CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

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

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

African Improved Cooking Stoves Programme of Activities – CPA No. 00001 (Ghana)
27/11/2012
Version 3.2

A.2. Description of the small-scale CPA:

The purpose of this CDM Programme Activity (CPA) is the dissemination of improved cooking stoves (ICS) in the Republic of Ghana (Ghana). The CPA will replace cooking stoves using charcoal fuel with more efficient stoves using charcoal fuel.

Stoves disseminated under this CPA are portable devices serving domestic charcoal users. These ICS are more efficient in transferring heat from the fuel to the pot, thus saving fuel (charcoal) compared to the charcoal stoves currently used by households. Furthermore, the ICSs applied in this CPA have been designed not only to increase heat transfer, but also to match the traditional utensils and cooking habits of the people in Ghana. In response to end-user testing, Envirofit International has adapted the design of the pot support of the CH2200 charcoal stove to better accommodate the round pots preferred by Ghanian people, with the new design known as the CH2300 (see below for pictures of stoves to be distributed under this CPA).

In line with CDM methodology AMS-II.G v.3 it is assumed that in the absence of the programme activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs. Therefore, by reducing the amount of fuel required for cooking, the replacement of traditional stoves by ICS reduces the amount of greenhouse gases (GHG) (CO_2) emitted into the atmosphere due to reduction of non-renewable woody biomass use by the ICS.

The proposed CPA is a voluntary action undertaken by the Coordinating/Managing Entity (CME), Envirofit International Ltd (Envirofit), a company based in the United States of America, and implemented by the Centre for Energy, Environment and Sustainable Development (CEESD), the Distributing Organisation (DO), an organisation based in Ghana.

The CPA will have a maximum energy saving of less than or equal to 60 GWh_{th}/year, thus staying within the micro-scale threshold[3]. Based on the estimated energy savings, it is envisaged that around 4,500 stoves will be distributed under the CPA.

By the start of the CPA crediting period, which as indicated in Section A.4.3.1 is expected to be 15 December 2012, it is anticipated that all 4,500 of the ICS will be in operation. This is based on the following distribution schedule:

[3] Note: since the threshold is expressed in $MWh_{electric}$ (20 GWh/year), for type II project activities a factor of 3 is used for the conversion of electric to thermal installed capacity and hence the micro scale threshold for CPA energy savings is 60 $GWh_{thermal}$ per year. This approach was confirmed by the SSC-CDM Working Group in regards to the application of methodology AMS-II.G (Clarification F-CDM-SSCwg ver 01 SSC_233).

- January 2012 – June 2012: 2,000 units
- June 2012 – December 2012: 2,500 units.

The proposed CPA will be implemented by CEESD (the DO), which has signed a contractual agreement with Envirofit (the CME) to participate in the PoA.

Contribution of the proposed CPA to sustainable development

Environmental benefits:

- *Greenhouse gas reductions:* The CPA will result in GHG reductions because it will reduce the consumption of non-renewable biomass in Ghana, where the biomass harvested for fuel use is typically non-renewable, as will be demonstrated below.
- *Air quality:* Users (especially women and children) will be exposed to fewer air pollutants through reduced emission of not only CO_2, but also carbon monoxide and particulate matter. Air pollution from cooking with solid fuel is a key risk factor for childhood pneumonia as well as many other respiratory, cardiovascular and ocular diseases. According to the "Emissions and Performance Test Protocol", with emissions measurements based on the stove testing protocol developed by Colorado State University, the average CO emissions results of the ICS to be installed show a percentage improvement above 60%, compared to a traditional metal "coalpot" stove[4].
- *Biodiversity:* will be improved as the CPA reduces pressure on remaining forest reserves in Ghana. The heavy reliance on wood fuel in Ghana has contributed to the degradation of Ghana's tropical forests to below 25% of their original size and will lead to an ecological disaster in the long run if not addressed[5].

Social and Economic benefits:

- *Employment:* The CPA will give rise to employment opportunities for new staff to be employed by CEESD, retailers involved in the sale of ICS, sales promoters and marketers, technicians and other related jobs in Ghana. Over the longer term, local assembly of Envirofit's stoves may be possible depending on the scale of demand.
- *Livelihood of the poor:* The circumstances of poor families will be improved since the project stoves reduce the amount of money spent on fuel, providing financial savings over the medium-long term. Reduction in fuel consumption implies relief from drudgery and more opportunity for productive activity, education and family life arising from less time spent collecting fuel.
- *Access to energy services:* The ICS to be distributed require less fuel, which in many areas can be a scarce resource or very expensive to buy. The ICS are more convenient, due to shortening of the required cooking time.

