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 Cook Stoves for East Africa (ICSEA)

Version 05
Date: 20/07/2012

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

1. General operating and implementing framework of PoA

The purpose of this small-scale Programme of Activities (PoA) is stimulating the dissemination of improved cook stoves (ICS) in East Africa. The PoA will encompass different models of ICS, depending on the supplier and the user of the stoves. The models of stoves are different sizes of the following wood fuel types:

- stoves for firewood
- stoves for charcoal

The stoves are both portable as well as fixed built-in types, serving domestic or institutional users. These ICS are more efficient in transferring heat to the meals, thus ICS require less fuel to prepare the same meal. This efficiency is translated into fuel savings compared to traditional stoves used in Africa. By reducing fuel consumption, the PoA reduces greenhouse gas emissions from the use of fuel. This reduction in fuel consumption is estimated and corresponding CO2 emission reductions are calculated from these savings.

Improved Cook Stoves for East Africa (ICSEA) Limited is the Coordinating/Managing Entity (CME) for this PoA. As such, it will coordinate the efforts from different Supplier Organisations (SO) to distribute ICS in Africa and comply with the requirements of this PoA. SOs will act as CPA implementers and are not Project Participants to this PoA.

During implementation, the CME for this PoA will:

- Issue/revoke authorisation to SOs to act as CPA implementers
- Organise and assess SO audits
- Provide technical and administrative support to SOs to guarantee compliance of ICSs and record keeping with the PoA requirements
- Oversee all communications required under the PoA
- Issue fuel efficiency rating for qualified ICS designs, once these have been tested to meet the PoA requirements
- Mediate CER agreements between the SOs and respective stove users on the one hand, and the CER buyers on the other and, as needed
- Manage the execution of CER agreements and distribution of the benefits
- Be responsible for the monitoring activities and data management required during the lifetime of the PoA.

- Maintain a database of sales records used to compute CERs and ensure that no double-counting of ICS sales occurs
- Be the focal point for CER registration and verification

Each SO will act individually, requesting authorisation for its CPA(s) to the CME and running the project in accordance with the demands of the local market. SOs will supply ICSs (manufactured locally or imported) and sell them on a commercial or a non-commercial basis[1]. SOs will have the necessary technical and administrative resources to ensure technical compliance to the PoA requirements of the ICS sold, as well as accurate and complete record keeping.

During implementation, each SO for this PoA will:

- Provide their stove models for testing according to the PoA requirements
- Comply with PoA requirements to become an authorised SO
- Manufacture and/or distribute ICS
- Ensure all the participants in the distribution chain are aware that the sales are subscribed to the PoA and are trained to comply with the requirements
- Keep records of sales and users as per the monitoring plan and provide them to the CME regularly
- Keep current with regards to the UNFCCC requirements, as enforced by the CME
- Receive audits and inspections to maintain authorisation status issued by the CME

SOs will sell the ICS, and are encouraged by the CME to make ICS more affordable to users. This affordability will be further stimulated as an increasing number of SOs become a part of this PoA and compete in the market for customer choice. The end users of the ICS will benefit from having a wide choice of high-quality (tested & rated) ICS at very affordable prices, added investment in marketing (awareness) and research and development of products that reduce deforestation and improve health by reducing indoor air pollution.

When purchasing the ICS, the buyer will fill an agreement with the SO that may contain, among others, information about the ICS model and rating, price and payment, the name, location/address and phone number of the user (the Sales Agreement). This information will allow the identification and the monitoring of the stove and its usage. By filling the Sales Agreement, the buyer will agree to discontinue the use of the traditional stove, and to use the ICS instead. Additional measures such as keeping close contact with the buyer through guarantee and maintenance schemes of the ICS will confirm that the ICS is in operation and will help to track the ICS.

Accordingly, the SO will use the CER proceeds to reduce the costs of ICS to customers, provide free or subsidised maintenance of the ICS and to recoup the SO's incurred associated costs of disseminating the stoves, such as research & development, training, marketing and building manufacturing facilities.

2. Policy/measure or stated goal of the PoA

The mission of this PoA is to make ICS affordable and available to all households across Africa, especially for low and medium income households where implementation of ICS is more difficult. The

[1] Some SOs may distribute their stoves on a non-commercial basis, i.e. non-profit-making. This may be the case of NGOs and other non-for-profit organisations that seek the sustainable dissemination of stoves.

stated goal is to enable the transformation of the traditional kitchens across Africa to ICS. Achieving this goal will result in:

- Reduced deforestation
- Reduced GHG emissions
- Improved people's lives:
    - Reduction of respiratory illness caused by indoor-air-pollution
    - Reduction of injuries occurring in unsafe kitchen environments such as burns from contact with the stove's hot surface, scalds from moving pots from a stove that has raised obstructions along its edges, or cuts through contact with sharp edges
    - Reduction of time/money spent obtaining fuel wood
    - Employment opportunities in the stoves industry

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

There are no laws or mandatory requirements in Africa stipulating the adoption of ICS by households, nor their dissemination. This proposed PoA is a voluntary action by the CME, Improved Cook Stoves for East Africa (ICSEA) Limited.

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

1. Coordinating or managing entity of the PoA as the entity which communicates with the Board.

Improved Cook Stoves for East Africa (ICSEA) Limited, Plot 47, Lubowa Estate, P.O.Box 70480, Kampala, Uganda.

2. Project participants being registered in relation to the PoA.

Project Participant and CME of this PoA.

Improved Cook Stoves for East Africa (ICSEA), Limited, Plot 47, Lubowa Estate, P.O.Box 70480, Kampala, Uganda

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participant	Kindly indicate if the Party involved wishes to be considered as a project participant (Yes/No)
Uganda (host)	Improved Cook Stoves for East Africa (ICSEA) Limited, (private entity and CME)	No
Kenya (host)	None	No
Burundi (host)	None	No
Rwanda (host)	None	No

This is a Unilateral CDM Project involving a non-Annex I Party company.

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

A.4.1. Location of the programme of activities:

Uganda, Kenya, Rwanda, and Burundi

A.4.1.1. Host Party(ies):

Uganda, Kenya, Rwanda, and Burundi

A.4.1.2. Physical/ Geographical boundary:

The geographical region within which all CPAs included in this PoA will be implemented is covering Uganda, Kenya, Rwanda and Burundi.

Fig 1. Map of Uganda, Kenya, Rwanda and Burundi, countries within this PoA

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

A typical CPA will be implemented by a SO and will consist of the sale of ICS on a commercial or non-commercial basis, installation of applicable models (only for fixed built-in stoves) and after-sales service (e.g. guarantee).

Location and energy limitation

Each CPA will be implemented by a SO respecting the geographical region of the PoA and a maximum energy saving of 180 GWh/year per CPA. In cases where the number of ICS per CPA exceeds the energy limit, the number of emission reductions (ERs) shall be capped at those generated by ICS saving a maximum of 180 GWh/year. Any additional ICS shall not be counted. During the life of the PoA the

number of CPAs implemented by each SO may increase and will be monitored according to the monitoring plan as described below.

As further discussed in section A.4.4.1 below, CPAs under this PoA are considered as not being a de-bundled component of a large-scale activity.

Operational and management plan

The SO and its supply chain will be responsible for the sale, installation (if appropriate) and after-sales service of the ICS and any arrangements for the distribution of carbon revenues. The operation of the ICS will be carried out by the user, and training or instructions on how to operate and maintain the ICS will be given by the SO.

The SO will follow the monitoring plan and procedures for identifying stoves sold during the course of the project and those which are still in use, so the appropriate number of emission reductions can be claimed. To facilitate this process, the SO will keep traceable information to be used by the CME and the DOE to track back to each individual stove built. The SO is also responsible for collecting the data of the customer on the Sales Agreement.

Monitoring

Each CPA is monitored and generates a separate annual count of emission reductions (ERs). Each CPA keeps a record of all ICS sold and a record of the location of the stove. Duplicate records are kept by the CME and all SO records are screened through spot-visits, together with cross-checks on the SO reports and logistics records in order to confirm that the sales record is authentic and that no double-counting occurs.

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

Each CPA will encompass any of the different types of ICS covered by the PoA, depending on the SO and the kind of user of the stoves. The models of ICS covered by the PoA are different designs, models and sizes of the following types:

Category Number	Type
1	Fixed built-in charcoal domestic stove
2	Portable charcoal domestic stove
3	Portable charcoal institutional stove
4	Fixed built-in charcoal institutional stove
5	Portable firewood institutional stove
6	Fixed built-in firewood institutional stove
7	Fixed built-in firewood domestic stove
8	Portable firewood domestic stove

ICS are more efficient than traditional stoves as they reduce heat loss. The domestic ICS model for the first CPA has been shown to use significantly less wood fuel to cook the same amount of food in comparison to traditional stoves. During the life of the project, research and development work may result in more efficient ICS. These shall be included in this PoA, subject to the appropriate baseline studies and tests proving real and measurable quantities of wood fuel saved.

The ICS are both portable as well as fixed built-in models. The specific designs and models provided by different SOs will be tested and rated by the testing organisations(s) under authorisation from the CME. The tests will ensure that the respective models meets standardised safety and efficiency requirements and that their emissions reductions are rated according to the approved monitoring methodologies. The most common baseline traditional stove for firewood in Africa is the three stone fire[2], and for charcoal the traditional metal stove, such as the metal sigiri in Uganda or metal jiko in Kenya. These sigiris or jikos have a high fuel consumption due to, among others, their lack of an improved combustion air supply and of a flue gas ventilation system.

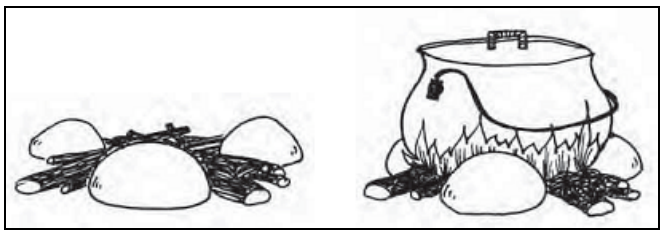


Figure 1. Three stone fire

Figure 2. Sigiri, Ugandan charcoal traditional metal stove

The ICS allowed in this PoA, include, but are not limited to, different models of the rocket stove design plus various non-rocket designs described below. However it is likely that new designs will come onto the market and will be included in the PoA.

Rocket stove design: Its principle features focus on achieving efficient fuel combustion at a high temperature by ensuring a good air draft into the fire, controlled use of fuel, complete combustion, and the efficient use of the resultant heat. Stoves using rocket principles can be very simple or complex. However, they all include the following design components: an L-shaped, insulated combustion chamber; a small fuel-feed opening to restrict the amount of fuel added to the stove at one time; and a small gap between the stove and cooking pot to improve heat transfer by forcing hot flue gases against the sides of the pot[3].

[2] For instance, in Uganda "the majority of the households (72.7%) use the three-stone method for cooking. The open charcoal stove is used by 14.8% of the households. Only 8.7% of the households use improved stoves" (EAC strategy to scale-up access to modern energy services. Uganda country report, EAC 2008). In Burundi and Kenya the most common system used for cooking is the traditional open fire (3-stone)" (EAC strategy to scale-up access to modern energy services. Kenya country report, EAC 2008.) (EAC strategy to scale-up access to modern energy services. Burundi country report, EAC 2008.) According to UNDP and WHO, "Access to ICS is even more limited in LDCs and Sub-Saharan Africa, where only 6%of people who use traditional biomass and coal for cooking has access to improved stoves" (The energy access situation in developing countries, WHO and UNDP 2009). This same study reports that the share of population relying on solid fuels for cooking with access to ICS is 5% for Uganda, 3% for Ethiopia, 1% for Tanzania, and 0% for Burundi.

