stoves continue to be used, monitoring shall ensure that the fuel-wood consumption of those stoves is excluded from B_{old}
(AMS-II.G. v.3, paragraph 20)

This parameter is monitored to establish the average amount of woody biomass consumed per annum (in kg) using the baseline (replaced) stoves. In order to monitor the parameter u_{old} the CME shall choose one of two options:

Option A involves monitoring the amount of fuel consumption using baseline (replaced) stoves in each monitoring period by interviewing a sample of ICS users and calculating the average value (kg).

Option B involves monitoring the amount of fuel consumption using baseline (replaced) stoves during the first monitoring period to establish an average value for u_{old} and fixing this amount for the subsequent monitoring periods.

In both cases, the CME will monitor the fraction of end users still using baseline stoves in each monitoring period over time and will multiply this value (f_{old} – described below) by either the most recent value estimated for u_{old} in the case of applying Option A, or the fixed value of u_{old} in the case of applying Option B.

Applying Option B would help to reduce the costs associated with monitoring, but is also conservative, since the parameter u_{old} can be expected to fall over time rather than increase. Logically, people will use their old stoves less over time as the benefits of lower fuel costs become more and more apparent. The provision of a warranty helps to ensure that end users can obtain replacements or repairs if required[41].

The sampling of u_{old} will be done by using a simple estimation technique. By asking the end user to estimate the number of meals they use the baseline stove for cooking during the monitoring period, compared with their behaviour prior to receiving the ICS, it is possible to determine the share of fuel consumption accounted for by baseline stoves. Depending on the user, the frequency of using the baseline stove may be quite rare (equivalent to once a month or less, e.g. for special occasions), semi-regularly (e.g. once a week for family gatherings) or quite frequent (e.g. every day for a particular meal). Thus, the proportion of meals cooked using the baseline stove during the monitoring period, compared with prior to receiving the ICS, can be used to estimate u_{old} in the following way:

$$u_{old} = \frac{MPM_{after\ ICS}}{MPM_{before\ ICS}} \cdot \text{Total annual fuel consumption (kg)}$$

Where:

$MPM_{after\ ICS}$ meals per month cooked using the baseline (replaced) stove after the receipt of the ICS
$MPM_{before\ ICS}$ meals per month cooked using the baseline (replaced) stove before the receipt of the ICS

In order to exclude u_{old} from the value of the parameter B_{old} (baseline woody biomass consumption) in the emissions reduction calculations in the equation in E.6.2, the value must represent an amount of woody biomass. For monitoring of continued use of charcoal stoves, therefore, the estimated value of u_{old} will be converted into an amount of woody biomass (fuelwood) consumption. This is done using the IPCC conversion factor of 6[42].

The Methodology AMS-II.G also allows for the disposal of replaced stoves. It is not envisaged that the CME will dispose of replaced stoves, however, should it decide to do so, there is no need to estimate u_{old} and the value is automatically zero if proof of the disposal is provided by the CME. The approach for implementing this option would be to obtain a declaration from end users that they have surrendered their baseline stoves and to take a digital photograph of each baseline stove being destroyed, with both of these documents being made available to the DOE during verification.

4. f_{old} (fraction)

This parameter is monitored to establish the fraction of end users still using baseline (replaced) stoves during each monitoring period. During monitoring, sampling will be used to estimate the value of this parameter by applying one of two approaches:

Option A involves estimating the fraction of end users using baseline (replaced) stoves (f_{old}). This will be done by observation of end user behaviour, checking for the existence of baseline stoves, and interview with the end user.

[41] See Annex 4 for discussion of the warranty offered on Envirofit cook stoves.

[42] http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf (page 1.45)

Option B involves estimating the fraction of end users *not* using baseline (replaced) stoves
Where:

$f_{old} = 1 - f_{non,old}$

This will also be done by observation of end user behaviour, checking for the existence of baseline stoves, and interview with the end user.

The decision to apply either Option A or Option B will be made by the CME based on the expected proportion of end users continuing to use baseline stoves in the group of CPAs that are being sampled as part of the PoA Sampling Plan. The approach for defining groups of CPAs is described in the PoA Sampling Plan below under the section *Sampling Frame*. In cases where it is anticipated that the majority of end users will stop using baseline stoves once they have started using the ICS, then Option B will be applied. Use of Option B will help reduce the costs associated with sampling in cases where it can be expected that the majority of end users will cease using baseline stoves, but should not affect the estimated value of the parameter or the calculation of emissions reductions.

If baseline stoves are disposed of as part of a CPA, then the value of f_{old} would be automatically zero.

The total number of ICS deployed (N_{all}) is also determined ex-post. However, since this value is automatically calculated using the PoA Distribution and Monitoring database, which contains all serial ID numbers of stoves sold, there is no need for further discussion of the approach involved.

PoA Sampling Plan

Due to the large number of ICS envisaged to be distributed as part of the CPAs to be included in the PoA, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling will be undertaken as part of a PoA-wide Sampling Plan that is designed in line with the requirements of AMS-II.G v. 3 and the "Standard for sampling and surveys for CDM project activities and programme of activities" (the Sampling Standard)[43]. The Sampling Standard (paragraph 20, footnote 18) allows for sampling across a group of CPAs, provided the homogeneity of population can be demonstrated, or differences are taken into account in the sample size calculation and 95/10 confidence/precision is applied.

Flexibility to apply cross-CPA sampling is critical for the feasibility of the proposed PoA due to the large number of CPAs envisaged. In particular, this is the case for monitoring the parameter η_{new} which involves carrying out WBTs in the field and therefore involves considerable time and cost. For this parameter there is likely to be a very high level of homogeneity amongst CPAs involving distribution of the same stoves, since the ICS to be distributed have been designed to meet stringent efficiency specifications and are manufactured in modern factories to specification. There is no reason to think the actual efficiency of the same ICS models will vary significantly from CPA to CPA or even country to country. For the other parameters, the CME will define a sampling frame for each group of CPAs such that the homogeneity of the group can be expected to be sufficient to allow for cross-CPA sampling.

Given the multi-country, end-user and multi-fuel (wood and charcoal) nature of the proposed PoA, it is not feasible to pre-define a common sampling approach for all CPAs that could be included in the PoA over time. Some aspects of the PoA Sampling Plan will remain fixed and these are identified clearly below. However, the Sampling Plan will also be elaborated further over time as additional CPAs are

[43] EB 69 Report, Annex 4

included. The Sampling Plan therefore provides: a framework for the sampling of all parameters contained in the Monitoring plan, the approach for sampling of these parameters, and an approach for integrating future CPAs to be included in the PoA into the Sampling Plan.