[4] Manufacturers' specifications based on results for the Envirofit CH2200 and CH4400 stoves compared with a traditional metal jiko. See Envirofit product overview available at http://www.envirofit.org/products/?1sub=cookstoves

[5] UNDP Ghana, Infolink: Environment and Energy, LPG – Substitution for wood fuel in Ghana – Opportunities and Challenges. UNDP Ghana, Accra, 2004.

- *Human and institutional capacity:* The CPA will facilitate capacity development among the staff employed by CEESD and the many retailers and other contractors that are to be engaged for distribution of ICS through the provision of trainings and workshops.

A.3. Entity/individual responsible for the small-scale CPA:

The entity responsible for the proposed CPA is CEESD, based in Kumasi, Ghana (see Annex 1 for details). CEESD is the Distributing Organisation (DO). CEESD is not a registered project participant.

Envirofit International Ltd (Envirofit) is the coordinating/managing entity (CME) of the PoA. Envirofit is a registered Project Participant and the Focal Point for the PoA.

A.4. Technical description of the small-scale CPA:

Biomass is the major energy source for Ghanaians. According to the Ghana Energy Commission, in 2009 firewood and charcoal contributed about 63% of the total energy supplied to end users, compared to 27% for petroleum and just 9% for electricity[6]. Firewood is predominantly used by rural households while urban households tend to use charcoal as the main fuel for cooking. Because the vast majority of this biomass is obtained from standing tree stocks, and since there are no dedicated woodlots or concerted afforestation/reforestation programmes, Ghana's woodfuel resource is seriously threatened and has been declining as a result[7].

Charcoal is typically produced in traditional earth mound kilns which are highly inefficient, with wood-charcoal conversion rates of around 18%[8]. The high level of charcoal use also leads to health impacts due to indoor air pollution, including carbon monoxide emissions, which disproportionately affects women and children. Despite ICS dissemination efforts going back to the late 1980s-early 1990s, the predominant cooking stove used by charcoal users is still the highly inefficient metal "coal pot", which typically has a thermal efficiency of around 10% or even less. Charcoal users who do have access to an improved stove typically use the "gyapa" stove, which has a clay liner and can achieve efficiency improvements of around 50% over the traditional coal pot. However, UNDP/WHO (2009) estimates that less than 1% of Ghanian stove users have access to an improved stove[9] (see Annex 3 for a full discussion of the baseline stove efficiencies and penetration). Further, the lack of quality control over gyapas means that lower efficiencies are also common, as is discussed in detail in Annex 3.

The CPA will replace the existing (conventional and improved) cook stoves in households which burn charcoal fuel relatively inefficiently with advanced improved cook stoves which burn charcoal fuel more efficiently (see below for details). The CPA will be implemented according to version 3.0 of the approved methodology *AMS-II.G - Energy Efficiency Measures in Thermal Applications of Non-Renewable*

[6] Kemausuor F, et al. A review of trends, policies and plans for increasing energy access in Ghana. Renewable and Sustainable Energy Reviews (2011) doi:10.1016/j.rser.2011.07.041

[7] Ishmael Edjekumhene and Jacqueline C Cobson-Cobbold, Low-carbon Africa: Ghana; in the report: Low-Carbon Africa: Leapfrogging to a Green Future. KITE, November 2011

[8] Edjekumhene and Cobson-Cobbold, 2011

[9] Legros, G., Havet, I., Bruce, N. and Bonjour, S., The Energy Access Situation in Developing Countries; A review focusing on the least developing countries and Sub-Saharan Africa. UNDP/WHO. New York, 2009, p91

Biomass. This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of the improved cooking stoves produced by Envirofit. Below are pictures of Envirofit's charcoal stoves that are envisaged to be distributed in this CPA.

Figure 1. CH2200 (left) and CH4400 (right) Charcoal Stoves

Figure 2. CH2300 charcoal stove with rounded pot support

The Envirofit charcoal stoves have been designed with the specific intention of maximizing thermal efficiency while simultaneously minimizing the production of toxic emissions. While many interrelated factors need to be considered in order to achieve these goals, two primary aspects of stove performance were explored during the development of the stoves: 1) charcoal surface temperature and 2) thermal sinks. In order to maximize temperature, the combustion chamber shape, fuel amount, and air flow through the stove all need to be considered and correctly coordinated. In order to use the available thermal energy in the most efficient manner possible, specific stove geometry and configuration choices were made, including reducing stove thermal mass and minimizing heat flux through the sides and bottom of the stove. The other element is correctly positioning the cook piece in relationship to the stove. This was essential in order to establish the correct radiation view factor and gas flow path needed for optimum heat transfer.