[3] Technical description based on; USAID 2010. Fuel-efficient stove programs in humanitarian settings

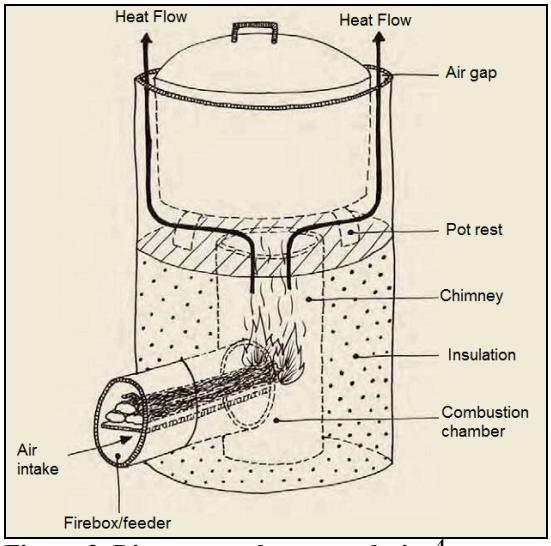


Figure 3. Diagram rocket stove design[4]

The following ICS are examples of stoves applying the rocket design:

Mud Stoves: These are made of local organic materials such clay/sand/mica/straw/grass/sawdust or agricultural waste. Typically the mixture is developed by mixing soil/clay with organic material to hold it together. Dung may also sometimes be added for additional adhesion of materials. The quality of the clay is an extremely important factor as "weak" clay will crack very fast and make the stove less efficient and undesirable to users. The clay can be mixed with animal dung or other organic materials such as groundnut shells, sugar cane, or rice husks to produce a mixture that will reduce cracking.

There are many models that vary in size, number of openings for pots, use of chimneys, use of pre-formed combustion chambers, etc. Once shaped, mud stoves are dried in the sun over time rather than fired in a kiln. Most mud stoves are fixed built-in stoves and they can serve both domestic and institutional users depending on the size of the stove. They normally use firewood, although charcoal can be used with the addition of a metal or ceramic grate.

[4] Adapted from a diagram by Peter Scott, http://www.hedon.info/GettingTechnologiesToTheMarket

Figure 4. Typical shielded fire stove

Figure 5. Rocket Lorena stove[5]

Ceramic stove: Similar to the mud stove, ceramic stoves are constructed with clay/soil combined with organic materials. The difference is that ceramic stoves are fired at high temperatures in a kiln for added durability. A ceramic lining/combustion chamber, which is sometimes covered with mud, improves its stability and insulation.

Figure 6. Maendeleo with metal cladding from Kenya[6]

Brick stove: Similar to the ceramic stove, brick stoves are constructed with bricks that have been previously fired at high temperatures in a kiln.

[5] Pictures of typical shielded stove and rocket lorena stove from Ministry of Energy and Mineral Development (MEMD), Uganda and German International Cooperation (GIZ), *Construction manual for firewood savings household stoves*, 2008

[6] http://stoves.bioenergylists.org/en/ingwegtzkenya

Figure 7. Institutional rocket stove made with bricks[7]

Figure 8. StoveTec prefabricated firewood stove

Prefabricated stoves: These are made of steel or other heavy metal or sheet metal (either new or scrap); sometimes with ceramic liners or grates. These stoves come in many models and sizes and are more expensive than mud or ceramic stoves, (usually three to ten times the cost), but are typically more durable. These stoves are normally purchased ready to use, and no assembly is required. They are usually produced in a factory location with a high level of oversight and quality control.

Non-rocket stove designs: These are ICS that have improved performance characteristics compared to traditional stoves but do not have the central L-shaped, insulated combustion chamber of the rocket stove design. They are typically, but not exclusively, charcoal-fuelled.

Figure 9. International Lifeline Fund, Uganda, locally manufactured charcoal stove

Figure 10. Envirofit CH 2200, charcoal stove

This categorisation of stoves is only indicative, and further research and development is expected to improve the rocket design, and completely new designs and models are likely to come onto the market

[7] Ministry of Energy and Mineral Development (MEMD) and German International Cooperation (GIZ), Construction manual for firewood savings institutional stoves, 2008

based on other technical principles such as wood fuel gasification etc. The stoves illustrated are only examples of stoves that may be disseminated under the PoA, however the use of these pictures does not represent any explicit intention of including these models under a CPA.

With the PoA's open access concept, allowing in principle both local manufacturers and importers of stoves to become part of the PoA, a wide variety of technology and design transfers may occur at the CPA level.

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

CPAs to be included under this PoA must meet the following requirements:

Nr.	Eligibility criteria description	Information requirement
1.	The CPA will be involved in the manufacturing, distribution and/or sales of ICS within the geographical region of the PoA	The following document shall be provided: • Contractual agreement between ICSEA Ltd and SO
2.	The CPA does not double-count any of its appliances for the ERs estimation	The following document shall be provided: • Contractual agreement between ICSEA Ltd and SO
3.	The ICS disseminated are high efficiency biomass fired cook stoves with a specified efficiency of at least 20%	The following document shall be provided: • Initial rating based on one of the tests for efficiency as determined in AMS-II.G./Version 03 clause 6
4.	The start date of the CPA shall not be before the commencement of validation of the PoA i.e. the 11/11/2010 on which the PoA-DD was published for global stakeholder consultation	The following document shall be provided: • Specific Sales Agreements
5.	The CPA complies with baselines and monitoring methodology requirements of AMS-II.G./Version 3	The following document shall be provided: • Completed due diligence questionnaire
6.	The CPA is additional as demonstrated in the additionality criteria in section E.5.2 . If the first approach is chosen one of the small scale additionality criteria has to be met. If the second approach is chosen the microscale eligibility has to be justified.	Any of the following evidences shall be provided (i) for first approach e.g. • production cost spreadsheet for financial barrier • technological description • Relevant information in SSC-CPA-DD following the additionality approaches set out in the PoA-DD. (ii) for second approach • evidence of country status • certified rating tests • Relevant information in SSC-CPA-DD following the relevant Guidelines for Demonstrating Additionality of Microscale Project Activities (Version

		03).
7.	The CPA organised a local stakeholder consultation and got environmental clearance of the project related activities	The following documents shall be provided: • Local Stakeholder Report including comments of stakeholders and how the comments were taken into account by the CPA implementer • Environmental clearance letter and/or EIA if requested by national regulations
8.	No public Official Development Assistance funding has been used for the implementation or operation of the CPA, which requires the purchase of CERs from this CPA	The following document shall be provided: • Confirmation Letter of No Diversion of ODA from CPA implementer
9.	The target group and distribution mechanism is defined.	Any of the following documents shall be provided: • Sales forecast • Marketing plan • description of technology (e.g. domestic or institutional stove)
10.	The SO agrees to support the sampling and survey activities of ICSEA Ltd.	The following document shall be provided: • Contractual agreement between ICSEA Ltd and SO
11.	The SO shall meet the limits for sales or installations for a specific CPA as provided by ICSEA Ltd to ensure that the small scale or microscale threshold criteria are met.	The following document shall be provided: • Contractual agreement between ICSEA Ltd and SO • Sales forecast
12.	The CPA is not a de-bundled component of another CPA or CDM project activity and follows the de-bundling criteria as described in A.4.4.1	The following evidence shall be provided: • Relevant information in CPA-DD as described in A.4.6 following the relevant de-bundling guidelines
13.	The CPA is validated in order to be included in ICSEA.	The following document shall be provided: • Inclusion Report
14.	The proposed CPA is a voluntary action by the SO	Any of the following documents shall be provided: • Contractual agreement • Published statement, vision or mission of the SO

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):

More than 84% of East African households rely on traditional biomass cooking methods[8], typically charcoal or firewood for urban dwellers, and firewood for rural households. The wood collected or harvested to fire the traditional stoves, or to respectively convert into charcoal for the same purpose, consists of a high percentage of non-renewable biomass in most East African countries. The prevailing cooking technology for charcoal users is the traditional metal charcoal stove, while the "three-stone" fire is the most frequently used technology by wood users. The substitution of traditional stoves with ICS saves fuel depending on the efficiency of the ICS. By reducing wood fuel consumption, the PoA is reducing anthropogenic GHG emissions.

According to the approved 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. Therefore the emission reductions are calculated based on the annual savings of non-renewable biomass multiplied by an emission factor to establish equivalence to such fossil fuel use.

The host countries have no national laws, policies or mandatory requirements stipulating the adoption of ICS by households. This proposed PoA is a voluntary action coordinated by Improved Cook Stoves for East Africa (ICSEA) Ltd, the CME. The target of this PoA to up-scale and standardize the use of ICS, which cannot be achieved without the use of carbon credit revenues as explained below.

Based on previous experience from other small-scale and governmental initiatives, the CME identified the barriers, and developed a strategy for the implementation of an ICS dissemination programme. The key challenges facing the SOs are:

- Training an optimum number of employees to reach further into rural areas
- Building manufacturing or importation capabilities
- Building up community awareness
- Making ICS more affordable and attractive
- Ensuring after-sales maintenance

To solve these challenges, SOs need either to train local people to manufacture ICS, supply ICS materials to local manufacturing units or invest in stocking imported ICS. Additionally, resources are required to develop awareness through demonstration fairs, radio advertisements, songs, and other mass advertising campaigns. In summary, improve the distribution channels for ICS. In some cases, it may involve providing credit for households to pay for the ICS in several instalments over time, or to provide guarantee, maintenance or carbon-revenue sharing incentives. Hence, a successful ICS project entails significant investment to cover the above-mentioned costs.

There is currently a very poor financial return associated with selling ICS in Africa, as the acceptable mass market price of an ICS can barely recoup the investment in material and labour costs – and the maintenance, dissemination and training materials or other fixed costs cannot be adequately covered. The uncertainty about the universal acceptance of ICS, together with the failure of previous ICS initiatives, increases the financial risks for investors. Moreover, the governments and private donors have shown limited interest in investing in similar programmes, due to the low return on investment of selling ICS, as well as country risks and other associated risks[9].

[8] Strategy on scaling up access to modern energy services. East Africa Community. http://www.eac.int/energy/index.php?option=com_docman&task=doc_download&gid=14&Itemid=70

[9] More information on additionality in section E.5.1.

Although there has been a considerable donor-funded effort to promote ICS over the past 20 years, the actual dissemination of ICS is low across Africa so far. In Uganda, only 8.7% of households use improved stoves.[10] It is reported from Kenya that only 4% efficient fuel wood stoves are employed countrywide.[11] The share of the population relying on solid fuels for cooking with access to ICS in 2007 was 1% for Tanzania and 0% for Burundi.[12]

In conclusion, an ICS programme at scale will not be implemented within the host countries in the absence of this PoA.

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

A.4.4.1. Operational and management plan:

Each authorised SO under this PoA will sign a standard contractual agreement with the CME to participate in the PoA as a CPA implementer in which the SO will commit itself to the following requirements:

- Those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA.
- The SO shall not assign a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA.
- As provided in A.4.2.1., the CPAs shall only sell specific ICS models/designs that have been tested and rated by organisations authorised by the CME.

During the sales of ICS, vendors shall complete Sales Agreements with the customers containing at least the following information:

Mandatory	Optional
- Name of customer - Address/location - Date of purchase - Serial number of the stove - Name of Supplier Organization	- Signature of buyer - Stove model - GPS coordinates (if applicable) - Purchase location (if applicable) - Phone number - Serial number (of the receipt) - Name of seller