Sampling design

i. Objectives and reliability requirements

The objective of sampling is to obtain a reliable estimate of the parameters to be monitored over the course of the crediting period and to meet the indicated confidence/precision levels. **This objective remains fixed throughout the life of the PoA.**

Step 1 in applying the PoA-Sampling Plan to a CPA at the time of inclusion is to identify if the CPA is to be sampled within a group of CPAs. This step is illustrated graphically in Annex 4. The CME will aim to monitor CPAs by sampling across a group of CPAs within a defined sampling frame wherever possible. If, however, there is a reason for a particular CPA to have its own sampling plan, this would be defined in the CPA-DD. For example, this might occur if the PoA includes a CPA that targets a particular end user group for which there are no further CPAs envisaged. In general, the sampling approach that will be applied to CPA-specific sampling will follow the same approach as for cross-CPA sampling, except where the methodology and/or the Sampling Standard call for a different approach (e.g. see below for determination of confidence/precision level).

Step 2 in applying the PoA Sampling Plan to a CPA at the time of inclusion is to select the applicable reliability level. This step is illustrated graphically in Annex 4. As a rule, the most stringent confidence/precision levels required by the methodology AMS-II.G and the Sampling Standard will be applied whenever sampling is undertaken. According to the Sampling Standard, 95/10 reliability is to be applied whenever sampling across a group of CPAs, which will typically be the case for this PoA. In the (rare) case of conducting CPA-specific sampling, the methodology AMS-II.G requires 90/10 confidence/precision if annual sampling is applied, or 95/5 confidence/prevision if biennial (every two years) sampling is applied.

Parameter	Description of parameter	Confidence/precision level (frequency of sampling)
η_{new}	The thermal efficiency of the ICS distributed (%)	Cross-CPA sampling: • 95/10 CPA-specific sampling: • 90/10 if annual • 95/5 if biennial
SOF	The Stove Operating Fraction, i.e. the fraction (up to 1.0) of users using the ICS	
u_{old}	The amount of woody biomass that continues to be used in the replaced stoves (kg)	
f_{old}	The fraction of stove users still using baseline (replaced) stoves (up to 1.0)	

In cases where the required level of precision is not able to be achieved, the lower bound of the applicable confidence interval of the parameter value will be used as is allowed by the methodology AMS-II.G v. 3 (para 22). The frequency of sampling will always comply with the requirements of the methodology and the Sampling Standard, but will be determined by the CME based on experience gained during the distribution and monitoring of ICS and its financial considerations (balancing the costs of conducting more frequent sampling vs the benefits).

ii. Target population

The overall target population is the ICS distributed as a result of the CPAs implemented under the PoA. In the case of a CPA-specific sampling plan, it is the ICS distributed under that specific CPA. **The definition of the target population will not change throughout the PoA lifetime, however, the numbers of ICS and end users listed in the Database will continue to increase over time as CPAs are included.** The ICS to be sampled will be drawn from the list of individual ICS serial ID numbers contained in the PoA Distribution and Monitoring Database, which is maintained by the CME. Each ICS is assigned to a CPA in the PoA Distribution and Monitoring Database and linked to an end user whose premises will be visited during monitoring.

See Section below on *Sampling Frame* for a detailed discussion of the approach for differentiating the target population during sampling, so as to ensure homogeneity within each group of CPAs.

iii. Sample Method

The CME will draw a sample from within each defined group of CPAs using simple random sampling. Each defined group of CPAs is referred to as a "Sampling Frame". **The method of using simple random sampling for a group of CPAs within a defined sampling frame will be fixed throughout the life of the PoA.** In the case of CPA-specific sampling, the same approach will be applied as for cross-CPA sampling however a simple random sample will be drawn from the population contained only within that specific CPA. The CME will then visit the end user premises where the selected ICS are located (most likely using contractors), conducting a sufficient number of field measurements for each of the parameters according to the estimated sample size.

To ensure a random sample selection, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its Serial ID number. Each ICS can thus be allocated a Sample Selection Number in each monitoring period, starting at 1 and increasing up to the total number of ICS in the Database for that pre-defined sampling frame. Applying the random number generators, the ICS can then be randomly chosen from the defined population up to the required sample size as calculated by the CME. This will be done for each group of CPAs within a defined sampling frame.

To estimate the parameters, sampling will involve the following approaches (outcome in brackets):

- η_{new}: ICS will be tested using WBTs. (ICS efficiency)
- SOF: visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use. (Yes/No)
- f_{old}: visual inspection of the premises to see if baseline (replaced) stove continues to be used. Interview with end user if required to verify that baseline (replaced) stove is still in use. (Yes/No)

  Where Option B as described above is applied, then:

  $$f_{old} = 1 - f_{non,old}$$

- u_{old}: interview with end user to establish the amount of cooking that is done in the monitoring period using baseline stove ($MPM_{after\ ICS}$) compared with the amount of cooking that was done in the baseline scenario ($MPM_{before\ ICS}$), multiplied by total annual fuel consumption in the baseline scenario (kg/year).

The above estimation approaches will remain fixed throughout the PoA lifetime, subject to the CME making improvements in the techniques as it gains experience in monitoring.

More ICS will be selected for sampling than is required by the sample size (see below for sample size estimation approach), to ensure that if there are any ICS or end users that are unable to be reached the required level of reliability is still achieved. Sampling of ICS/end users from the buffer selection will only take place when the required sample size has not yet been reached. The CME will select a relatively large buffer, determining the ideal size of the buffer through experience gained during monitoring of each parameter. While it may be adequate to set the buffer at, say, 10-30% of the estimated sample size, the CME is more likely to set a conservative buffer (e.g. 100% or 200% of the estimated sample size) and break it down into smaller buffer "sub-segments". It will conduct additional sampling in a step-wise approach for each of these sub-segments until it has met the reliability requirements. The CME will stop monitoring a particular parameter once the required level of confidence/precision has been reached, provided that the calculated minimum number of samples has been achieved after the completion of one or more buffer sub-segments. For example, in the case of applying a 30% buffer, three buffer sub-segments of 10% each could be defined, to be completed in three sequential steps:

1. Visit first 10% of premises required for the 30% buffer. If the number of responses is sufficient to achieve the required reliability level, then stop sampling.
2. If step 1 is not sufficient to achieve the required reliability level, then visit the next 10% of premises (increases the additional sampling to 20% of the 30% buffer). If this additional sampling is sufficient, then stop sampling.
3. If step 2 is not sufficient to achieve the required reliability level, then complete the final 10% of the additional sampling buffer (bringing the total to 30%).