The CH2200 stove has an average thermal efficiency of 38.2%, and is therefore significantly more efficient than the stoves to be replaced, including the "improved" locally manufactured stoves; it also reduces carbon monoxide emissions by around 63%, making it highly beneficial from a health

perspective[10]. The CH4400 stove encloses a majority of the combustion chamber so that some of the heat radiated from the charcoal is reflected back onto the coal bed. This rapidly increases the temperature of the charcoal, increasing the amount of heat that is transferred to the pot, with an average thermal efficiency of 31.4%; it also destroys 80% of the carbon monoxide that would be seen in a typical charcoal stove making it even cleaner than the CH2200 from a health perspective[11]. In order to achieve the very low carbon monoxide emissions, it is critical to get the inside of the stove to a very high temperature to destroy the carbon monoxide. By making the chamber hotter, more energy is lost through parasitic losses to the stove body. This reduces overall efficiency compared with the CH2200 and CH2300, which is even more efficient than the CH2200 due to the modified design (average thermal efficiency of 39.4%). In addition, since the CH4400 stove is bigger (see pictures above) and has a higher thermal mass, more energy is used in heating up the stove body. These two things account for the lower efficiency on the CH4400 compared with the CH2200 and CH2300.

Operational and management plan

Contractual obligations

The CME (Envirofit) will coordinate the activities to be undertaken by the DO (CEESD) under this CPA. As part of the inclusion of the CPA under the PoA, an agreement will be signed by the DO - representing its staff and contractors - and the CME. The agreement will include the following:

(i) Commercial arrangements between the CME and the DO;

(ii) Arrangements to pass on ownership of the carbon emission reduction rights from DO to CME;

(iii) Specific provisions and declarations that the CPA developer agrees that their activity is being subscribed under the PoA;

(iv) Requirements that the CPA is implemented within the regulations and policy requirements of the host countries;

(v) The DO's CDM-specific responsibilities and deliverables during the stove distribution to ensure accurate collection of information from customers;

(vi) A declaration that the CPA has not and will not be registered as a single CDM project, CPA of another PoA or a voluntary carbon market project; and

(vii) Provisions outlining the consequences of non-compliance with the above requirements.

[10] Certified test results from testing conducted by the Engines and Energy Conversion Laboratory at Colorado State University available at www.envirofit.org

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

Training and guidance

Suitable training will be provided by the CME to ensure that the DO is fully aware of the rules of the PoA and the correct protocol to be followed during ICS distribution, data collection and ex-post monitoring activities.[12] This includes provision of a *Distribution Manual* to guide the DO and any third parties sub-contracted by the DO. The DO will provide training of any sub-contractors and the retailers to be involved in the direct selling of stoves.

Distribution model

The DO (CEESD) will purchase improved charcoal stoves from the CME (Envirofit). The DO will open and operate its own distribution centers in selected districts, to be staffed by CEESD personnel. It is envisaged that this expansion will start in the Ashanti Region, in which the headquarters of CEESD is located. The region is a suitable starting point due to the support of local stakeholders as demonstrated during the consultation session held in Accra on 14 November 2011 and the good balance between urban, peri-urban and rural communities. Expansion to other regions is also envisaged by CEESD.

From the centralised distribution centres, CEESD will utilize an extensive network of retailers to distribute improved charcoal stoves to households. Suitable retailers will be identified and trained by the DO in the major towns in the selected districts. Only retailers with established businesses trading in the selected districts will be eligible for selection.

CEESD will also sell ICS units directly to customers from its distribution centres. Stoves sold by retailers or CEESD will be sold at the same recommended retail price to ensure a level playing field. In order to reach remote communities within the districts, CEESD will also recruit, employ and train a number of staff who will promote the ICS to be distributed, known as “extension agents”. The extension agents will be expected to travel to all parts of their respective district to create awareness of the distribution programme and explain the benefits of using ICS to communities. They will not be involved in the actual selling of ICS.

The figure below provides an illustration of the organization hierarchy involved in the ICS distribution foreseen by CEESD.

[12] A third party may be involved beside or instead of the DO in the ex-post monitoring. In this case the training would need to be provided to the third party.