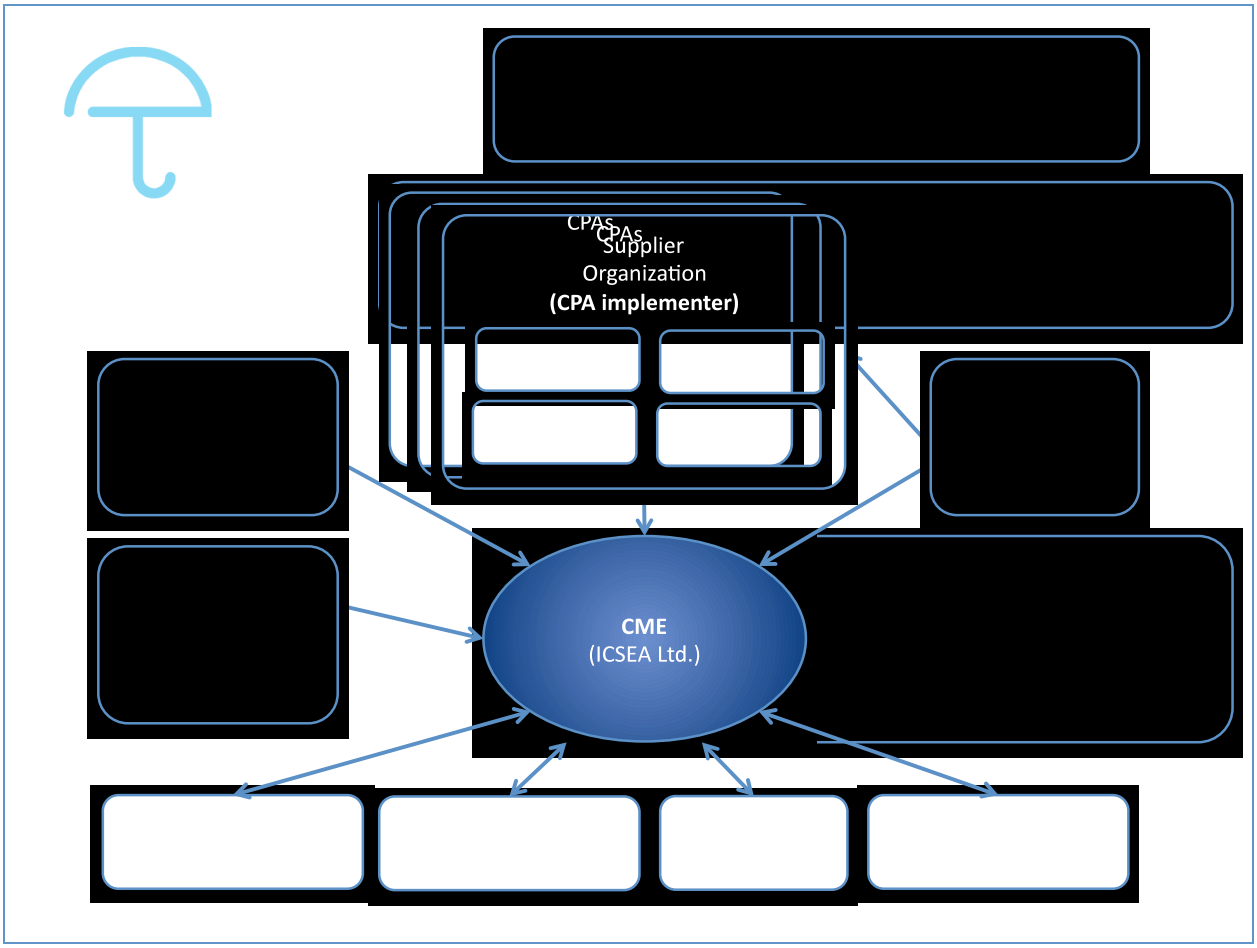
The mandatory items for the Sales Agreement are sufficient to estimate correctly the number of ERs corresponding to each CPA. For instance, the name of the customer and the address will be needed to track back the stove during monitoring, and the serial number of the ICS will identify the precise stove and its model. The date of purchase will show the CERs earned in the respective monitoring period. The rest of the information is optional to facilitate the monitoring and stove identification.

[10] Helio International: Energy Systems: Vulnerability-Adaptation-Resilience (VAR), 2009, Uganda

[11] Ashington Ngigi, EAC Strategy to Scale-Up Access to Modern Energy Services, Kenya country baseline report and workplan, 2008

[12] UNDP: The_Energy_Access_Situation_in_Developing_Countries, 2009

Sales Agreements from vendors will be gathered by the SO and transferred to an electronic record kept by the SO (the "Sales Record") and precisely assigned to its corresponding CPA. The Sales Agreements as well as the electronic records will be periodically delivered to the CME, which carries out or organises spot-visits, together with cross-checks on the SO materials and logistics records in order to confirm that the Sales Record is authentic. The Sales Record allows for the verification of the actual number of stoves sold, avoiding double-counting of emission reductions in the PoA by systematically analyzing each ICS sold and customer data. The contact point of the end user will be the SO and its network of vendors.



It is the responsibility of the CME to register the PoA. The CME prepares all the necessary documentation for validation to be passed to the DOE, including the Letters of Approval from the DNAs. The CME will also be responsible for organising the inclusion of CPAs, and the finalisation of the respective CPA-DDs.

The CME will organise the monitoring of the PoA through a field monitoring group(s) for usage surveys, and of the testing group(s) for the efficiency checks. The SOs will support the monitoring as required by the CME, but it is the CME that maintains the monitoring reports and makes them available for submission to the DOE for verification.

Finally the CME will be the focal point with the EB and will receive the CERs generated. The CERs will be assigned among their corresponding CPAs, and the respective SOs will each decide on their sale. The SOs may or may not handle the selling of their CERs themselves. In cases where the capacity of the SOs to sell the CERs is limited or they have decided otherwise, the CME may offer a sales service resulting in the transfer of CERs to the respective CERs buyers, and the resulting revenues to the SOs.

The CME operational management system will ensure that the following requirements are met:

(i) A record keeping system for each CPA under the PoA.
To identify each ICS participating in the PoA, all the ICS sold will have a unique serial number that will be recorded in the Sales Agreement at the moment of purchase. The Sales Agreement details will be transferred into the electronic records database of each SO where the CME will identify its corresponding CPAs, and the Sales Agreements will be kept by the CME for unique record-keeping. The serial numbers will be used to monitor the stove and determine the emission reductions for each CPA.

(ii) A system/procedure to avoid double accounting.
This will avoid the risk of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA. The electronic database will be used for double accounting checks to be performed. The unique serial number will avoid the same stove being counted twice in different CPAs in the PoA. The database will not allow two ICS to have the same serial number, and each serial number will belong to only one CPA. The SOs will be aware by their contractual agreement with the CME, that they must not distribute the same ICS under another PoA or CDM project activity. The SO must certify that the proposed CPA is not registered under another CDM project activity. Before submitting a new CPA for inclusion to a DOE, the CME will carry out a search in the UNFCCC CDM registry to ensure that the proposed CPA is not included in another registered PoA, or registered as a CDM project activity. Should such a case occur the CME will not include the CPA under the PoA. If the contractual agreement between the CME and the SO has been signed, the agreement will automatically terminate and the ER crediting operations of the SO will be suspended.

(iii) The CPA included in the PoA is not a de-bundled component of another CPA or CDM project activity.
As per the *Guidelines on assessment of de-bundling for SSC project activities, version 03* issued at the EB's 54th meeting, article 10 allows exemption from de-bundling check as follows: *"If each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity"*. ICS distributed under the PoA will be no larger than the 1% SSC threshold of the methodology that is 1.8 GWh/year. ICS are more likely to be 100 times under the 1% limit set for de-bundling, around 0.01 GWh[13] for domestic ICS. In the unlikely case that a CPA includes an ICS that goes beyond the 1% limit, the corresponding de-bundling check will be carried out at the CPA level.

[13] Calculation according to the parameters of the first CPA in Uganda considering a baseline consumption of 4.5 tonnes/year and that the ICS saves half the wood fuel.

(iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA.

The contractual agreement between the CME and the SO will ensure that those operating the CPA are aware of their involvement in the PoA. Each of the levels of ICS distribution will be informed of its involvement in the PoA and its registration as a CDM project.

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

The CME has the competencies to review and include CPAs in the PoA.

1. The Managing Director of ICSEA Ltd initially signs a Confidentiality & Non-Disclosure Agreement with each applicant Supplier Organisation (SO) whereby there is a mutual exchange of information about the PoA and the activities of the applicant SO. An initial review of the applicant's information is carried out by management team.
2. Once the CME team has positively reviewed the initial information provided by the applicant SO, a Memorandum of Understanding is signed between the parties whereby the CME management team undertakes a full due diligence assessment of the applicant, largely based on KYC (Know Your Client) principles. Shortcomings in the applicant's information and its proposed activities are communicated, and remedial actions are proposed, which the CME may mobilise support to rectify.
3. Once the due diligence assessment is positive, a Supplier Organisation Approval (SOA) is signed between the parties which sets out the mutual obligations of the CME and the applicant. The SOA carefully documents the way in which the PoA's CME will work with CPAs, and sets out both CDM and PoA requirements, and makes binding references to the PoA's Management Rules and the CME's Terms & Conditions of Business. Once the SOA is signed the Approved SO is at liberty to submit individual Proposed CPAs for inclusion.
4. Once a Proposed CPA is submitted to the CME by an Approved Supplier Organisation it is reviewed by the CME management team and, if found to be both satisfactory in terms of its compliance with the PoA-DD, the International Rules and the CME's Management Rules, an Inclusion Agreement is signed between the parties whereby the CME undertakes to submit the CPA to its validating DOE for inclusion into the PoA. The CME handles all issues raised by the DOE. The CME's Managing Director is the direct contact point for the CDM EB.

Managing Director

The Managing Director is responsible for the strategic management of the CME. This senior position requires appropriate management training, many years of experience in project management, in-depth CDM knowledge and experience of the East African region.

General Manager

The General Manager is a senior level position requiring a broad background in business management. The person will need a good knowledge of CDM procedures and carbon finance, and must be competent in all aspects of the CME's operations. The post requires significant project management experience in East Africa.

Monitoring Manager

The Monitoring Manager is a senior level position. The role requires excellent organisational, analytical and communication skills to ensure the compliance of CPAs with their obligations that will result in successful verifications of CPAs' emission reductions and sustainable

development outcomes. The post requires a good understanding of CDM procedures and experience in project monitoring.

(vi) ***Records of arrangements for training and capacity development for personnel.***
All CME staff will be provided with training organised either by ICSEA in-house staff, ICSEA Ltd.'s parent company (Uganda Carbon Bureau) or from external consultants as appropriate. The CME will provide training to the staff of the Supplier Organisations who are responsible for the operation of the CPAs to ensure their ability to comply with all aspects of the PoA's requirements.

(vii) ***Procedures for technical review of inclusion of CPAs.***
In accordance with the sequence of events described in *(v)* above, the CME will conduct a full technical review of each CPA prior to inclusion. This will involve ensuring that each CPA meets the required eligibility criteria for compliance with the approved methodology, the baseline, additionality, double counting avoidance and de-bundling. It will also ensure that the CPA complies with all the regulatory requirements of the host country(s).

(viii) ***Measures for continuous improvements of the PoA management system.***
The CME will periodically review the management system of the PoA to ensure that there is a continuous improvement in its efficiency using in-house and external resources as appropriate.

A.4.4.2. Monitoring plan:

The CME opts for a verification method that does not use overall sampling but verifies each CPA.

To ensure full transparency and to avoid double-counting, the verification method may treat all CPAs under each SO as a single population. Hence, the CPAs may be verified in groups or as single CPAs.

The CME will keep an electronic database of the data contained in all the Sales Agreements. Verification can be done using a statistically sound sample of each SO population. Verification of the PoA electronic database may be done by phone, post, email or physical visits to households as required, thus ensuring that the status of the verification can be determined for each CPA.

Monitoring of stoves usage, their continued efficiency, leakage and the fraction of non-renewable biomass used will be carried out periodically by the CME and/or by organisations authorised by the CME. The detailed monitoring plan and the parameters to be monitored are included in E.7.

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

Public funding is being provided by DFID as support for the process towards registration of the PoA e.g. validation cost, stove testing cost, study support.

The Nordic Climate Facility (NCF) is supporting the PoA with funding to establish the CME and to assist CPA candidates to get ready for their inclusion in the PoA. NCF was established to fund innovative climate change approaches. The NCF is financed by the Nordic Development Fund (NDF), which is the joint multilateral development finance institution of Denmark, Finland, Iceland, Norway and Sweden.

Official Development Assistance (ODA) is not being diverted to the implementation of the PoA as the United Kingdom, Denmark, Finland, Iceland, Norway or Sweden do not seek to purchase any credits from this PoA.

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

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

15/09/2012 or date of registration of the PoA whichever is later.

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

28 years

SECTION C. Environmental Analysis

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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 ✓

It has been decided to undertake the environmental analysis at the CPA level due to the differing circumstances of the SOs in relation to the manufacturing and the supplying of ICS. Furthermore, due to the multiple host country locations of the PoA, each CPA will need to comply with the respective host country environmental documentation requirements depending on which of them the CPA is operating in.

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

N/A, as this will be provided at the 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),:

N/A, as this will be provided at the CPA level

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 ✓

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

It has been decided to do the stakeholder consultation at the CPA level due to the different nature of the SOs in relation to the manufacturing and the supplying of ICS. Furthermore, due to the multiple host country locations of the PoA stakeholders may greatly vary in their comments.

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

N/A, as this will be provided at the CPA level

D.3. Summary of the comments received:

N/A, as this will be provided at the CPA level

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

N/A, as this will be provided at the CPA level

SECTION E. Application of a baseline and monitoring methodology

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

The small-scale project activity to be applied by CPAs included in this PoA is a Type II project: "Energy Efficiency Improvement Projects" and applies the small scale baseline and monitoring methodology 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:

The category "Type II – Energy efficiency improvement projects" is applicable according to the methodology AMS II.G, version 3, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" because the "category comprises small 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 biomass fired cook stoves or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers."