Whenever the CME selects a very large buffer (e.g. 100% of the estimated sample size), it will break the buffer down into small steps (e.g. for a buffer of 100%, the CME would use ten steps with 10% increments per step) to ensure that this approach does not result in unnecessary costs being incurred.
The buffer approach will remain fixed throughout the PoA lifetime subject to the CME making improvements in the techniques as it gains experience in monitoring.

iv. Sample size

The required sample size will be calculated by the CME for each parameter to be estimated for each group of CPAs during the monitoring period. To calculate the required sample size for each parameter, the CME requires a range of information relating to the group of CPAs. The required information and its sources are outlined in the table below.

Information required for sample size estimation	Source of information
Parameter definition (units and whether mean or proportion/percentage)	AMS-II.G and Monitoring Plan in PoA-DD and CPA-DDs
Confidence/precision level required	AMS-II.G, Sampling Standard See Step 2: Reliability level in Annex 4
Population size (total number of ICS within sampling frame)	PoA Distribution and Monitoring Database See Step 3: Sampling Frame selection in Annex 4
Expected value of parameter	CPA-DD Section B.6.1
Expected range within which value could vary	CPA-DD Section B.6.1
Equations for sample size estimation	*Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69 Annex 5)

A detailed description of the approach for estimating sample sizes for each of the parameters to be monitored is provided in Annex 4. In the case of CPA-specific sampling, the same approach will be used except the sampling frame will be limited to the population within that specific CPA.

v. Sampling Frame

The proposed sampling approach for cross-CPA sampling involves defining a different Sampling Frame for each group of CPAs with common characteristics and then drawing a different sample for each defined sampling frame using simple random sampling. In the case of CPA-specific sampling, the sampling frame will be limited to the population within that specific CPA and this will be defined at the CPA level.

At a minimum, the CME will define each Sampling Frame according to the following criteria:

I. **Country**. Given this is a multi-country PoA, the first level of differentiation is the country. Country-level differentiation is consistent with the use of national average values for establishing the baseline, and the definition of national CPA boundaries.

II. **Fuel type**. Similarly, this is a multi-fuel PoA, so the second level of differentiation is on the basis of fuel type: either wood fuel ICS or charcoal ICS. This is also a logical differentiation because in countries with both fuel types available rural populations tend to be wood fuel users, while urban populations tend to be charcoal users. Therefore, the fuel type differentiation also helps to account for demographic differences.

III. **End user**. Since it is envisaged that the PoA could include CPAs targeting various end user groups, it is necessary to differentiate the CPA groups on the basis of end user. According to Eligibility Criteria 9, CPAs must target either households, small/medium enterprises (e.g. small restaurants) or community organisations such as schools.

IV. **Stove type**. Stove types can be treated as sufficiently homogenous (referred to below as "similar") provided that their efficiencies are in a similar range, defined as being within +/-10% of each other, and they have other common design features. This means differentiating between fixed vs portable stoves, stoves with a capacity designed for households vs institutional users, and potentially other design features that could impact on end user preferences. The only exception to this rule will be in the case where for practical reasons the CME wishes to merge two sampling frames by combining a relatively small number of stoves of a different design (say, outside the +/- 10% efficiency range) in a sampling frame containing a relatively large number of stoves. Provided the stoves being merged into the large sampling frame account for less than 10% of the total population of stoves in that sampling frame, this will be allowed. This would increase the standard deviation of n_{new} during sampling, leading to slightly larger sample sizes being required. A weighted average of η_{new} will be determined in line with paragraph 6 of AMS-II.G V.3.

The CME will learn from the monitoring experience over time and may further differentiate the sampling frame on the basis of other characteristics. For example, CPA groups could also be differentiated according to the responsible DO. One exception to the above approach is that the parameter η_{new} can be assumed to be highly homogenous for each stove model regardless of how the end user group, distribution region etc is defined. This is due to the highly standardised manufacturing of the eligible ICS to stringent quality standards. When monitoring η_{new} the CME may choose to draw a common sample for each stove model from across CPA groups.

The PoA Distribution and Monitoring Database can then be used to produce a list of all the ICS fitting within the defined Sampling Frame, which will be eligible for selection during sampling. In figure 6 below the approach is described at a generic level for hypothetical sampling frames in two countries

simply referred to as A and B (this is to account for the planned addition of new countries to the PoA post registration). A naming system will be established to identify each sampling frame according to its key parameters:

- Sampling Frame AWH1 contains CPAs involving wood stove ICS distributed to households in Country A where the stove is similar to the G3300 (a portable wood stove pictured in A.4.2.1 with an average thermal efficiency of 32.6%).
- Sampling Frame ACS1 contains CPAs involving charcoal stove ICS distributed to SMEs (e.g. small restaurants) in Country A where the stove is similar to the CH2200 (a portable charcoal stove pictured in A.4.2.1 with an average thermal efficiency of 38.2%).
- Sampling Frame BWH1 contains CPAs involving wood stove ICS distributed to households in Country B where the stove is similar to the Z3000 (a fixed wood stove pictured in A.4.2.1 with an average thermal efficiency of 29.5%).
- Sampling Frame BCH1 contains CPAs involving charcoal stove ICS distributed to SMEs (e.g. small restaurants) in Country A where the stove is similar to the CH4400 (a portable charcoal stove pictured in A.4.2.1 with an average thermal efficiency of 31.4%).

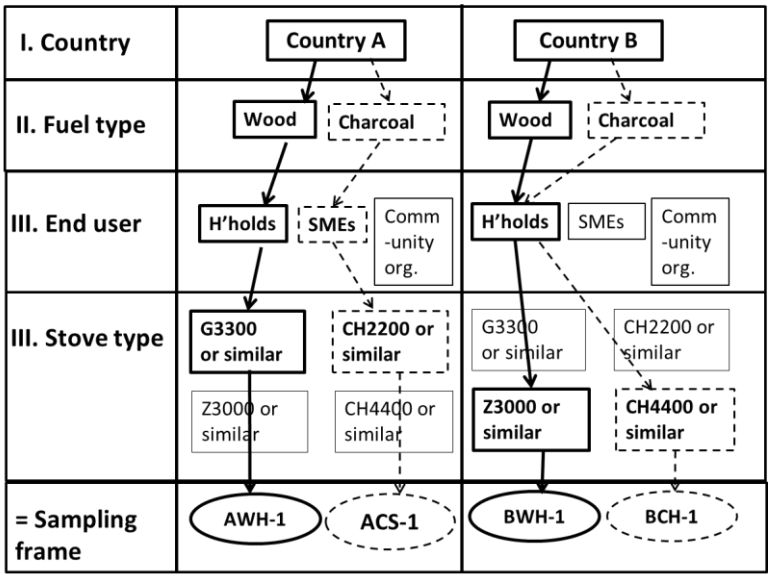

Figure 8: Sampling frame definition approach

Each Sampling Frame will be defined by the CME over time to suit the CPAs included in the PoA. Annex 4 provides a more specific application of the approach described above for Kenya and South Africa, which are the first two countries included in the PoA.