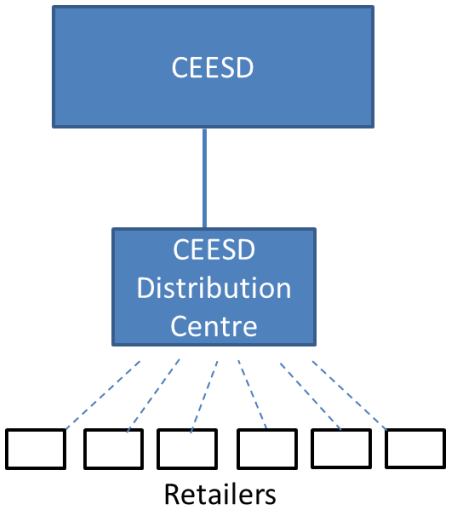

Figure 3: Distribution model - organisational hierarchy

The sale of ICS units by retailers may take place on the retailer's premises, at stalls during market days, or door-to-door. Initial interest may be generated by the demonstration of the stove benefits in a local area (e.g. public market) and where appropriate via advertising campaigns in local media and via the extension agents. Users will also receive guidance on how to clean and maintain the ICS at the time of sale. A warranty is offered for all Envirofit stoves, giving the customer an added incentive to provide correct contact information at the time of sale. The warranty guarantees the combustion chamber of the Envirofit stoves for 5 years. In this time the customer is able to obtain a replacement stove or part if their stove is found to be defective or stops working properly.

Collection of data

The retailers will be trained to ensure correct procedures are fulfilled during the distribution. The DO is fully responsible to ensure the correct distribution process and data gathering is followed, as is required of the DO in its agreement with the CME. In turn, the DO will link remuneration to the complete and accurate collecting of information during the distribution of stoves in its contractual agreements with retailers (see below).

Figure 3 below provides a graphical overview of the operational and management structure described above, showing responsibilities for distribution, data collection and data verification.

Whether sold by CEESD directly, or via retailers, a range of information will be collected from each customer to ensure that the customer in question is not registered as part of another CDM project or that it is not double counted within the same CPA and to enable tracking of the stove during monitoring.

The following information is to be recorded by the Retailer or, in the case of a direct sale from a CEESD distribution center, the CEESD staff member, in each CPA Distribution Record (a paper form which has been developed by the CME) at the time of distribution:

- Name/Identification of end user;
- The phone number of the end-user (if available);

- Alternate phone number (e.g. close relative) (if available/necessary);
- Geographical location (fixed address if possible, alternatively other means of locating the stove could be used such as GPS coordinates or the address of the church to which the person belongs);
- Serial ID number of ICS (visible on a metal plate riveted to the bottom of the stove and on a sticker on the cardboard box containing the stove);
- Type of old stove being replaced (to confirm only charcoal stoves are being replaced);
- Model of ICS being distributed;
- Date of distribution;
- Retailer ID number.

In addition to the Envirofit logo being fixed on each of the ICS units, each CPA Distribution Record clearly displays the logos of both the CME, Envirofit International, and the DO, CEESD. Therefore, this document demonstrates that the corresponding ICS with its unique serial ID number has been distributed to that specific customer under the PoA to which this CPA belongs, and not under another PoA managed by a different CME and/or a CPA implemented by a different DO. Each customer can prove that their stove was distributed under the Envirofit PoA by CEESD as he/she retains a carbon copy of the CPA Distribution Record and can present this during verification. If any customer is unable to do so, for example if they have misplaced it, there are two other copies retained by the DO and the CME as back up and these can be made available during verification.