Non-renewable biomass has been used since 31 December 1989 as the FAO describes in its Global Forest Resources Assessment 2010 for each country in which it is shown that there has been a clear reduction of forest coverage since 1990[14].

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

[14] Use of non-renewable biomass can be demonstrated when there is a depletion of biomass stock in forests or a reduction of forest coverage, which means that there has been an unsustainable use of the biomass resources. In Uganda, according to Global Forest Resource Assessment 2010, biomass stock from forests (above-ground biomass) decreased from 287 million tonnes since 31 December 1989 to only 182.2 million tonnes in 2010. In Kenya it has decreased from 901.3 million tonnes to 817.1 million tonnes in the same period. A similar trend has been followed in Burundi, from 43.3 million tonnes to 28.4 million tonnes, In Rwanda for instance, the 698,660 ha of forest in 1990 had decreased to 545,000 ha. by 2005.

The gas included is carbon dioxide in the CPA-boundary that is the physical, geographical site of the ICS.

Source		Gas	Included?	Justification / Explanation
Baseline	Combustion of charcoal or firewood	CO_2	yes	Source of baseline emissions
		CH_4	no	Excluded for simplification
		N_2O	no	Excluded for simplification
Project Activity	Combustion of charcoal or firewood	CO_2	yes	Source of baseline emissions
		CH_4	no	Excluded for simplification
		N_2O	no	Excluded for simplification

The PoA will cover the dissemination of ICS over all the territories that are included in the registered PoA-DD's project boundary.

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

As per 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.

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:

Additionality is demonstrated at the PoA level. The typical CPA has to fulfil the key criteria of additionality as stipulated in chapter E.5.2. of this PoA-DD. The first additionality approach follows the "Guidelines on the demonstration of additionality of Small-Scale Project Activities (Version 09.0), EB 68 Annex 27.)". The second additionality approach follows the "Guidelines for Demonstrating Additionality of Microscale Project Activities (Version 04)".

It is worth noting that most of the countries covered by the PoA are located in LDCs. The barrier demonstration will respect paragraph 10, Annex 13 of EB 50, wherein barrier demonstration of additionality in LDCs is discussed.

First Approach

(a) Barrier Analysis
There are realistic and credible barriers that would prevent the implementation of the proposed project activity from being carried out if the project activity was not registered as a CDM activity:

(i) **Investment barriers**

A typical CPA will be implemented by a SO and will consist of the sale of ICS on a commercial or non-commercial basis, installation for applicable models (only for fixed built-in stoves) and after-sales service (e.g. guarantee). Thus, an SO needs to invest in the production or importation, marketing, distribution sales and after-sales service of the ICS. Once the true costs of the above are included in the retail price of an ICS, even the cost of locally produced (low-cost) ICS is unaffordable. The only initiatives that have achieved any success in sales have not originated from private investors: they have been subsidised by NGOs or donors for a limited period that limits the scope of dissemination and sustainability.

The funds to carry out these activities could not be borrowed from standard financial institutions, as the perceived risk would be too high for their lending criteria and the business model of the borrower would be operating at a loss.

The technology required to manufacture ICS is available to local producers in Africa or the ICS technology can be directly imported by local distributors. Market acceptance of ICS technology has been demonstrated through studies and experience. However, in all cases these technologies are available at a cost that is higher than the acceptable market price, which creates the need for external sources of finance.

(ii) Barriers due to prevailing practice

It is expected that switching to ICS will pose a smaller barrier than switching to technologies using other types of fuel, such as LPG and electricity. The cost of delivering the same amount of energy from LPG could be up to five times the cost of delivering it from an ICS for charcoal.[15] However, the use of traditional stoves still imposes a very strong adoption barrier, which could result in the continuation of the use of traditional cooking methods. Overcoming this "inertia" requires a significant amount of sensitisation, marketing, demonstration and personal recommendation, and the maintenance of the stoves over a sustained period.

According to the report from UNDP-WHO[16], concerning the energy access situation in developing countries, only 5% of the Ugandan population relying on solid fuels for cooking has access to ICS; in Burundi it is 0%.

Carbon finance can be used to fund these activities, which are required to shift the common practice from inefficient traditional stoves to ICS.

(iii) **Financial barriers at user level**

There is currently a very poor financial return associated with selling ICS in Africa, as the acceptable mass market price of an ICS can barely recoup the investment in material and labour costs – and the maintenance, dissemination and training materials or other fixed costs cannot be adequately covered. The uncertainty about the universal acceptance of ICS, together with the failure of previous ICS initiatives, increases the financial risks for investors. Moreover, the governments and private donors have shown limited interest in investing in similar programmes, due to the low return on investment of selling ICS, as well as country risks and other associated risks.

[15] Cost Benefit Analysis of Uganda (2007) by Habermehl for GTZ, chapter 9.6 Table showing annual amounts of fuel consumed and the annual costs of cooking.

[16] The energy access situation in developing countries, a review focusing on the least developed countries and sub-saharan Africa, UNDP, November 2009

Multiple analyses have shown that an acceptable market price for ICS is not sufficient to sustain the business of producing/importing, marketing, distributing and selling ICS to households currently using traditional biomass. For instance, a study from Columbia University in 2008 determined that an imported model of portable ICS for wood with high market acceptance in Uganda, would only become attractive to customers in the price range lower than 10 USD, while the unit cost in Ruhiira in western Uganda is closer to 20 USD.[17] Even the cost of locally produced ICS is in excess of the market range. For instance, the cost-to-date of each locally made ICS for the International Lifeline Fund's stove programme in northern Uganda has been higher than 20 USD for the different models. For these reasons, the majority of programmes that have achieved any success in sales have been subsidised by NGOs or donors, which is unfeasible for sustained dissemination on a large scale. The only case in East Africa of a stoves programme that is not being subsidised is the Ugastove Gold Standard project, which in fact uses carbon finance to achieve the largest sales of any current stoves programme in Uganda, and has been sustained by such funding for the past five years.

These case studies show that each SO requires external finance to achieve a realistic scale-up of ICS adoption for poor households.

Conclusion

The barriers set out here are significant enough to establish that a CPA meeting at least one of these barriers is additional. The criteria to assess if one of the barriers exists for a proposed CPA are described in E.5.2.

(b) As per paragraph 2 (c) of the Guidelines on the demonstration of additionality of Small-Scale Project Activities (Version 09.0)

CPAs that are solely composed of ICS where the users are households or communities or Small and Medium Enterprises (SMEs) and where each unit produces savings of no more than 9GWh are automatically additional

Second Approach

For CPAs compliant with the CDM rules on micro-scale additionality, the CPA's additionality can be demonstrated alternatively as follows: [18]

CPAs that aim to achieve energy savings at a scale of no more than 60 GWh of thermal energy per year are additional if one of the below two conditions is satisfied:
(a) The geographic location of the CPA is in one of the LDCs included in this PoA.
(b) Each of the ICS in the CPA achieves an estimated annual energy savings equal to or smaller than 1800 MWh, and the end users of the ICS are households/communities/SMEs.

[17] Edwin Adkins et al.,Field testing and survey evaluation of household biomass cookstoves in rural sub-Saharan Africa, in: Energy for Sustainable Development 14 (2010)

[18] EB 63 Report, Annex 23

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

Referring to the assessment and demonstration of additionality in section E.5.1, any one of the following criteria will be applied in order to assess the additionality of a CPA that is proposed to be included in the registered PoA:

First Approach

- Lack of access to capital due to the kind of business and risks associated in the region/country as demonstrated by bank letter or other third party information (investment barrier), or,
- The SO provides evidence that loans linked to expected carbon credits or ERPAs with advanced payment were granted as seed funding to overcome investment barriers until sufficient benefits from CERs will be generated[19] (investment barrier), or,
- The full cost of a domestic ICS at the retail point without carbon finance is higher than 10 USD. This cost is to include at least the cost of the manufactured appliance, the amortisation of capital investments of the SO, the amortisation of personnel training, expenditure in overcoming technological barriers (sensitisation, marketing, etc.), distribution and retailing margins, etc. (financial barrier at user level & barrier due to prevailing practise) or,
- In those cases where the criteria above are not met because the total cost of the appliance is lower than the deemed market value, the CPA can still demonstrate additionality if it is addressing a target market with a lower-cost appliance. For such cases, the criteria for assessment would be to demonstrate that the full cost of the appliance (including SO margins) is higher than the target retail price regarded as benchmark (financial barrier at user level).
- CPAs where each of the ICS in the CPA achieves an estimated annual energy savings equal to or smaller than 9000 MWh, and the end users of the ICS are households/communities/SMEs.

Second Approach

- CPAs that aim to achieve energy savings at a scale of no more than 60 GWh of thermal energy per year and the geographic location of the CPA is in one of the LDCs included in this PoA, or,
- CPAs that aim to achieve energy savings at a scale of no more than 60 GWh of thermal energy per year and each of the ICS in the CPA achieves an estimated annual energy savings equal to or smaller than 1800 MWh, and the end users of the ICS 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 includes the introduction of ICS. The stoves are small appliances for efficiency improvements in the thermal application of non-renewable biomass. It is assumed that in the absence of the project activity, in accordance with AMS-II.G version 3 in which, in Section 3, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.

[19] EB 50 Report, Annex 13

The baseline scenario in the countries of East Africa is described and discussed in footnote 2 in section A.4.2.1.

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

According to the applied methodology, emission reductions would be calculated as follows:

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

Where:

ER_y	Emission reductions during the year y in tCO2e
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted. The IPCC default for wood fuel, 0.015 TJ/tonne is applied
$EF_{projected\text{-}fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. As per methodology, a value of 81.6 tCO_2/TJ is employed.

$B_{y,savings}$ is calculated as follows:

$$B_{y,savings} = \sum_{j=1}^{n} \sum_{i=1}^{n} B_{y,\,savings,\,(i,\,j)}$$

Where:

i	Model of ICS which is a specified size of an ICS type or a group of sizes of an ICS type
j	Cohort for each model of ICS. A cohort is defined as the ICS model sold or gone through maintenance in the same year *y*
$B_{y,savings,(i,j)}$	Quantity of woody biomass that is saved in tonnes per model and cohort of ICS

$B_{y,savings,(i,j)}$ is calculated per model and cohort of ICS as the savings directly depend on the efficiencies of each model and cohort of ICS. The savings in woody biomass can be calculated in any of the following three approved options. The decision on which of the options to choose for each CPA will be taken at CPA level for each CPA.

Option 1:

$B_{y,savings,(i,j)} = B_{old,(i,j)} - B_{y,new(i,j)}$

Where:

$B_{old,(i,j)}$	Quantity of woody biomass used in the absence of the project activity in tonnes per model and cohort of ICS
$B_{y,new(i,j)}$	Annual quantity of woody biomass used during the project activity in tonnes, measures as per the Kitchen Performance Test (KPT) protocol. The KPT should be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the KPT procedures specified by the Partnership for Clean Indoor Air (PCIA).

$B_{y,new(i,j)}$ is determined equally to $B_{old(i,j)}$ but using $C_{y,fueltype,region,new,(i,j)}$ instead of $C_{y,fueltype,\ region,old}$.

Where:

$C_{y,fueltype,region,new,(i,j)}$	Annual consumption of woody biomass per appliance (tonnes/year) used during the project activity derived from a KPT per cohort and model of ICS.

Option 2:

This option compares the efficiency of the baseline stove against the efficiency of the ICS deployed.

$B_{y,savings,(i,j)} = B_{old,(i,j)} \cdot (1- \eta_{old,i}/ \eta_{new,(i,j)})$

Where:

$B_{,old,(i,j)}$	Quantity of woody biomass used in the absence of the project activity in tonnes per model and cohort of ICS
$\eta_{old,i}$	Efficiency of the baseline system/s being replaced, measured using representative sampling methods or based on referenced literature values (fraction), use weighted average values if more than one type of system is being replaced. A default value of 0.10 may be optionally used if the replaced system is three stone fire, or conventional system with no improved combustion air supply or flue gas ventilation system i.e., without a grate as well as a chimney; for other types of system a default value of 0.2 may be optionally used
$\eta_{new,(i,j)}$	Efficiency of the system being deployed as part do the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average calues if more than one type of system is being introduced by the project activity.