If the CME fails to achieve the required level of reliability for any parameter, it will either conduct more sampling following the approach outlined above or take the lower boundary of the results, thus ensuring conservativeness. This will also inform the CME's future decisions about sampling frame definition and help achieve outcomes closer to expectations.

Data

vi. Field measurements

The following parameters will be measured as indicated in the table below (both in the case of cross-CPA sampling and in the case of CPA-specific sampling):

Parameter	Timing (indicative)	Frequency (required by AMS.II.G)	Methods to be applied	Comments on seasonal fluctuation
η_{new}	First monitoring will occur within 24 months of ICS distribution at the latest, and will include ICS of different vintages	At least every two years. Likely to be done annually.	WBTs	Not due to any seasonal fluctuation
SOF	First monitoring is likely to occur within 12 months of ICS distribution, and will include ICS of different vintages	At least every two years. Likely to be done annually.	Visit to premises, visual inspection and interview with owner of ICS if required (if ICS is clearly in use, then no interview required)	Unlikely to be due to seasonal fluctuation
u_{old}	First monitoring is likely to occur within 12 months of ICS distribution, and will include ICS of different vintages	Not specified in methodology – Option A: monitored once in the first monitoring period for the group of CPAs and then fixed. Option B: monitored every monitoring period.	Visit to premises and interview with owner of ICS to estimate share of annual consumption accounted for by baseline stoves (approach described under Sampling Method above)	Unlikely to be due to seasonal fluctuation if interview questions are explained properly (requires input from local partners to ensure estimation is not influenced by events such as seasonal festivities, holidays etc)
f_{old}	First monitoring is likely to occur within 12 months of ICS distribution, and will include ICS of different vintages	Not specified in methodology – to be monitored simultaneously with SOF. Thus, at least every two years, but likely to be annually.	Visit to end user premises, visual inspection and interview with owner of ICS if required (if the end user is clearly not using a baseline stove then no interview is required)	Unlikely to be due to seasonal fluctuation if interview questions are explained properly (requires input from local partners to ensure estimation is not influenced by events such as seasonal festivities, holidays etc)

vii. Quality assurance/Quality control

The potential for non-responses, refusals and related issues will be considered by the CME for each defined sampling frame. This will occur both in the case of applying cross-CPA sampling and in the case where CPA-specific sampling is applied. As the PoA is intended to include multiple countries with a high level of cultural diversity as well as different end user groups, there is no "one size fits all" approach for dealing with these issues. However, in order to avoid many of these problems the CME will undertake the following strategies, tailoring the specific approach to the local circumstances:

1) **Ensuring end user awareness.** At the time of sale, the ICS customer is made aware that they are required to participate in monitoring activities. This will be via a written statement (in English

and local language where appropriate) on the carbon waiver form, or via alternative means such as training sales personnel to explain the importance of monitoring to each customer.

2) **Questionnaire design.** The design of the questionnaire will ensure that the questions are non-intrusive and easy to understand for both the interviewee and interviewer. For example, when conducting sampling to estimate the parameter u_{old} a simplified approach has been designed to avoid the need for asking customers how much money they spend on fuel.

3) **Drawing on local knowledge**. The local contractors to be hired by the CME in each country will play an important role in tailoring the approach to suit local circumstances. For example, in some instances, it may be essential for a local person to conduct the interview in order to obtain accurate results, e.g. to explain to the end user that their old stove will not be removed if they admit to its continued use.

4) **Quality of contractors**. Any third parties hired by the CME to carry out sampling, data will be required to demonstrate a high level of cultural awareness, local language skills and appropriate experience with data entry and data management. The CME will ensure that contractors are adequately trained for the tasks they are contracted for (eg. carrying out of WBTs in line with a methodology supported by an appropriate international body such as PCIA). Training will also be provided on how to deal with non-responses, refusals and other problems should these occur.

If the sampling results are insufficient to achieve the target reliability levels, the CME has a number of options to address this (see below). By selecting a larger than necessary sample size (buffer) before commencing monitoring, the CME can help ensure that an adequate number of responses are obtained during sampling.

Outliers will be dealt with by applying the CDM materiality principles outlined in CMP7. That is, the outliers will be disregarded provided that doing so does not lead to an overestimation of the emissions reductions of a group of CPAs of higher than:

- 5% in the case of SSC-CPAs (CMP 7, Paragraph 4(d))
- 10% in the case of micro-scale CPAs (CMP 7, Paragraph 4(e))

The data contained in each individual CPA Monitoring Record and collected during field measurements will be transferred to the CME by the Monitoring Agents. Either the originals of the CPA Monitoring Records or scanned copies of each Record will also be provided to the CME to enable cross-checking. The CME will cross-check the data provided by contractors against the original Monitoring Records.

The calculation of the sample size will be carried out using estimates for proportions, mean of values and standard deviations as the actual characteristics of the population/sampling frame are unknown ex-ante. In order to ensure the quality of the sampling results, the CME can draw on the provisions for reliability calculations as provided by the *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69 Annex 5). In the event that the initial sampling results do not fulfil the required level of confidence and precision, the CME will undertake additional samples drawn from the

buffer (see description of the approach above under *Sample Method*). If the required reliability level is still not sufficient after utilising the buffer, the CME may choose to apply the lower bound of the sampling results as is allowed for by the methodology (AMS-II.G v. 3, para 22). As a last resort, the sampling exercise may be repeated entirely with an increased sample size.

The data contained in each individual CPA Monitoring Record and collected during field measurements will be transferred to the CME by the Monitoring Agents. Either the originals of the CPA Monitoring Records or scanned copies of each Record will also be provided to the CME to enable cross-checking.

The CME will be responsible for maintaining a secure PoA Distribution and Monitoring Database, which includes all the data relating to the CPAs within the PoA. The Database will be located on the CME's secure server. The system automatically backs up on regular basis any files that have been modified. The files are backed up onto separate hard drives that are regularly swapped to ensure there is always one drive located securely offsite. The CME may improve this system over time with new technology.

i. Analysis

The data obtained from sampling of each group of CPAs will be used to estimate values for the parameters described above. The values will then be factored into the emissions reduction calculations and the monitoring report for each monitoring period, and this will result in the request for issuance of CERs.