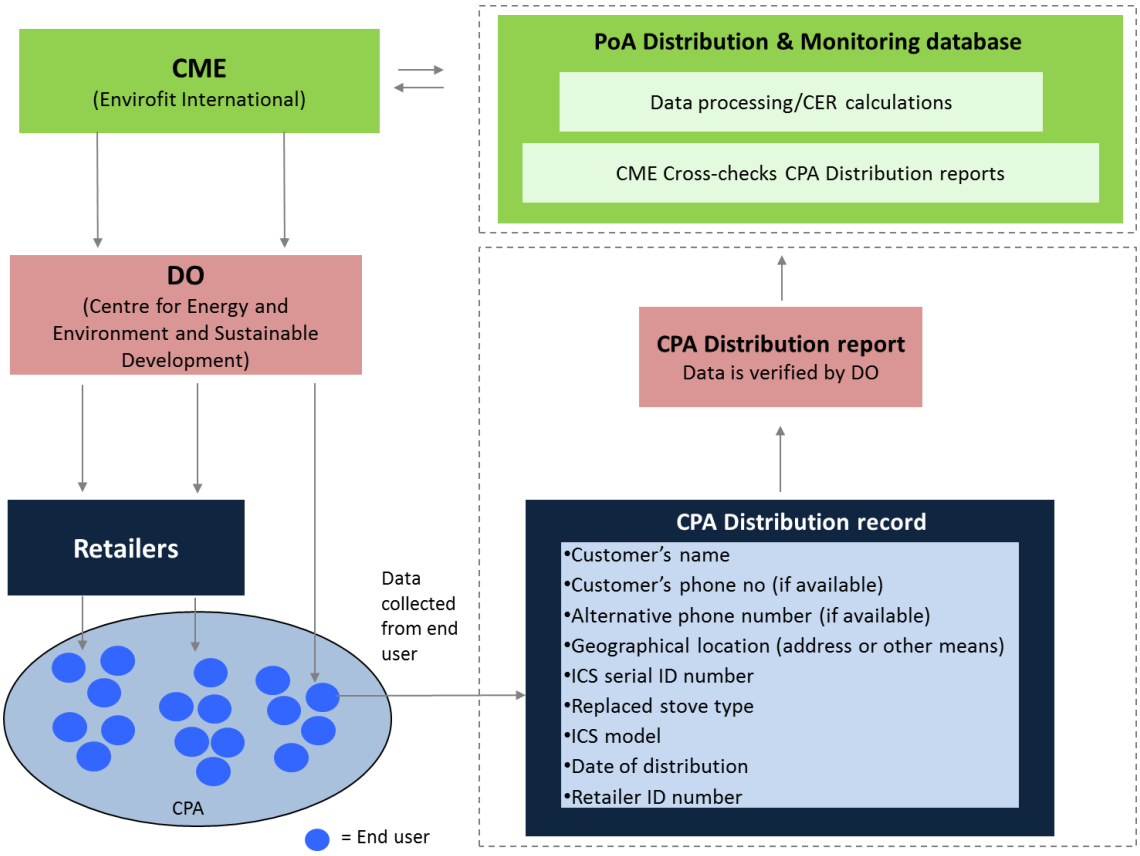

Figure 4: Operational structure and key responsibilities for data collection

The data will be collected by the person selling the stove on a paper-based, standardized form.

Transfer of carbon rights

At the time of sale, the seller of the stove (Retailer or CEESD staff member) will obtain the customer's approval to assign his or her exclusive carbon rights to the CME by way of a signature on the paper-based CPA Distribution Record. In the case of customers who cannot sign a thumb print will be obtained.

Transfer of information to the CME

The data contained in CPA Distribution Records will be compiled by the DO and entered directly into the CME's database via an online server. The data is entered in an Excel-based spread sheet format that is referred to in the diagram above as a CPA Distribution Report. This approach has been designed to integrate data seamlessly with the CME's master database covering all CPAs under the PoA (see below

for details – this means that the data is always stored securely on the CME's server). The data from each CPA Distribution Record will be accessible to the CME in real time as it is entered by the DO

Incentive structure

Retailers are incentivized to fill out the CPA Distribution Records correctly in order to be able to purchase stoves from CEESD at a distributor price which will be less than the recommended retail price. CEESD is responsible for ensuring the completeness and accuracy of the information collected by the individual retailers in the CPA Distribution Records prior to compiling a CPA Distribution Report and transferring the collected data to the CME. An appropriate incentive structure will be put in place to ensure that the validity of CPA Distribution Records has been confirmed prior to sending such information to the CME. This is evidenced by the contractual agreements between the CME and the DO on the one hand, and between the DO and its Retailers on the other.

CME responsibilities

The CME will keep a record of the serial numbers of the ICS units distributed by the DO under this CPA and all other CPAs under the PoA. This will enable cross-checking of data provided by each of the DOs to ensure no double counting of stoves across CPAs. The CME is responsible for cross-checking the data contained in the CPA Distribution Reports provided by the DO in order to confirm authenticity. If erroneous CPA Distribution Records are identified (e.g. inconsistency between sales claimed by DO and stove serial numbers supplied to the DO) these will not be included in the emissions reduction calculations. Double counting of emissions reductions will be avoided because each CPA and each ICS distributed will have a unique identification number. The CME will maintain the information required for emissions reduction calculations and verification in a secure electronic database, the "PoA Distribution and Monitoring Database". A CPA can be uniquely identified by its identification number allocated in the database and by the serial ID numbers associated with the ICS units that are distributed under that specific CPA. During monitoring it will thus be possible to distinguish between the individual stoves included under each CPA.

The CME is fully in control of the security of the Database and the data contained within it. The stove and customer data used for monitoring and emissions reduction calculations will never be stored on the DO's computers since it is uploaded in real time to the database which remains on Envirofit International's secure server. At present, the PoA Distribution and Monitoring Database is located on the CME's "Sharepoint" system. That system automatically backs up every night any files that have been modified, so there is a constant back up. The files are backed up onto two separate hard drives that are swapped out each month so there is always one drive offsite.