Option 3:

This approach has been approved by the EB[20] and substitutes the efficiency for the Specific Fuel Consumption with the result of the Controlled Cooking Test[21]:

$$B_{y,savings,(i,j)} = B_{old,(i,j)} \cdot (1- \frac{SC_{new,(i,j)}}{SC_{old,i}})$$

Where:

$B_{,(i,j)}$	Quantity of woody biomass used in the absence of the project activity in tonnes per model and cohort of ICS
$SC_{old,i}$	Specific Fuel Consumption of fuel consumption rate of the baseline system/s i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour, respectively. Use weighted average values if more than one type of system is being replaced
$SC_{new,(i,j)}$	Specific Fuel Consumption or the fuel consumption rate of the system/s deployed as part of the project per cohort and model of ICS i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour, respectively. Use

[20] F-CDM-SSCwg ver01 SSC_395, Clarification on Determination of Biomass Savings in AMS-II.G ver02

[21] Bailis, R., Controlled Cooking Test (CCT) Version 2.0, August 2004

weighted average values if more than one type of system is being introduced by the project activity

$B_{old,(i,j)}$ is determined using option (a) in the methodology; by calculating the product of the number of systems multiplied by the estimated average annual consumption of woody biomass per appliance (tonnes/year).

$$B_{old,(i,j)} = N_{(i,j)} \cdot C_{y,\,fueltype,\,region} \cdot L_{(i,j)}$$

Where:

$N_{(i,j)}$	Number of systems per cohort and model
$C_{y,fueltype,region,old}$	Estimate of average annual consumption of woody biomass per appliance (tonnes/year) derived from a survey of local usage
$L_{(i,j)}$	Leakage, the fraction by which emission reductions are multiplied to obtain an assessment adjusted for leakage risks

The number of systems ($N_{(i,j)}$) is determined as the fraction of days in a year in use for each ICS of the same model and cohort ($t_{fraction,y,(i,j)}$), by the fraction of these ICS to be still in use per cohort and model of ICS.

$$N_{(i,j)} = U_{(i,j)} \cdot \sum_{(i,j)=1}^{n} t_{fraction,\,y,\,(i,\,j)}$$

Where:

$U_{(i,j)}$	Usage, the fraction to adjust for drop off of ICS per cohort and model
$t_{fraction,y,(i,j)}$	Fraction of the days in use in year y of a single ICS deployed per cohort and model

When a CPA is included in this PoA the variables have to be determined or measured for the region included in the PoA and/or each model of ICS used as applicable.

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

Data / Parameter:	**$NCV_{biomass}$**
Data unit:	TJ/tonne
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data used:	IPCC default for wood fuel
Value applied:	0.015
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value that is provided in AMS II.G./Version 03
Any comment:	

Data / Parameter:	**$EF_{projected-fossilfuel}$**
Data unit:	tCO2/TJ
Description:	Emission factor for the substitution of non-renewable woody biomass by similar consumers.

Source of data used:	IPCC
Value applied:	81.6
Justification of the choice of data or description of measurement methods and procedures actually applied :	Stipulated in AMS II.G./Version 03 clause 5 page 2: The substitution fuel likely to be employed by users is applied.
Any comment:	

Data / Parameter:	$C_{y,fueltype,region,old}$
Data unit:	tonnes/year
Description:	Quantity of woody biomass used in the absence of the project activity in tonnes per type of ICS within a region.
Source of data used:	Historical data or a survey of local usage on regional level which could comprise a country
Value applied:	Variable, to be determined for each region and fuel type
Justification of the choice of data or description of measurement methods and procedures actually applied :	Estimate of average annual consumption of woody biomass per appliance (tonnes/year) derived from a survey of local usage or historical data. If data were obtained by survey the survey follows the representative sampling methods as described in clause 22 of AMS II.G./Version 03.
Any comment:	The same value may be applied by several CPAs provided the survey represents the same region and use of fuel type (e.g. domestic charcoal stoves for the same region).

Data to be reported if option 2 is chosen

Data / Parameter:	$\eta_{old,i}$
Data unit:	Fraction
Description:	Efficiency of the baseline appliance being replaced
Source of data used:	Representative sampling testing based on Water Boiling Tests or any other test approved by the UNFCCC, referenced literature or default values according to the methodology AMS II.G./Version 03
Value applied:	Variable, to be determined for each CPA
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value according to the methodology may apply, or results from testing in a laboratory may apply.
Any comment:	This parameter may or not may be reported according to the option selected at CPA level for the estimation of emission reductions.

Data to be reported if option 3 is chosen

Data / Parameter:	$SC_{old,i}$
Data unit:	g/kg
Description:	Parameter to calculate efficiency of ICS. Specific Fuel Consumption, reported in grams of fuel per kilogram of food cooked of the stoves being replaced

Source of data used:	Controlled Cooking Test CCT [22] or any other test approved by the UNFCCC
Value applied:	Variable
Justification of the choice of data or description of measurement methods and procedures actually applied :	Traditional stoves are tested by a laboratory according to the CCT protocol.
Any comment:	This parameter may or not may be reported according to the option selected at CPA level for the estimation of emission reductions.

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:	$f_{NRB,y}$
Data unit:	Fraction
Description:	Fraction of woody biomass saved by the project activity in the year y that can be established as non-renewable biomass
Source of data to be used:	FAO, national forestry agencies and environmental authorities
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Variable for each region or country.
Description of measurement methods and procedures to be applied:	The $f_{NRB,y}$ will be determined for each CPA based on the most recent national approved studies or African studies. Where available, a regional approach will be used to determine $f_{NRB,y}$. At least once a year the parameter will be monitored. By updating the value at least once a year, leakage b) is taken into consideration.
QA/QC procedures to be applied:	This factor will be monitored according to the monitoring plan, and updated when necessary. Cross check comparisons will be made against UNFCCC published default values, and any significant differences will be justified.
Any comment:	

Data to be reported if 1st option 1 is chosen

Data / Parameter:	$C_{y,fueltype,region,new,(i,j)}$
Data unit:	tonnes/year
Description:	Annual consumption of woody biomass per appliance (tonnes/year) used during the project activity derived from a KPT per cohort and model of ICS.
Source of data to be used:	Historical data or a KTP survey of local Usage on regional level which could comprise a country
Value of data applied for the purpose of calculating expected	Variable, to be determined for each region and fuel type per cohort and model of ICS.

[22] Bailis, R., Controlled Cooking Test (CCT) Version 2.0, August 2004

emission reductions in section B.5:	
Description of measurement methods and procedures to be applied:	Annual KPT survey at regional level of woody biomass consumption for the deployed systems. The survey follows the representative sampling methods as described in paragraph 18. of the AMS II.G
QA/QC procedures to be applied:	Test during monitoring will be performed by the CME and/or by an authorised organization designated by the CME.
Any comment:	This parameter may or may not be monitored according to the option selected at CPA level for the calculation of emission reductions.

Data to be reported if option 2 is chosen

Data / Parameter:	$\eta_{new,(i,j)}$
Data unit:	Fraction
Description:	Specified efficiency of the ICS being deployed as part of the project activity.
Source of data to be used:	Representative sampling testing based on Water Boiling Tests or any other test approved by the UNFCCC, or referenced literature
Value of data applied for the purpose of calculating expected emission reductions in section B.5:	Variable range, to be determined for each type ex ante and ex post. The specified efficiency of ICS may also change over the lifetime of the stove, normally decreasing over the time. Therefore the specified efficiency of a ICS is a range of values where its lower limit is an efficiency of 20% in comparison with $\eta_{old,i}$, and its higher limit is a 10% higher than the ex ante value presented in the CPA-DD.
Description of measurement methods and procedures to be applied:	ICS are tested by a laboratory according to the WBT or any other approved test ex ante and ex post as part of the monitoring. The ICS to be tested according to the monitoring plan will be randomly selected from the usage sample survey. Tests during monitoring will be performed by an authorised organization at least every two years.
QA/QC procedures to be applied:	Tests during monitoring will be performed by the CME and/or by an authorised organisation designated by the CME. Cross checks on the CME or authorised organisations will be made annually by comparisons of control stoves.
Any comment:	This parameter may or may not be monitored according to the option selected at CPA level for the calculation of emission reductions.

Data to be reported if option 3 is chosen

Data / Parameter:	$SC_{new,(i,j)}$
Data unit:	g/kg
Description:	Parameter to calculate efficiency of ICS. Specific Fuel Consumption, reported in grams of fuel per kilogram of food cooked of the stoves being deployed as part of the project activity.
Source of data to be used:	Controlled Cooking Test (CCT) or any other test approved by the UNFCCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Variable range, to be determined for each model ex ante and ex post. The specified efficiency of a group of ICS it is meant to change over the lifetime of the stove, normally decreasing over the time. Therefore the specified efficiency of an ICS is a range of values where its lower limit is an efficiency improvement of 20% in comparison with $SC_{old,i}$, and its higher limit is a 10% higher than the ex ante value presented in the CPA-DD.
Description of measurement methods	ICS are tested by a laboratory according to the CCT or any other approved test ex ante and ex post as part of the monitoring. The ICS to be tested according to the

and procedures to be applied:	monitoring plan will be randomly selected from the Usage sample survey.
QA/QC procedures to be applied:	Tests during monitoring will be performed by the CME and/or by an authorised organization designated by the CME
Any comment:	This parameter may or not may be monitored according to the option selected at CPA level for the calculation of emission reductions.

Data / Parameter:	$t_{fraction,(i,j)}$
Data unit:	Fraction of 365
Description:	Fraction of the days in use in year y of a single ICS deployed
Source of data to be used:	Derived from sales records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Variable for each CPA, forecast and small scale limit. The number of operational stoves each year will be summarised in a table and justified by comparing the efficiency savings of each stove to the small scale limit of savings of 180 GWh per year.
Description of measurement methods and procedures to be applied:	The SO keeps a paper and electronic record of the sales date, and the stove is considered to be in use from the commissioning date, which is the date on which the stove is put into use for the first time. This factor will be calculated daily through the electronic database.
QA/QC procedures to be applied:	Sales records will be scrutinised by the SO to avoid double-counting and the CME will also conduct spot-checks to verify the legitimacy of such records. On a monthly basis, SOs will verify the stoves put into use based on the ICS sales during the month through telephone surveys or physical inspection/verification or third party monitoring events. These monitoring events may include a record of one or a combination of the following activities or events: (a) customer inspections resulting from loan or hire purchase agreements (b) double verified records of community-based stove monitoring staff (c) independent monitoring verification exercises organised by the CME. This will provide the commissioning date, which is the date on which the stove is put into use for the first time and will be used as the start date for the computation of certified emission reductions. On a monthly basis, CPAs will send duplicate copies of sales agreements to ICSEA for verification of the data entered into the sales database. Telephone checks and spot checks will be used by the CME to review and authenticate the data in the sales database. An ICS not found to be in use will be suspended from the sales database until it is verified to be in use. If it is not found to be in use before the annual verification, it will not be included in the sales database and may be deleted and replaced with a new ICS. This data will also be used to determine the number of ICS installed in the CPA.
Any comment:	

Data / Parameter:	$U_{(i,j)}$
Data unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an assessment adjust for drop off of ICS in use per cohort year. A cohort is defined as the ICS

	model sold or gone through maintenance in the same year..
Source of data to be used:	Survey of ICS users per cohort using sampling methods.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Variable for CPAs. The value will be one as long as no data for drop off adjustment are available.
Description of measurement methods and procedures to be applied:	The SO keeps a paper and electronic record and a survey is done at least every two years in order to assess the ICS in operation. This factor addresses the leakage to be considered as per AMS II.G./Version 03 clause 14 if equipment currently being utilised is transferred from outside the boundary to the project activity.
QA/QC procedures to be applied:	Usage monitoring will be performed by the CME and/or by an authorised organisation designated by the CME following the sampling plan. In all cases cross-checking procedures appropriate to the monitoring choice will be undertaken.
Any comment:	

Data / Parameter:	$L_{(i,j)}$
Data unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an assessment adjusted for leakage risks
Source of data to be used:	Official data per host country or default value as per methodology
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Variable for CPAs. The value will be 0.95 as long as no data for leakage adjustment are available.
Description of measurement methods and procedures to be applied:	As per AMS II.G./Version 03 clause 23 (a) if non-renewable woody biomass saved under the project activity that is then used as the baseline of other CDM project activities, then B_{old} is adjusted to account for the quantified leakage. If the CPA increases NRB significantly, the next CPA and indeed the same activity, should operate under a reduced NRB fraction. This risk is addressed by re-appraisal of the NRB fraction every year. The fNRB will be adjusted when official statistical data is available. This increase of use of NRB should be adjusted by population growth and be accounted for as leakage. If this data is not available, then the adjustment will be calculated through the reduction of B_{old} to the fNRB formula calculations. As per AMS II.G./Version 03 clause 23 (b) if the CPA provides evidence that outside the project boundary the use of non-renewable energy sources have not been used increasingly during the Monitoring Period, then there is no leakage (leakage factor is 1). Official data on energy use may be used to demonstrate that outside the project boundary renewable energy sources have not been used decreasingly. According to AMS II.G./Version 03 clause 23 (c) as an alternative to adjustments in (a) and (b), a net to gross adjustment factor of 0.95 can be used to account for these

	leakages, in which case surveys are not required.
QA/QC procedures to be applied:	Survey follows sampling guidelines
Any comment:	

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

The monitoring plan describes how to collect, assess and archive all relevant data to be monitored according to the methodology. Data from the monitoring procedures will be recorded in the electronic project database and summarized in the Monitoring Report. The data collection that will follow the " Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities (Version 02.0)"[23], will comply with the requirements for the verification stated in A.4.4.2 of transparency and double-counting avoidance, and will check the required parameters in the methodology AMS II.G./Version 03 in an unbiased and reliable way.