If sampling is conducted more than once during each monitoring period, the approach will be to take the values obtained during the first sampling phase and the values obtained during the second sampling phase and then calculate the average of these values. For example, to estimate the parameters for a 12-month monitoring period, the CME could undertake the initial sampling round at the 6-month mark and then a second sampling round at the 12-month mark. It would then take the average of the two sets of values obtained from sampling and these averages will then be applied for the purposes of the emissions reduction calculations. The approach will follow the requirements of the methodology AMS-II.G V.3 (e.g. in the case of establishing the efficiency of the ICS distributed (parameter η_{new}) the weighted average value will be applied if there is more than one type of stove included in a sampling frame). Reporting will be done as per the recommended approach in the *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69 Annex 5), indicating the sample mean along with the confidence interval where applicable.

Implementation

The CME will implement the Sampling Plan over the lifetime of the PoA, elaborating new sampling frames as the new CPAs are included and further refining the Sampling Plan based on experience. In time for the first monitoring period, the CME will contract any necessary third parties who would be responsible for undertaking actual field measurements. The timing of this will depend on the speed of CPA inclusion and ICS distribution, but it is envisaged that contractors will be engaged within 6 months of PoA registration and that the first monitoring will occur after 12 months of PoA commencement The CME will train any such third parties to ensure that field measurements are undertaken in line with the standards required of the Sampling Plan (eg. WBTs will follow a procedure that meets internationally-recognized standards such as those approved by PCIA).

The skills and experience required for the data collection activities under the Sampling Plan include:

- Experience conducting WBTs
- Experience conducting door-to-door surveys of biomass consumption
- Local language skills (especially important for input to questionnaire design and interviewing of end users)
- English language skills
- Cultural awareness
- Numerical proficiency
- Data entry skills

Finding a contractor in each country with all of these skills and experience may be challenging. It is therefore possible that the CME will need to employ more than one contractor to ensure that it has the right mix of skills and experience and is able to effectively implement the Sampling Plan in each country to be covered under the PoA.

E.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

21/05/2012

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Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding has been received.

Annex 3

BASELINE INFORMATION

The key baseline information such as the fraction of non-renewable biomass, annual amount of fuel consumption, and efficiency of stoves to be replaced will be established in the first CPA in each country.

Establishment of the Non Renewable Biomass factor

Project participants may use applicable default values as per EB 67, Annex 22 and approved by the DNA, detailed formulas or approved tools provided by the UNFCCC to establish f_{NRB}, if available at the time of CPA inclusion. The specific approach in each host country shall be determined in the first CPA-DD. All subsequent CPA in that country shall apply the same approach until the approved default values change, a default value is approved for the first time, or a period of 10 years is completed. After the 10 year period is completed without an approved default value being available, f_{NRB} is recalculated. If default values are not used, the approach below is to be applied:

Differentiation between non-renewable and renewable woody biomass

Project participants shall determine the shares of renewable and non-renewable woody biomass in B_y (the quantity of woody biomass used in the absence of the project activity) the total biomass consumption using nationally approved methods (e.g. surveys or government data if available) and then determine $f_{NRB,y}$ as described below.

The fraction of woody biomass saved by the project activity in year *y* that can be established as non-renewable is:

$$f_{NRB,y} = \frac{NRB}{NRB + DRB}$$

Where:

$f_{NRB,y}$	Fraction of woody biomass used in the absence of the project activity in year *y* that can be established as non renewable biomass using survey methods
NRB	Non- renewable woody biomass
DRB	Demonstrably renewable woody biomass

Where NRB = B_y - DRB

Project proponents may use surveys in order to determine f_{NRB} or may apply the following approach:

Determination of B_y
B_y is the biomass used in tonnes dry matter in year y in the absence of the project activity in the area for which the f_{NRB} is calculated. This can be either a whole country or a region within it.

However, if there is a lack of data availability to determine the f_{NRB} on a project-specific basis, from the shares of renewable (DRB) and non-renewable woody biomass (NRB) in the total biomass consumption (i.e. B_y - the quantity of woody biomass used in the absence of the project activity), in order to have the comparable proportion value of f_{NRB}, a national-level or regional-level default value for f_{NRB} will be derived by calculating **Total Annual Biomass Removals (R_y)** from each country as a proxy for **B_y** and

estimating the proportion **of R_y that is demonstrably renewable (DRB) and non-renewable (NRB)**, which can cover all CPAs in that specific region or country.

B_y is calculated using the two following approaches, of which the more conservative result shall be applied.

1. B_y is calculated based on volumetric wood harvest data and converted to tonnes using the appropriate Biomass Conversion and Expansion Factor for wood removal as:

$$B_y = H_y * BCEF_R$$

Where:

H_y	Volumetric wood harvest in m^3/yr in year y. National and regional data from literature or published reports can be used. FAO data can also be used.[44]
$BCEF_R$	Biomass Conversion and Expansion Factor for conversion to wood removals[45] in ton/m^3. IPCC values can be used.

2. Total Annual Biomass Removals (R_y) from each country is used as a proxy for B_y in line with the SSC WG information note contained in their thirty fifth meeting report annex 20[46]. FAO and IPCC data may be used to determine this. R_y is calculated as follows:

$$R_y = MAI_y - \Delta BM_y \quad \textbf{(1)}$$

Where:

R_y	Total annual biomass removals in t/yr in year y
MAI_y	Mean Annual Increment of biomass growth in t/yr in year y
ΔBM_y	Annual change in living forest biomass in t/yr in year y

Mean Annual Increment of biomass growth in year y (MAI_y) is calculated in as the product of the Extent of Forest in year y (F_y) in hectares and the country-specific growth rate $r_{G,y}$ of the Mean Annual Increment:

$$MAI_y = F_y * r_{G,y} \quad \textbf{(2)}$$

Where:

MAI_y	Mean Annual Increment of biomass growth in t/yr in year y
F_y	Extent of forest in ha in year y
$r_{G,y}$	Growth rate of biomass, calculated as a weighted average based on FAO reporting on distribution of total forest area by ecological zone and IPCC above-ground biomass growth rates for different ecological zones in t/ha/yr in year y.

[44] http://www.fao.org/forestry/fra/

[45] IPCC Chapter 4. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.5.

[46] http://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf

Determination of DRB Demonstrably renewable woody biomass

Woody[47] biomass is "renewable" if one of the following two conditions is satisfied:

1. The woody biomass is originating from land areas that are forests[48] where:
   (a) The land area remains a forest;
   (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.
2. The biomass is woody biomass and originates from non-forest areas (e.g. croplands, grasslands) where:
   (a) The land area remains cropland and/or grasslands or is reverted to forest;
   (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.