Archiving

The DO will send the original CPA Distribution Records or scanned copies of the paper originals to the CME as requested by the CME. The CME will ensure that all CPA Distribution Records (either original or scanned copy of original) are archived securely to enable verification by the DOE at a later point in time. Archives will be maintained for at least 2 years after end of crediting of each CPA or after last issuance - whichever is later. A copy of the PoA Distribution and Monitoring Database will be kept in an electronic format.

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

Republic of Ghana (Ghana).

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The boundary of the proposed SSC-CPA is determined by the location of the individual households where the ICSs are distributed, and is limited to the territorial area of the host country, Ghana (see figure 4 below).

Figure 5: Map of the Republic of Ghana (source: CIA World Factbook, 2011)

The headquarters of CEESD are located in Kumasi, which is in the Ashanti region of Ghana. The coordinates of Kumasi are 4.854, -2.084. From its base in Kumasi, CEESD will distribute stoves to surrounding areas, starting with the districts of Ejisu Juabeng and Bosomtwe (shown in Figure 5 below). However, the CPA boundary is not limited to these districts.

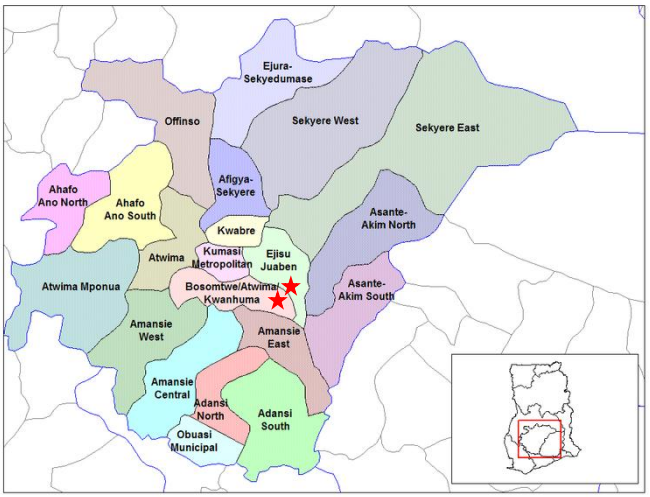

Figure 6: Map of the districts of Ashanti Region, Republic of Ghana (source: http://en.wikipedia.org/wiki/File:Ashanti_districts.png)

The identification of each ICS distributed is possible through the unique serial number attached to each stove, which will be uniquely assigned to an end user within the CPA. See photographs below showing the stove ID numbers, which will be located in two places: riveted to the side of each stove on a metal plate and on a sticker on the side of the cardboard box which contains each stove.

Figure 7: Stove ID numbers located on actual stove and box

This information will be stored securely by the CME in the PoA Distribution and Monitoring Database and will be available to the DOE during verification. Thus the CPA is uniquely defined by its geographic location, the stove ID numbers belonging to it and the associated end user locations.

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

03/01/2012

(This is the date of departure of the first shipment of stoves from the port in China as indicated in the Bill of Lading).

A.4.2.2. Expected operational lifetime of the small-scale CPA:

10 years. The manufacturer of the ICS to be distributed under the proposed CPA, Envirofit International, has undertaken rigorous testing of the stoves both in the laboratory and the field and estimates that with an appropriate education and monitoring process the expected life of the current stove line should be in the range of 7-10 years.

A.4.3. Choice of the crediting period and related information:

Fixed crediting period.

A.4.3.1. Starting date of the crediting period:

15/12/2012

The crediting period starting date is the date of registration of the PoA (EB 70, Annex 2).

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

10 years.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Project Year	Annual estimation of Emission Reductions (in tonnes CO_2e)
1 (15th to 31st December 2012)	645
2 (2013)	15,477
3 (2014)	15,477
4 (2015)	15,477
5 (2016)	15,477
6 (2017)	15,477
7 (2018)	15,477
8 (2019)	15,477
9 (2020)	15,477
10 (2021)	15,477
11 (Jan - 14th December 2022)	14,832
Total Emission Reductions (tonnes of CO_2e)	**154,770**
Total Number of crediting years	**10**
Annual average over the crediting period of estimated reductions	**15,477**

See the emissions reduction spreadsheet for more detailed information on the underlying assumptions and calculation steps for emission reduction calculation and the energy savings associated with each stove.

A.4.5. Public funding of the CPA:

No public funding has been received for the development or implementation of the CPA. Any third party funding that has been received has not resulted in the diversion of Official Development Assistance from any Annex I country. An official statement has been provided to this effect by the CME and DO.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

In accordance with paragraph 9 of Annex 32 to the EB47 Report, "Guidance for determining the occurrence of de-bundling under a Programme of Activities (PoA)," if each independent subsystem/measures included in the CPA of a PoA is no greater than 1% of the small scale threshold defined by the methodology applied, than that CPA of PoA is exempted from performing the de-bundling check, i.e. considered as being not a de-bundled component of a large scale activity.