The monitoring plan consists of:

- Monitoring concept
- Monitoring requirements and procedures for replacement of traditional stoves
- Monitoring requirements and procedures for efficiency of ICS
- Requirement for annual consumption of woody biomass
- Monitoring requirements and procedures for leakages
- Data collection
- Data archiving
- Training
- Quality Assurance/Quality Control Procedures
- Monitoring Report
- Monitoring responsibilities

Monitoring concept

The CME will be responsible for the collection of all Sales Agreement data, for internally verifying the information in the Sales Agreements, and creation of the Monitoring Report at the end of each Monitoring Period. The SO will be responsible for data entry into the Sales Records and will submit it to the CME for screening and for ensuring that the information in the Sales Agreements is complete and correct. The total amount of Sales Agreements will reveal the quantity of stove sold at the end of a Monitoring Period. The electronic database will record the start and end dates of each selling year y for each ICS (t fraction), and calculate the emission reductions attributable to each Monitoring Period. Appropriate record keeping procedures will be implemented to ensure that each Monitoring Period dataset can be transparently attributed to its corresponding CPA, preventing any occurrences of double-counting. Hence, the project database will keep records on the current status of each CPA—the duration of previous Monitoring Periods, the household surveys, and verification activities. The monitoring sampling will be tracked through the PoA's electronic database that consolidates the Sales Records from all CPAs.

In order to account for drop-off in use (U)[24], the ICS deployed by the SO will be monitored through a census[25] and/or a usage survey. A census and/or a representative sample will be selected to count for drop-off or disposal of ICS. Sampling size will be chosen to achieve a 90/10 precision when annual sampling is chosen or 95/5 precision if it is biennial. In cases where survey results indicate that the precision level is not achieved the lower bound of the confidence interval may be chosen instead of

[23] EB 65 Report, Annex 2

[24] AMS II.G./Version 03 clause 16

[25] See Annex 4

repeating the survey effort. In order to avoid this situation, oversampling will be encouraged. In cases where a SO chooses the option of a census for monitoring purposes, monitoring may include a record of one or a combination of the following activities or events:
(a) an annual maintenance/repair event
(b) customer inspections resulting from loan or hire purchase agreements
(c) double verified records of community-based stove monitoring staff
(d) independent monitoring verification exercises organised by the CME.

In general, a cohort is defined as the year that an ICS model is sold in or gone through maintenance in the same year.
Cohorts of ICS that are older than the expected normal lifetime of the ICS may or may not be included in the monitoring, and accordingly regarded in the calculation of emission reductions. A decision to cut off older cohorts will depend on the guarantee and maintenance policy adopted by the SO and will be decided by the CME.

Concerning the sampling of ICS for the efficiency[26] check[27], ICS will be grouped according to exclusive and exhaustive characteristics that significantly affect the ICS's lifetime, such as final user size (domestic/institutional) and type (fixed built-in/transportable) and cohort/age. The sample to be selected from each stratum will follow the required precision or the lower bound of the confidence interval and the necessary sampling requirements[28]. In cases where different SOs are distributing the same model of ICS manufactured by the same organisation, and it can be safely assumed a similar lifetime according to similar guarantee and maintenance policies, the CME may or may not decide to cluster the ICS of different SOs into the same cohort, safeguarding the transparency of being able to attribute each ICS according to its CPA.

Requirements for replacement of traditional stoves
Monitoring shall ensure that either the replaced low efficiency appliances are disposed of and not used within the boundary or within the region, or if baseline stoves continue to be used, that wood fuel consumption of those stoves is excluded from calculations.

Monitoring procedures
It will be checked if replaced low efficiency appliances have been dismantled and are no longer in use by the households or any other households within the project boundary, or if baseline appliances are still in use, then monitoring will ensure that fuel wood consumed by these stoves is excluded from the B_{old} calculation.

During usage surveys, if evidence of use of traditional cooking appliances is found in households that have purchased an ICS the following criteria will be taken into consideration for adjustment:

1. If the use of traditional appliances is only during peak cooking needs (e.g. for celebrations) then it can be assumed that there is no adjustment needed because the baseline studies will be performed in households during normal cooking conditions and data from peak cooking will be removed from B_{old} calculations.

[26] See Annex 4

[27] AMS II.G./Version 03 clause 15

[28] EB 65 Report, Annex 2

2. If the household size is larger than can be reasonably assumed to be satisfied by the ICS in question (e.g. a small ICS for a household of 4 is used in a household of 8 together with a traditional stove) then it can be assumed that the ICS is being fully utilized and no adjustment should be applied.
3. If the ICS ownership has been transferred (e.g. sales or gifts) and the ICS can be found to be still in use, no adjustment is needed.
4. If none of the above cases is true, then adjustment for that household will be estimated on the basis of an interview to conservatively estimate the fraction of time in which the ICS is in use. The total adjustment for that CPA will hence be based on the sampling and statistics described in the monitoring concept and its annexes.

Requirements for efficiency of ICS
A check of efficiency of a representative sample will be carried out annually or at least every two years to test the efficiency of the ICS in use. The WBT or any other appropriate test will be used for this purpose. Tests during monitoring will be performed by the CME and/or by an authorised organization designated by the CME.

Monitoring procedures
The parameter for efficiency, the efficiency (η_{new}) or the specific fuel consumption of deployed ICS (SC_{new}), will be tested at least every two years by the CME and/or by an authorised organization designated by the CME. Tests on η_{new} or SC_{new} for the Monitoring Report will be carried out on stoves selected from the usage survey. It will be permissible to reduce the number of tests by first testing the oldest cohort, and then deciding whether or not a test of younger stoves is necessary. If stoves of a certain cohort are found to achieve a certain performance level, a conservative estimation may be applied to younger stoves if this is preferred to conducting further tests.

Requirement for annual consumption of woody biomass
If option 1 is selected to estimate the quantity of fuel saved, the annual consumption of woody biomass of the appliances deployed will be monitored annually with Kitchen Performance Tests (KPT) following a 90/10 precision and the necessary sampling requirements[29].

Requirements for leakages
According to AMS II.G./Version 03, the following sources of leakage have to be assessed:

a) The use/diversion of non-renewable biomass saved under the project activity by non-project households/users who previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable biomass used by the non-project households/users, that is attributable to the project activity then B_{old} is adjusted to account for the quantified leakage.

b) Use of non-renewable biomass saved under the project activity to justify the baseline of other CDM project activities can also be a potential source of leakage. If this leakage assessment quantifies a portion of non-renewable biomass saved under the project activity that is then used as the baseline of another CDM project activities then B_{old} is adjusted to account for the quantified leakage.

c) Increase in the use of non-renewable biomass outside the project boundary to create non-renewable biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non-renewable biomass

[29] EB 65 Report, Annex 2

outside the project boundary then B_{old} is adjusted to account for the quantifiable leakage.

Monitoring procedures
Regarding leakage a), if non-renewable woody biomass saved under the project activity that is then used as the baseline of other CDM project activities, then B_{old} is adjusted to account for the quantified leakage. Alternatively, according to AMS II.G. para 13 (a) the default net to gross adjustment factor of 0.95 is applied to account for leakage.

Regarding leakage b) if the CPA increases NRB significantly, the next CPA and indeed the same activity, should operate under a reduced NRB fraction. This risk is addressed by re-appraisal of the NRB fraction every year. The fNRB will be adjusted when official statistical data is available. This increase of use of NRB should be adjusted by population growth and be accounted for as leakage. If this data is not available, then the adjustment will be calculated through the reduction of B_{old} to the fNRB formula calculations.

For leakage c),if the CPA provides evidence that outside the project boundary the use of non-renewable energy sources have not been used increasingly during the Monitoring Period, then there is no leakage (leakage factor is 1). Official data on energy use may be used to demonstrate that outside the project boundary renewable energy sources have not been used decreasingly. Otherwise B_{old} will be adjusted for leakage according to the result of conducted surveys or official data. The monitoring would include surveys of the amount of non-renewable woody biomass saved under the project activities that is used outside the project boundaries where previously renewable energy sources were used. Surveys with 90/30 precision will be conducted for this purpose.

As an alternative to adjustments in b) and c), a net to gross adjustment factor of 0.95 can be used to account for these leakages, in which case surveys are not required .

Data collection
The CME will collect the data necessary for the monitoring and for the emission reductions calculation. Data will be managed through an electronic database that can directly attribute the data to the CPA, thereby allowing unambiguous determination of the emission reductions attributable to each CPA.

Data archiving
Sales Agreements will be stored by the CME. A back-up of the project database will also be stored on an electric medium by the CME. All data monitored and required for verification and issuance will be kept for at least two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

Training
The CME will provide the necessary training to the SOs and the parties involved in the monitoring to ensure that the data recorded is complete and accurate. This monitoring training will be provided by the CME to the SOs before the inclusion of their CPAs, and also to the monitoring and testing groups before the Monitoring Period exercises start.

Quality Assurance/Quality Control Procedures
Different quality control and quality assurance measures will be put in place by the CME to ensure that all emission reductions are real. Surveys and testing will be carried out and the CME will check the consistency of the results. The CME, through its monitoring manager, will ensure that the studies are accurate and that a conservative approach has been taken.

Sales records will be scrutinized by the SO to avoid double-counting and the CME will also conduct spot-checks to verify the legitimacy of such records. Sales Agreements will be checked at three levels, by the vendor, the SO and the CME, and missing or wrong data will be corrected wherever possible. In cases where it is not possible, any mandatory missing data will automatically invalidate that ICS and the *t fraction* will be counted as zero resulting in no emission reductions being generated by that appliance. Wrong data entered in the Sales Agreement that lead to an inability to track ICS during monitoring will result in a lower usage rate. However in cases where the ICS can be traced, and missing information can be corrected, the new data will be updated in the Sales Agreement and the electronic Sales Record.

Monitoring Report

The CME will assess all monitoring data and produce a Monitoring Report corresponding to the preceding Monitoring Period of the required sample of CPAs for the DOE to verify. This report will present the data relating to the emission reductions generated by CPAs during the Monitoring Period. The Monitoring Report will also include, as required by the sampling plan:

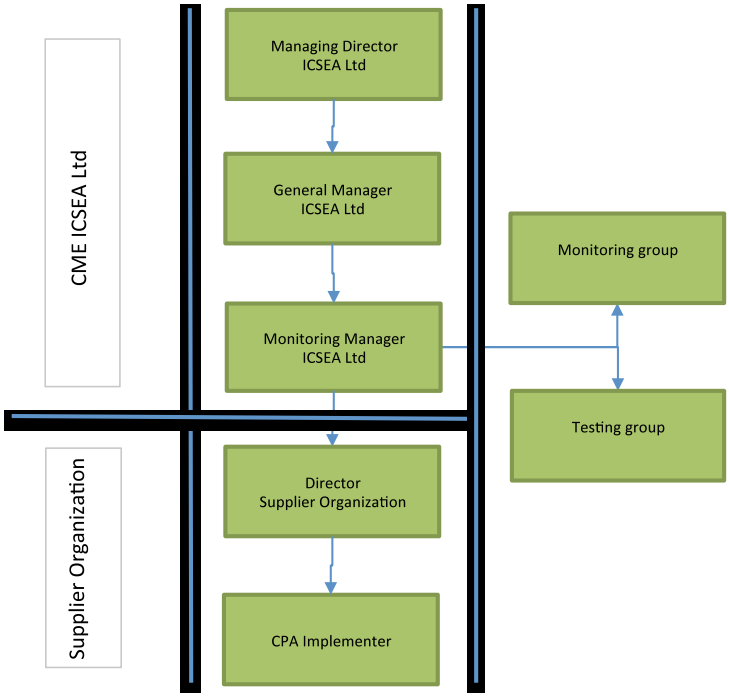
1. Unbiased and reliable estimates of the mean value of parameters used in the calculation of greenhouse gas emission reductions.
2. Necessary precision of estimated parameters if required, or the lower bound of the confidence interval and the necessary sampling requirements.
3. Formulas used in calculating and reporting parameters.