DRB is calculated as:

1. Estimating the sum of all demonstrably sustainable managed forests in the area in hectare. Published reports, surveys or literature can be used.

2. Calculating the product of the growth rate of biomass in tonnes dry matter per hectare in the area and the demonstrably sustainable managed forest area.

$$DRB_y = r_{G,y} * F_{protected,y}$$

Where:

$r_{G,y}$	Growth rate of biomass in tonnes dry matter per hectare in year y. Appropriate IPCC default values may be used[49].
$F_{protected,y}$	Demonstrably protected forest extent in hectare in year y. FAO data may be

[47] In cases of charcoal produced from woody biomass, the demonstration of renewability shall be done for the areas where the woody biomass is sourced.

[48] The forest definitions as established by the country in accordance with the decisions 11/CP.7 and 19/CP.9 should apply.

[49] IPCCC chapter 4. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.9 and table 4.10

used to determine this[50]. Where no indication of the protected forest area is available, 15% of the total forest extent or a more conservative values approved by the EB, shall be conservatively assumed to be protected.

It shall be noted that if national values are used to calculate B_y and R_y, then national values shall be used to calculate $F_{protected,y}$. Similarly, if regional values are used to calculate B_y and R_y, then regional values shall be used to calculate $F_{protected,y}$.

Determination of Non-renewable biomass

Non-renewable woody biomass (*NRB*) is the quantity of woody biomass used in the absence of the project activity (B_y) minus the *DRB* component, as long as at least two of the following supporting indicators are shown to exist:

- A trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area;
- 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;
- Increasing trends in fuel wood prices indicating a scarcity of fuel-wood;
- Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass.

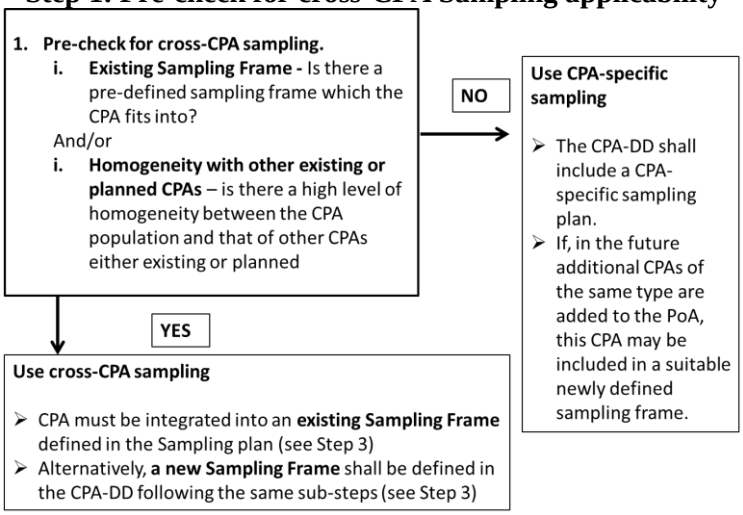
[50] http://www.fao.org/forestry/fra/

Annex 4

MONITORING INFORMATION

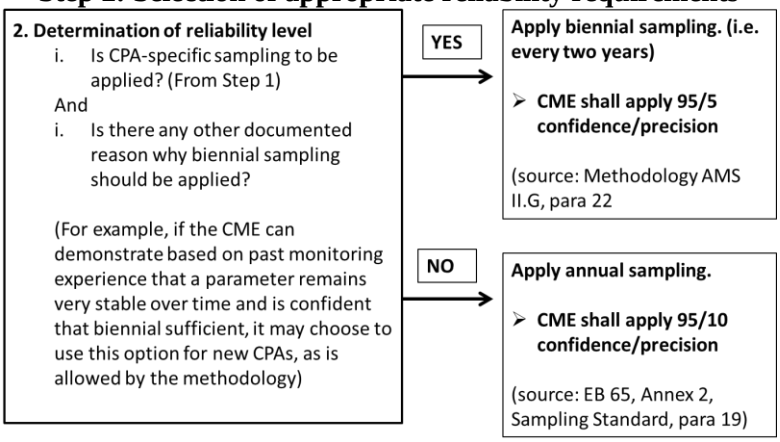
The following steps outline the approach for adding CPAs into the PoA Sampling Plan at inclusion.

Step 1: Pre-check for cross-CPA Sampling applicability



In Step 1, the CME will perform an initial check to determine whether the CPA can be covered by cross-CPA sampling or not. The simplest way of determining this is to check whether there is likely to be a suitable CPA Sampling Frame that has already been defined, based on the criteria that were outlined in the PoA Sampling Plan. If the CPA is the first of its kind to be included in the PoA, but the CME is planning other similar CPAs, then it will define a new CPA Sampling Frame in Step 3. This information will be included in the CPA-DD. If the CPA is not similar to other existing or planned CPAs in terms of these key criteria (e.g. it is in a new country and involves distribution of a new type of ICS technology, with no plans for further CPAs of this type), then the CME shall include a CPA-specific sampling plan in the CPA-DD.

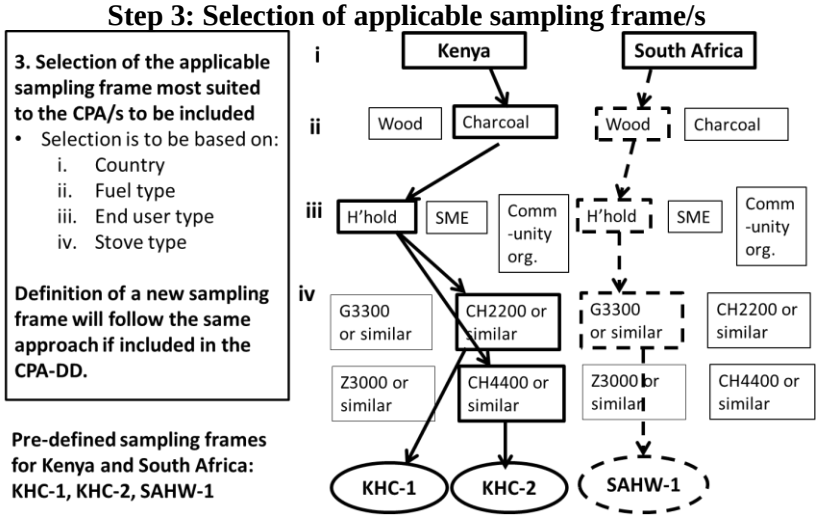
Step 2: Selection of appropriate reliability requirements



In Step 2, the CME will determine the applicable reliability requirements using the decision from Step 1 combined with the requirements of the methodology AMS-II.G and the Sampling Standard. The most

likely outcome (assuming cross-CPA sampling) is that annual sampling will be applied using 95/10 accuracy/precision.