The small scale threshold, as defined by AMS-II.G V.3, is for a maximum energy saving of 180 GWhr/year. Hence, 1% of the threshold is 1.8 GWh_{th}/year. The estimated energy savings contributed by each ICS is only around 13 MWh_{th}/year, which is around 0.007% of 180GWh_{th}/year (see emissions calculation spreadsheet). Therefore, the CPA is exempted from the de-bundling check since the savings from the individual units by far do not exceed 1% of the SSC threshold.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

The CPA is neither registered as an individual CDM project activity nor is it part of another registered PoA. All ICS units distributed under this CPA are uniquely identifiable by a serial number and can be located (on the basis of the information that will be collected and maintained by the CME.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

African Improved Cooking Stoves Programme of Activities

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA:

The CPA meets all the eligibility criteria for inclusion as outlined in Section A.4.2.2. of the PoA-DD. This is demonstrated below:

No.	Eligibility criteria		Means of proof	Confirmation
	Description	Conditions to be met		
1.	Boundary and location of the CPA	The CPA is located within the boundary of one of the countries within the PoA boundary.	Location and boundary is specified in the specific CPA-DD and supported with GPS coordinates.	Yes (As indicated in A.4.1.2 the CPA is limited to Ghana, a

				country being within the PoA boundary, as listed in section A.4.1.1 of the PoA-DD)
2.	Avoiding double counting	The CPA includes a means of uniquely identifying the stoves to be distributed and the end-users who will receive stoves. This shall ensure no double counting of stoves within the PoA and ensure that stoves can be identified as belonging to this PoA and not to a PoA managed by any other CME.	Photo or similar proof that stoves have a unique serial ID number or other means of identification. For first CPA, document to be provided: stove sales receipt ("CPA Distribution Record") showing CME and DO logos, end user details including name and address and stove ID number. For all subsequent CPAs, in addition to the sales receipt the programme logo shall be displayed on the stoves.	Yes (Stoves to be distributed each have a unique serial ID number, as indicated in figure 5 in the CPA-DD. As this is the first CPA, the CPA Distribution Record has been provided showing CME and DO logos, end user details and stove serial numbers. A copy is retained by the customer and can be presented during verification. Additional copies are held by the CME and DO.)
3.	Applicability of Methodology AMS-II.G - Technology type	The ICS uses one of the following fuel types: • Wood fuel • Charcoal	Technical specification of ICS provided	Yes (Manufacturer's specifications available at www.envirofit.org and statement from CSU indicate that all three of the models to be distributed (CH2200, CH2300 and CH4400) are charcoal stoves)
4.	Applicability of Methodology	The ICS has a minimum efficiency of 20% (AMS II.G, Version 3, para 1)	Technical specification of ICS provided (either from manufacturer's	Yes (Manufacturer's

	AMS-II.G – Minimum ICS efficiency/ specifications of technology including the level and type of service		specifications or test results using the Emissions & Performance Test Protocol (EPTP)[13])	specifications show average thermal efficiencies are provided in the Emissions and Performance Report conducted by Colorado State University: CH4400: 31.4%[14] CH2200: 38.2%[15] CH2300: 39.4%[16]
5.	Start date of CPA	The start date of the CPA shall be after the PoA validation start date (i.e. not prior to 13 December 2011, which was the date the PoA was made available online on the UNFCCC website for global stakeholder consultation).	The start date of the CPA will be specified in each CPA-DD and an appropriate proof will be provided (e.g. this could include, but need not be limited to a document showing the stove shipping date, document showing date on which local assembly started or some other means such as the date of contract closure between the CME and DO).	Yes (The start date of the CPA is 03 January 2012, which was the shipping date. (See Bill of Lading)
6.	Applicability of Methodology AMS-II.G - Non-Renewable Biomass in use since Dec 1989	The first CPA in each country will demonstrate that non-renewable biomass has been in use since December 1989.	At least two of the factors listed in paragraph 10 of methodology AMS-II.G v.3 are shown to exist in the country	Yes (See Annex 3 for details)

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

[14] http://www.envirofit.org/images/products/pdf/ch4400/CH4400SpecSheet_01262011.pdf

[15] http://www.envirofit.org/images/products/pdf/ch2200/CH2200SpecSheet.pdf

[16] Certification sheet for CH2300 has been provided as proof.