Generally, the Monitoring Report will use the current CDM Monitoring Report Form and follow the current "Guidelines for completing the Monitoring Report Form".

Monitoring Responsibilities

The CME is in charge of supervising all the monitoring activities through its general manager and managing director, but it is the monitoring manager who will have the direct responsibility for all the monitoring activities, including data collection, data monitoring, and writing the Monitoring Report. The SOs and their CPAs will support the CME in all the monitoring activities by collecting the Sales Agreements and facilitating the tracking of the ICS and helping the monitoring and testing groups. The monitoring and testing groups will conduct their respective studies for monitoring the required parameters, but the final responsibility for the data contained in the Monitoring Report belongs to the CME.

Monitoring Organization Chart



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)

Date of completion:
21/04/2011

Name of the responsible persons and entity:
Georg Zenk
Igor Markov
Carlos Guerrero Lucendo
Sebastian Randig
Uganda Carbon Bureau Ltd
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Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Official Development Assistance (ODA) is not being diverted to the implementation of the PoA as the United Kingdom, Denmark, Finland, Iceland, Norway or Sweden do not seek to purchase any credits from this PoA.

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION

SAMPLING PLAN[30] DROP OFF CHECK

Any one of the following two approaches may be used based on an analysis of the estimated monitoring costs and benefits associated with each approach-monitoring costs for the 2 approaches are expected to vary depending on the geographical coverage of the CPA and the comprehensiveness of the CPA's existing monitoring/tracking system. The census approach also allows ease of substitution for ICS that are proven to have dropped out:

Approach 1: Census

A census of all ICS in use obtained through the monitoring of records in the CPA's database. The database will be continually updated with the following events:
(a) an annual maintenance/repair event
(b) customer inspections resulting from loan or hire purchase agreements
(c) double verified records of community-based stove monitoring staff
(d) independent monitoring verification exercises organised by the CME.

Approach 2: Sampling

SAMPLING DESIGN

Since this is a multi-country POA, the CPAs admitted to the POA may choose in advance a suitable sampling plan from one of the following 4 options based on the estimated monitoring costs associated with each option-monitoring costs for the 4 options are expected to vary depending on the geographical coverage of the CPA and the CPA's existing monitoring/tracking system in addition to the envisaged risks and benefits of each option:

OPTION 1: ANNUAL INSPECTION PER CPA[31]

Objectives and reliability requirements

[30] According to appendix 3 of the Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities (Version 02.0), EB 65 Report, Annex 2; equations were obtained from "Best Practices Examples Focusing on Sample Size and Reliability Calculations", EB 67 Annex 6

[31] This implies either conducting a census or selecting a random sample for each CPA independently according to the sampling plan

The objective is to estimate the proportion of project improved cook stoves (ICS) that are still in operation/use at the end of each year. AMS II.G./Version 03 will be applied. The overall objective is to estimate the annual emission reductions during the year y in tCO_2e during the crediting period, and with 90/10 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPA at the end of the year. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database.

The data to be collected on each sampling unit (ICS) is whether it is in use or not.

Sampling method

Simple random sampling will be used. A number of ICS will be sampled using simple random sampling with the aid of a computerised randomiser. The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame.

Sample size

The required sample size will be determined using simple random sampling.

The equation for estimating the sample size is:

$$n \geq \frac{1.645^2 NV}{(N-1)X0.1^2 + 1.645^2 V}$$

Where $V = \frac{p(1-p)}{p^2}$ and p is the expected proportion

n Sample size

N Population total

p Our expected proportion

1.645 Represents the 90% confidence required

0.1 Represents the 10% relative precision

The minimum sample sizes for the different scenarios required to meet the confidence and precision requirements are calculated in a sample size computation spreadsheet.[32]

[32] Sample size calculation spreadsheet provided to the DOE

Summary results for different populations are found in the following table for an assumed 50% of cook stoves still in use[33]:

Population size	Calculated minimum sample size	Adjusted sample size according to response rate of 80%
1,000	214	268
2,000	239	299
3,000	249	312
4,000	254	318
5,000	257	322
6,000	259	324
7,000	261	327
8,000	262	328
9,000	263	329
10,000	264	330
11,000	265	332
12,000	265	332
13,250	266	333
14,000	266	333

Sampling frame

The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame.

[33] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

OPTION 2: ANNUAL INSPECTION OF A RANDOM SAMPLE OF CPAS FROM EACH SUPPLIER ORGANISATION (SO)

Objectives and reliability requirements

The objective is to estimate the proportion of project improved cook stoves (ICS) that are still in operation/use at the end of each year. AMS II.G./Version 03 will be applied. The overall objective is to estimate the annual emission reductions during the year y in tCO_2e during the crediting period, and with 95/10 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPAs classified by Supplier Organisation at the end of the year. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database.

The data to be collected on each sampling unit (ICS) is whether it is in use or not.

Sampling method

Multistage sampling will be used. A number of ICS within the selected CPAs belonging to each Supplier organisation will be sampled using simple random sampling with the aid of a computerised randomiser. The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame.

Sample Size

The required sample size will be determined using multistage sampling.

The equation for the number of clusters (CPAs) to be sampled is:

$$C \geq \frac{\frac{SD_b^2}{p^2} X \frac{\bar{u}}{M-1} + \frac{1}{\bar{u}} X \frac{SD_w^2}{p^2} X \frac{(\bar{N}-\bar{u})}{(\bar{N}-1)}}{\frac{0.1^2}{1.96^2} + \frac{1}{M-1}\frac{SD_b^2}{p^2}}$$

Where:

C	Number of groups/clusters/CPAs that should be sampled
M	The total number of clusters (CPAs) in the population
$\bar{u}$	Number of (ICS/households) to be sampled within each cluster (CPA)
$\bar{N}$	Average units (ICS/households) per cluster (CPA)
SD_b^2	Variance between clusters (CPA)
SD_w^2	Average within cluster (CPA) variation
p	Overall proportion of ICS in use
1.96	Represents the 95% confidence required
0.1	Represents the 10% relative precision
$\bar{p}$	Is the average proportion of ICS

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet [34].

Summary results for different possible numbers of CPAs are found in the following table for an assumed 80% of cook stoves in use: [35]

Number of ICS to be sampled from each CPA	Number of CPAs to Sample	Total sample size
1	96	96
5	21	105
10	11	110
15	8	120
20	6	120
25	6	150
30	5	150
35	4	140
40	4	160

Sampling frame

The PoA database of stove and user information and their corresponding CPAs classified by Supplier Organisation established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame. The stoves in the PoA database will be classified by Supplier Organisation by CPA for sampling purposes.

[34] provided to the DOE

[35] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

OPTION 3: BIENNIAL INSPECTION PER CPA

Objectives and reliability requirements

The objective is to estimate the proportion of project improved cook stoves (ICS) that are still in operation/use at the end of each year. AMS II.G./Version 03 will be applied. The overall objective is to estimate the annual emission reductions during the year y in tCO_2e during the crediting period, and with 95/5 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPA at the end of the year. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database.

The data to be collected on each sampling unit (ICS) is whether it is in use or not.

Sampling method

Simple random sampling will be used. A number of ICS will be sampled using simple random sampling with the aid of a computerised randomiser. The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame.

Sample size

The required sample size will be determined using simple random sampling.

The equation for estimating the sample size is:

$$n \geq \frac{1.96^2 NV}{(N-1)X0.05^2 + 1.96^2 V}$$

Where $V = \frac{p(1-p)}{p^2}$ and p is the expected proportion

n Sample size

N Population total

p Our expected proportion

1.96 Represents the 95% confidence required

0.05 Represents the 5% relative precision

The minimum sample sizes-for the different scenarios-required to the meet the confidence and precision requirements are calculated in a computation spreadsheet[36].

Summary results for different populations are found in the following table for an assumed 50% of cook stoves still in use[37]:

Population size	Calculated minimum sample size	Adjusted sample size according to response rate of 80%
1,000	607	759
2,000	870	1088
3,000	1017	1272
4,000	1111	1389
5,000	1176	1470
6,000	1224	1530
7,000	1261	1577
8,000	1290	1613
9,000	1313	1642
10,000	1333	1667
11,000	1349	1687
12,000	1363	1704
13,250	1378	1723
14,000	1385	1732

Sampling frame

The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame.

[36] Sample size calculation spreadsheet provided to the DOE

[37] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

OPTION 4: ANNUAL INSPECTION OF A RANDOM SAMPLE OF CPAS FROM CPAS USING THE SAME ICS MODEL

Objectives and reliability requirements

The objective is to estimate the proportion of project improved cook stoves (ICS) that are still in operation/use at the end of each year. AMS II.G./Version 03 will be applied. The overall objective is to estimate the annual emission reductions during the year y in tCO_2e during the crediting period, and with 95/10 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPAs classified by Stove Model at the end of the year. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database.

The data to be collected on each sampling unit (ICS) is whether it is in use or not.

Sampling method

Multistage sampling will be used. A number of ICS within the selected CPAs deploying the same stove model will be sampled using simple random sampling with the aid of a computerised randomiser. The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame.

Sample size

The required sample size will be determined using multistage sampling.

The equation for the number of clusters (CPAs) to be sampled is:

$$C \geq \frac{\frac{SD_b^2}{p^2} X \frac{\bar{u}}{M-1} + \frac{1}{\bar{u}} X \frac{SD_w^2}{p^2} X \frac{(\bar{N}-\bar{u})}{(\bar{N}-1)}}{\frac{0.1^2}{1.96^2} + \frac{1}{M-1}\frac{SD_b^2}{p^2}}$$

Where:

C	Number of groups/clusters/CPAs that should be sampled
M	The total number of clusters (CPAs) in the population
$\bar{u}$	Number of (ICS/households) to be sampled within each cluster (CPA)
$\bar{N}$	Average units (ICS/households) per cluster (CPA)
SD_b^2	Variance between clusters (CPA)
SD_w^2	Average within cluster (CPA) variation
p	Overall proportion of ICS in use
1.96	Represents the 95% confidence required
0.1	Represents the 10% relative precision
$\bar{p}$	Is the average proportion of ICS

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet [38].

Summary results for different possible numbers of CPAs are found in the following table for an assumed 80% of cook stoves in use: [39]

Number of ICS to be sampled from each CPA	Number of CPAs to Sample	Total sample size
1	96	96
5	21	105
10	11	110
15	8	120
20	6	120
25	6	150
30	5	150
35	4	140
40	4	160

Sampling frame

The PoA database of stove and user information and their corresponding CPAs classified by Supplier Organisation established through the Sales Agreements and subsequently updated on a continuous basis will be used as the sampling frame. The stoves in the PoA database will be classified by Stove Model by CPA for sampling purposes.

[38] provided to the DOE

[39] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

DATA

Field measurements

The main variable that will be measured by the usage survey is the proportion of ICS in use. Monitoring surveys will be conducted to determine and validate the proportion of ICS in use.

Quality assurance/quality control

A team of research assistants and supervisors for the usage survey will be recruited and trained in all aspects of sampling, data collection and interviewing by the CME or a CME-appointed agent. The training will involve both theoretical and practical aspects to ensure that all the research assistants are competent to collect the desired data. Data collection protocols will be prepared and given to the research assistants and supervisors to guide them during the data collection exercise. In addition, there will be a supervisor from the CME head office. Mobile devices, for instance mobile phones and other devices, will be used to electronically send data to the central database at the CME head office. The updating of the PoA's central database will be strictly monitored with several permission levels and passwords. In cases where the use of mobile devices is impossible, paper copies of questionnaires will be used to collect data about the usage of ICS from the selected sample.

The data collection protocols prepared for the research assistants will include the procedures for handling cases of non-response (refusals, not-at-home, out-of-population cases and related cases). A variable will be included to capture the results of interviews with the following 4 options: responded, out-of-population, refused, not-at-home. The protocols will also include the roles and responsibilities of the research assistants and supervisor. In addition, the definition of each of the study variables, mode of data collection and recording will be highlighted in the data collection protocol.