Step 3: Selection of applicable sampling frame/s



In Step 3, the CME will use four criteria to determine the appropriate Sampling Frame or Sampling Frames. The Sampling Frame defines the target population which the ICS to be distributed in the CPA will be considered part of. Thus, if there are more than one stove types or multiple end user types covered by a CPA it will be necessary to select multiple sampling frames to ensure that all the ICS are covered by the Sampling Plan.

In the case of selecting an existing Sampling Frame, the CME will ensure that the CPA should match the characteristics of the defined Sampling Frame and this should be stated in the CPA-DD. In the case of a newly defined Sampling Frame, the CPA-DD should define the Sampling Frame and give it a unique identifier which can be used by subsequent CPAs of the same type.

For example, the first CPA to be included in this PoA involves the distribution of portable charcoal ICS (CH2200 and CH4400) to households in Kenya. As shown in the diagram for Step 3 above, the CME defines two Sampling Frames for the first CPA: one to cover sampling relating to the CH2200 stove, and a second for the CH4400 stove. The ICS are differentiated since the difference in their efficiencies is more than 10%; the efficiency of the CH4400 is 31.4% compared with 38.2% for the CH2200 (as per the certification sheets provided from Colorado State University)[51]:

- KHC-1: ICS distributed in Kenya, burning charcoal, used by households, where stove characteristics are similar to the CH2200 stove (efficiency of 38.2% (+/-10%), portable).
- KHC-2: ICS distributed in Kenya, burning charcoal, used by households, where stove characteristics are similar to the CH4400 (efficiency of 31.4 (+/-10%), portable).

Future CPAs in Kenya can then use either of these sampling frames if applicable.

Similarly, if the first type of CPA included in South Africa involves distribution of woodfuel ICS, such as the G3300, to households, applying Step 3 results in the Sampling Frame being defined as "SAHW-1":

[51] As stated above, stoves within +/- 10% average thermal efficiency rating of each other and other similar characteristics can be considered as homogenous for sampling purposes.

- SAHW-1: ICS distributed in South Africa, burning woodfuel, used by households, where stove characteristics are similar to the G3300 (efficiency of 32.6% (+/-10%), portable).

The applicable Sampling Frame for each CPA will be contained in the CPA-DD.

Step 4: Sample size estimation

The sample size estimation approach is described below each of the parameters for a hypothetical population of 100,000 ICS units applying 95/10 precision (cross-CPA sampling). In order to calculate the required sample sizes, estimates for the proportions and the mean values are required. Of the four parameters to be monitored, two are proportions/percentages (SOF and f_{old}) and two are mean values (η_{new} and u_{old}). Furthermore, the standard deviation needs to be assumed in case of sampling for a mean value. For the first monitoring period, the possible value ranges for the parameters are drawn from the table further below in Annex 4. For the following monitoring periods, the estimates shall be adjusted taken the results of the previous monitoring period(s) into account.

For the parameters SOF and f_{old} the following equation[52] is applied:

$$n \geq \frac{c^2 \times N \times p(1-p)}{(N-1) \times precision^2 \times p^2 + c^2 \times p(1-p)} \quad (1)$$

n	=	Number of elements to be sampled
N	=	Total number of elements in the population
p	=	Proportion
c	=	Constant referring to the level of confidence (e.g. 1.645 for 90 % confidence and 1.96 for 95 % confidence.
precision	=	Required precision (e.g. 10% = 0.1)

For the parameters η_{new} and u_{old} the following equation[53] is applied:

$$n \geq \frac{c^2 \times N \times V}{(N-1) \times precision^2 + c^2 \times V} \quad (2)$$

Where:

$$V = \left(\frac{SD}{mean} \right)^2 \quad (3)$$

n	=	Number of elements to be sampled
N	=	Total number of elements in the population
mean	=	Average value of the parameter that is expected in the total population
SD	=	Standard deviation of the parameter that is expected in the total population
c	=	Constant referring to the level of confidence (e.g. 1.645 for 90 % confidence and 1.96 for 95 % confidence.
precision	=	Required precision (e.g. 10% = 0.1)

[52] Equation according to the *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69 Annex 5)

[53] EB 69, Annex 5

The calculation of the required sample size is illustrated below for a 95/10 level of confidence and precision.

η_{new}:

$$n \geq \frac{1.96^2 \times 100{,}000 \times V}{(100{,}000-1) \times 0.1^2 + 1.96^2 \times V} \geq 14 \quad (4)$$

Where:

$$V = \left(\frac{0.02}{0.21}\right)^2 \quad (5)$$

Generally, a minimum sample size of 30 is envisaged to be applied in order to achieve reliable results, even if the estimated sample size calculation shows that fewer samples are sufficient to achieve the required confidence/precision. The approach for estimating the required sample size can be illustrated using the example of the Envirofit G3300 wood cook stove and the hypothetical sample population of 100,000 units. The stove has an average thermal efficiency of 32.6% and a standard deviation of 0.5% (as per the stove certification sheet from Colorado State University provided as proof). However, to be conservative, the standard deviation for the calculation of the sample size has been derived from the assumption that the efficiency of all G3300 stoves will be within the range of +/- 10% of the mean. According to the *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69 Annex 5)the standard deviation is thus determined to be 1.63%[54]. A sample size of 30[55] would be sufficient for η_{new} values with a standard deviation of approximately10%, which is only a hypothetical and very conservative assumption.

The table below provides an overview of the sample size calculation for all of the Envirofit stove models listed in Section A.4.2.1. Generally, a minimum sample size of 30 stoves will be applied in order to achieve robust and reliable results from sampling even if the sample size calculation suggest a value below 30 samples.

Model:	Mean according to test results	Standard deviation (SD) according to test results	Standard deviation (SD) based on +/- 10% range	Calculated sample size based on SD from test results	Calculated sample size based on SD from +/- 10% range	Assumed minimum sample size
G3300	32.6%	0.5%	1.63%	0.09	0.96	30
Z3000	29.5%	2.8%	1.475%	3.46		
M5000	29.7%	0.8%	1.485%	0.28		
CH2200	38.2%	1.4%	1,91%	0.52		
CD4400	31.4%	1.0%	1,57%	0.39		

[54] According to paragraph 44 of the *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69, Annex 5).

[55] A minimum sample size of 30 stoves is applied in order to achieve robust and reliable results from sampling.

SOF:

$$n \geq \frac{1.96^2 \times 100{,}000 \times 0.95 \times (1-0.95)}{(100{,}000-1) \times 0.1^2 \times 0.95^2 + 1.96^2 \times 0.95 \times (1-0.95)} \geq 21 \quad (6)$$

Where:

A sample size of 100 would be sufficient to achieve the required confidence/precision for SOF values ranging from 1.0 to 0.8. (The anticipated value of SOF for ex-ante emissions reduction purposes is 0.95. This is to be applied in the emissions reduction calculations at the CPA level).

u_{old}:

$$n \geq \frac{1.96^2 \times 100{,}000 \times V}{(100{,}000-1) \times 0.1^2 + 1.96^2 \times V} \geq 59 \quad (7)$$

Where:

$$V = \left(\frac{270}{579}\right)^2 \quad (8)$$

In the case of CPAs involving residential woodfuel users in Kenya for example, a sample size of 84 would be sufficient to achieve the required confidence/precision for u_{old} values ranging from 37kg to 1120kg, which is equivalent to 1.1-33% of annual woodfuel consumption in rural Kenya (3,394kg)[56]. In this example, the anticipated mean of u_{old} for ex-ante emissions reduction purposes is 579 kg and the standard deviation is 270 kg. An assumed value based on local knowledge about cooking patterns and expected behaviour of end users will be applied to each CPA for ex-ante emissions reduction calculation purposes (see table below for details of approach taken for estimation purposes). The actual values estimated during monitoring will help determine the values to be assumed ex-ante for future CPAs.

f_{old}:

There is a need for some flexibility in the sampling approach for this variable. The purpose of this flexibility is to avoid having an estimated sample size that is so large that it makes the cost of monitoring prohibitive to the economics of the whole programme. This could occur if the CME is required to estimate very low values of either f_{old} or $f_{non,old}$ through sampling (for example, if it expects the range of values for f_{old} to be below say 10% and it cannot estimate $f_{non,old}$ instead).

Prior to monitoring each group of CPAs, the CME will take a view on whether the majority of end users will or will not continue to use the old stoves after they have received the ICS. Since it is possible that the circumstances in a particular country, region or end user group could influence end user behaviour, the CME will use this information to decide on whether to apply either Option A (sampling of f_{old}) or Option B (sampling $f_{non,old}$) for the sampling of different groups of CPAs to be monitored.

[56] Ministry of Energy (2002): Study on Kenya's energy demand, supply and policy strategy for households, small scale industries and service establishments, Final report prepared by Kamfor Company Ltd., Nairobi, Table 3.1 p. 10

Here we provide an estimate of the sample size required for monitoring this parameter under circumstances where the CME expects that the fraction of end users continuing to use baseline (replaced) stoves (f_{old}) is lower than the fraction of end users *not* continuing to use baseline (replaced) stoves ($f_{non,old}$). This is a logical outcome since end users have made the decision to purchase the more expensive ICS due to having perceived an opportunity to save on fuel costs. Their investment in the ICS will only pay off if they stop or significantly reduce their cooking with their inefficient stove. Applying Option B, the sample size can be estimated as follows:

$$f_{old} = 1 - f_{non,old}$$

Applying this approach for example, the parameter will be determined by sampling as follows.

$$n \geq \frac{1.96^2 \times 100{,}000 \times 0.9 \times (1-0.9)}{(100{,}000-1) \times 0.1^2 \times 0.9^2 + 1.96^2 \times 0.9 \times (1-0.9)} \geq 43 \quad (9)$$

A sample size of 100 would be sufficient to achieve the required confidence/precision assuming a range of the proportion of end users not using the old stoves ($f_{non,old}$) from 1.0 to 0.8. (The anticipated value of the proportion of end users not using the old stoves for ex-ante emissions reduction purposes will be applied at the CPA level, and is expected to be in the order of 0.9. Experience gained during the actual monitoring of this parameter will help inform the value assumed for future CPAs).

It should be noted that the parameter $f_{non,old}$ is not the same as the parameter SOF, and that f_{old} is not mutually exclusive to SOF, since it is possible that end users will use both stoves at the same time.

Value ranges of parameters for sample size estimation		
Parameter	**Value range**	**Reasons for value range**
η_{new} (efficiency of deployed ICS)	0.293-0.359	The value range is +/- 10% of the average thermal efficiency of the G3300 stove (32.6%). This is more conservative than the standard deviation according to test results of 0.5%.
SOF (Stove Operating Fraction – fraction of ICS operational and in use)	1.0-0.8	This value cannot be known in advance. However, this is seen as a reasonable range for the purposes of estimating sample size. There is no reason to think that end users would purchase stoves at a considerable cost compared with cheaper alternatives, and then not use them unless they are defective. Envirofit International's stoves which are envisaged to be distributed as part of CPAs under this PoA have been tested in the laboratory and field over several years, are manufactured to a high quality standard in modern factories, and come with a 5 year warranty on the combustion chamber.
u_{old}	37-1120kg	This range is provided for the purposes of sample size estimation. It is equivalent to 1.1-33% of annual household woodfuel consumption (3,394kg per annum) in rural Kenya, which is an example of an end user group that will be targeted by CPAs under this PoA. The source for this value is a comprehensive report prepared for the Kenyan Ministry of Energy in 2002 by the company KAMFOR[57]. The range of 1.1-33% has been chosen because it covers three scenarios for the proportion of the amount of cooking that is done using baseline (replaced) stoves compared with the amount of cooking that was done previously using the baseline stove. (This assumes 3 meals per day (90 meals per month) are cooked in total using either the old or new stoves): • Low Scenario: one meal per month: 1/90 = 1.1% of 3,394 = 37.3kg • Medium Scenario: one meal per week: 4/90 = 4.4% of 3,394 = 149.3kg • High Scenario: one meal per day: 30/90 =33% of 3,394 = 1120kg
f_{old} fraction of users still using baseline (replaced) stoves.	0.0 – 0.2 Where: $f_{old} = 1 - f_{non,old}$ and $f_{non,old}$ is expected to be in the range of 0.8-1.0	The value of f_{old} cannot be known in advance. If it is expected that more end users will stop using baseline stoves once they have received the ICS, then monitoring will actually estimate the fraction of end users *not* using baseline (replaced) stoves ($f_{non,old}$) (Option B). As a reasonable assumption for ex-ante sample size estimation purposes, a range of 0.8-1.0 is seen as reasonable for $f_{non,old}$. The learnings gained during the actual distribution and monitoring will help determine the real value of f_{old} to be applied at the CPA level and the appropriate choice of estimation approach (Option A or B).

[57] Ministry of Energy, Study on Kenya's energy demand, supply and policy strategy for households, small scale industries and service establishments. Final report prepared by Kamfor Company Ltd. Nairobi, 2002, Table 3.1 p10