In case of non-response as a result of respondents not being at home, there will be at least 3 callbacks. Oversampling will also be undertaken to take care of non-response.

In addition, supplier organisations will be trained in all aspects of data collection and recording, especially using mobile devices and other relevant technologies, for the continuous updating and monitoring of data in the PoA's central database.

Since the main parameter in the usage survey is the proportion of ICS in use, no outlier data/measurements are expected. However, check programmes will be prepared to automatically reject data that is defective and will automatically notify the research assistant that the data is defective for immediate verification, rectification or callback.

Analysis

The data obtained from the selected households owning the ICS will be further cleaned and validated for accuracy and analysed by the CME's Monitoring Manager. All the sales data and the usage survey data will be captured in a computerised database. The analysis will include computation of the proportion of ICS in use, frequencies of the other study variables and the computation of variables necessary for the estimation of emission reductions according to AMS II.G/Version 03. The results will be summarised using the pre-specified level of confidence. The precision of the estimates (proportion of ICS in use) will be checked to ensure that the estimate is within the pre-specified reliability precision. The reliability of the estimates will be checked by computing and evaluating the standard error of the proportion to establish whether it is within the permissible limits.

IMPLEMENTATION

Implementation Plan

The Monitoring Manager will be responsible for data collection and data analysis. The Monitoring Manager has experience in sampling and surveys.
The schedule for implementing the sampling will be set out by the Monitoring Manager.

SAMPLING PLAN[40] EFFICIENCY CHECK

SAMPLING DESIGN

Since this is a multi-country POA, the CPAs admitted to the POA may choose in advance a suitable sampling plan from one of the following 4 options based on the estimated monitoring costs associated with each option-monitoring costs for the 4 options are expected to vary depending on the geographical coverage of the CPA and the CPA's existing monitoring/tracking system in addition to the envisaged risks and benefits of each option:

OPTION 1: ANNUAL INSPECTION PER CPA

Objectives and reliability requirements

The objective is to estimate the mean thermal efficiency of the project improved cook stoves (ICS) with 90/10 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPA at the end of the year that are in use. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database. The total number of cook stoves that are in use will be identified through either one or a combination of the following activities that will be stored in the monitoring database: The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

The data to be collected on each sampling unit (ICS) is its thermal efficiency.

Sampling method

Simple random sampling will be used. A number of ICS in each cohort will be sampled using simple random sampling with the aid of a computerised randomiser. The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-

[40] According to appendix 3 of the Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities (Version 02.0), EB 65 Report, Annex 2; equations were obtained from "Best Practices Examples Focusing on Sample Size and Reliability Calculations", EB 67 Annex 6

based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

Sample size

The required sample size will be determined using simple random sampling in each cohort.

The equation for estimating the sample size in each cohort is:

$$n \geq \frac{1.645^2 NV}{(N-1)0.1^2 + 1.645^2 V}$$

Where $V = \left(\frac{SD}{Mean}\right)^2$

n sample size

N Total number of ICS in use

Mean Our expected standard deviation

1.645 Represents the 90% confidence required

0.1 Represents the 10% relative precision

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet .[41]

Summary results for different populations are found in the following table for an assumed 0.285 mean efficiency[42]:

Population size	Standard deviation	Calculated minimum sample size	Adjusted sample size according to response rate of 80%
1,000	0.175	93	117
2,000	0.175	98	123
3,000	0.175	99	124
4,000	0.175	100	125
5,000	0.175	101	127
6,000	0.175	101	127
7,000	0.175	101	127
8,000	0.175	101	127
9,000	0.175	101	127

[41] Sample size calculation spreadsheet provided to the DOE

[42] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

10,000	0.175	102	128
11,000	0.175	102	128
12,000	0.175	102	128
13,250	0.175	102	128
14,000	0.175	102	128

Sampling frame

The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

OPTION 2: ANNUAL INSPECTION OF A RANDOM SAMPLE OF CPAS FROM EACH SUPPLIER ORGANIZATION (SO)

Objectives and reliability requirements

The objective is to estimate the mean thermal efficiency of the project improved cook stoves (ICS) with 95/10 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPA at the end of the year that are in use classified by Supplier Organisation. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database. The total number of cook stoves that are in use will be identified through either one or a combination of the following activities that will be stored in the monitoring database: The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

The data to be collected on each sampling unit (ICS) is its thermal efficiency.

Sampling method

Multistage sampling will be used. A number of ICS in each cohort within the selected CPAs belonging to each Supplier organization will be sampled using simple random sampling with the aid of a computerised randomiser. The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

Sample size

The required sample size will be determined using multistage sampling.

The equation for the number of clusters (CPAs) to be sampled is:

$$C \geq \frac{\frac{SD_E^2}{clustermean^2} X \frac{M}{M-1} + \frac{1}{u} X \frac{SD_W^2}{observationmean^2} X \frac{(N-u)}{(N-1)}}{\frac{0.1^2}{1.96^2} + \frac{1}{M-1} \frac{SD_E^2}{clustermean^2}}$$

Where:

C Number of groups/clusters/CPAs that should be sampled

M The total number of clusters (CPAs) in the population

$\bar{u}$ Number of (ICS/households) to be sampled within each cluster (CPA)

$\bar{N}$ Average units (ICS/households) per cluster (CPA)

SD_E^2 Variance between clusters (CPA)

SD_w^2 Average within cluster (CPA) variation
1.96 Represents the 95% confidence required
0.1 Represents the 10% relative precision

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet .[43]

Summary results for different possible numbers of CPA are found in the following table for an assumed efficiency of 0.28[44]:

Number of ICS to be sampled from each CPA	Number of CPAs to Sample	Total sample size
1	87	87
5	20	100
10	12	120
15	9	135
20	8	160
25	7	175
30	6	180
35	6	210
40	6	240

Sampling frame

The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey. The stoves in the PoA database will be classified by Supplier Organization by CPA for sampling purposes.

[43] Sample size calculation spreadsheet provided to the DOE

[44] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

OPTION 3: BIENNIAL INSPECTION PER CPA

Objectives and reliability requirements

The objective is to estimate the mean thermal efficiency of the project improved cook stoves (ICS) with 95/5 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPA at the end of the year that are in use. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database. The total number of cook stoves that are in use will be identified through either one or a combination of the following activities that will be stored in the monitoring database: The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

The data to be collected on each sampling unit (ICS) is its thermal efficiency.

Sampling method

Simple random sampling will be used. A number of ICS in each cohort will be sampled using simple random sampling with the aid of a computerised randomiser. The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

Sample size

The required sample size will be determined using simple random sampling in each cohort.

The equation for estimating the sample size in each cohort is:

$$n \geq \frac{1.96^2 NV}{(N-1)X0.05^2+1.96^2 V}$$

Where $V = \left(\frac{SD}{Mean}\right)^2$

n sample size

N Total number of ICS in use

Mean Our expected standard deviation

1.96 Represents the 95% confidence required

0.05 Represents the 5% relative precision

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet. [45]

Summary results for different populations are found in the following table for an assumed 0.285 mean efficiency[46]:

Population size	Standard deviation	Calculated minimum sample size	Adjusted sample size according to response rate of 80%
1,000	0.175	368	460
2,000	0.175	450	563
3,000	0.175	486	608
4,000	0.175	507	634
5,000	0.175	520	650
6,000	0.175	529	662
7,000	0.175	536	670
8,000	0.175	541	677
9,000	0.175	545	682
10,000	0.175	548	685
11,000	0.175	551	689
12,000	0.175	553	692
13,250	0.175	556	695
14,000	0.175	557	697

Sampling frame

The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

[45] Sample size calculation spreadsheet provided to the DOE

[46] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

OPTION 4: ANNUAL INSPECTION OF A RANDOM SAMPLE OF CPAS FROM CPAS USING THE SAME ICS MODEL

Objectives and reliability requirements

The objective is to estimate the mean thermal efficiency of the project improved cook stoves (ICS) with 95/10 confidence/precision.

Target population

The target population is the total number of ICS installed by the CPA at the end of the year that are in use. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database. The total number of cook stoves that are in use will be identified through either one or a combination of the following activities that will be stored in the monitoring database: The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

The data to be collected on each sampling unit (ICS) is its thermal efficiency.

Sampling method

Multistage sampling will be used. A number of ICS in each cohort within the selected CPAs operating the same Stove Model will be sampled using simple random sampling with the aid of a computerised randomiser.The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

Sample size

The required sample size will be determined using multistage sampling.

The equation for the number of clusters (CPAs) to be sampled is:

$$C \geq \frac{\frac{SD_b^2}{clusterinmean^2} X \frac{M}{M-1} + \frac{1}{u} X \frac{SD_w^2}{observationmean^2} X \frac{(N-u)}{(N-1)}}{\frac{0.1^2}{1.96^2} + \frac{1}{M-1} \frac{SD_b^2}{clusterinmean^2}}$$

Where:

C Number of groups/clusters/CPAs that should be sampled
M The total number of clusters (CPAs) in the population
$\bar{u}$ Number of (ICS/households) to be sampled within each cluster (CPA)

$\bar{N}$ Average units (ICS/households) per cluster (CPA)
SD_b^2 Variance between clusters (CPA)
SD_w^2 Average within cluster (CPA) variation

1.96 Represents the 95% confidence required
0.1 Represents the 10% relative precision

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet.[47]

Summary results for different possible numbers of CPA are found in the following table for an assumed efficiency of 0.28[48]:

Number of ICS to be sampled from each CPA	Number of CPAs to Sample	Total sample size
1	87	87
5	20	100
10	12	120
15	9	135
20	8	160
25	7	175
30	6	180
35	6	210
40	6	240

Sampling frame

The PoA database of stove and user information established through the Sales Agreements and subsequently updated on a continuous basis will be used to identify ICS in use that will be used as the sampling frame. The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey. The stoves in the PoA database will be classified by Stove Model by CPA for sampling purposes.

[47] Sample size calculation spreadsheet provided to the DOE

[48] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

DATA

Field measurements

The main variable that will be measured by the efficiency survey is the efficiency rating of ICS in use.

Quality assurance/quality control

A team of research assistants and supervisors for the usage survey will be recruited and trained in all aspects of sampling, data collection and interviewing by the CME or a CME-appointed agent. The training will involve both theoretical and practical aspects to ensure that all the research assistants are competent to collect the desired data. Data collection protocols will be prepared and given to the research assistants and supervisors to guide them during the data collection exercise. In addition, there will be a supervisor from the CME head office. Mobile devices, for instance mobile phones and other devices, will be used to electronically send data to the central database at the CME head office. The updating of the PoA's central database will be strictly monitored with several permission levels and passwords. In cases where the use of mobile devices is impossible, paper copies of questionnaires will be used to collect data about the usage of ICS from the selected sample.

The data collection protocols prepared for the research assistants will include the procedures for handling cases of non-response (refusals, not-at-home, out-of-population cases and related cases). A variable will be included to capture the results of interviews with the following 4 options: responded, out-of-population, refused, not-at-home. The protocols will also include the roles and responsibilities of the research assistants and supervisor. In addition, the definition of each of the study variables, mode of data collection and recording will be highlighted in the data collection protocol.

In case of non-response as a result of respondents not being at home, there will be at least 3 callbacks. Oversampling will also be undertaken to take care of non-response.

In addition, supplier organisations will be trained in all aspects of data collection and recording, especially using mobile devices and other relevant technologies, for the continuous updating and monitoring of data in the PoA's central database.

Since the main parameter in the thermal efficiency of the ICS, limits for outlier data/measurements will be preset. Check programs will also be prepared to automatically reject defective data and automatically notify the testers that the data is defective for immediate verification and rectification or callback.

Analysis

The data obtained from the selected households owning the ICS will be further cleaned and validated for accuracy and analysed by the CME's Monitoring Manager. All efficiency rating survey data will be captured in a computerised database. The analysis will include computation of the thermal efficiency of ICS in use. The results will be summarized using the pre-specified level of confidence. The precision of the estimates (thermal efficiency of ICS in use) will be checked to ensure that the estimate is within the pre-specified reliability precision. The reliability of the estimates will be checked by computing and evaluating the standard error of the mean thermal efficiency to establish whether it is within the permissible limits.

IMPLEMENTATION

Implementation Plan

The Monitoring Manager will be responsible for data collection and data analysis. The Monitoring Manager has experience in sampling and surveys.
The schedule for implementing the sampling will be set out by the Monitoring Manager.