7.	Additionality of CPAs	The CPA shall satisfy the latest version of the "Guidelines on the demonstration of additionality of small-scale project activities". Depending on whether the CPA is small scale or micro-scale, the CPA shall satisfy one of the two additionality tests below (test 1 is for micro-scale CPAs and test 2 is for small-scale CPAs): 1. If the CPA size is below 60 GWh_{th}/year[17]: (a) The geographic location of the project activity is a LDC/SID or special underdeveloped zone of the host country as identified by the Government before 28 May 2010; or (b) The project activity is an emission reduction activity with both conditions (i) and (ii) satisfied; (i) Each of the independent subsystems/measures in the project activity achieves an estimated annual emission reduction equal to or less than 1.8 GWh_{th}/year; and (ii) End users of the subsystems or measures are households/communities/SMEs. 2. If the CPA size is between 60 and 180 GWh_{th}/year:	The level of energy savings from the individual sub-systems and the overall CPA are estimated using an Excel sheet or similar tool; the location of the CPA is defined in the CPA-DD; the end user groups are defined in the CPA-DD.	Yes (According to test 1 for micro-scale CPAs, the CPA size (total energy savings) is below 60 GWh_{th}/year (see Emissions Reduction spreadsheet with calculation of maximum number of stoves allowed for micro-scale threshold) and the project activity is an emission reduction activity with both conditions (b) (i) and (ii) satisfied)

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

		(a) End users of the subsystems or measures are households/communities/SMEs; and (b) Each of the independent subsystems/measures in the project activity achieves an estimated annual emission reduction equal to or less than 9 GWh_{th}/year.		
8.	Official Development Assistance (ODA)	The CPA is either: a) not receiving any funding from Annex I parties; or b) the Annex I party funds do not result in a diversion of ODA.	a) Confirmation by the DO or CME b) Confirmed by the LoA of the host country	Yes (a: The CPA is not receiving any funding from Annex I parties and is not resulting in diversion of ODA – see letters provided.)
9.	End-user group	The CPA is either aimed at households, community organisations (e.g. schools) or small/medium enterprises.	The CPA-DD specifies the target end-user group and the appropriate baseline (also see EC#17). Supporting documents could include but need not be limited to a copy of the CME's contract with the DO and/or agreements with distributors used by the DO.	Yes (The targeted end user group for this CPA is households using charcoal stoves as outlined in Section A.2. A copy of CME's contract with DO has been provided showing that stoves are to be distributed to households).
10.	Sampling	Sampling of stoves within the CPA must meet the requirements of AMS-II.G v.3 and the "Standard on Sampling and Surveys for CDM Projects and Programmes of Activities" (the Sampling Standard).	The CPA-DD either specifies a) sampling will be undertaken as part of the PoA Sampling Plan, and in Section B.6.1 describes how the PoA Sampling Plan is to be applied; or b) if CPA-specific	Yes (a: Sampling will be undertaken as part of the PoA Sampling Plan, which is contained in the PoA-DD. The approach for applying the PoA

			sampling is to be undertaken, the CPA Sampling Plan must meet the requirements of AMS-II.G v.3 and the Sampling Standard. The CPA-specific sampling approach shall follow the approach outlined in the PoA Sampling Plan except where the methodology AMS-II.G and/or the Sampling Standard call for a different approach.	Sampling Plan is described in Section B.6.1)
11.	SSC Limit for CPAs	The annual energy savings of each CPA shall not go beyond the limits of 180 GWh_{th}/year over the entire crediting period. In the case of using option 1 to prove additionality under Eligibility Criteria 7, the limit shall be 60 GWh_{th}/year over the entire crediting period.	The maximum number of ICS will be determined in each CPA-DD depending on the technology used (excel sheet will be provided to show calculated energy savings). If a CPA exceeds the applicable limit in any year, the claimable emission reduction shall be capped based on the estimated GHG reductions in the CPA-DD[18]).	Yes (The annual energy savings are not beyond the limits of 60 GWh_{th}/year over the entire crediting period – see Emissions Reduction spreadsheet provided).
12.	Exempted from de-bundling	Each ICS reduces energy consumption by less than 1% of the SSC threshold of 180GWh, or 1.8 GWh_{th}/year[19].	Specific energy savings for the applied ICS estimated using Excel sheet or similar tool.	Yes (The average energy savings of each ICS to be distributed is only

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

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

				around 13 MWh/year or less, which is roughly 0.007% of the 180GWh threshold. See emissions reduction calculations spread sheet)
13.	Contractual agreement	The DO has signed a contractual agreement with the CME to participate in the PoA. This agreement: • defines the ownership of the carbon emission reduction rights • covers the DO's distribution and monitoring related responsibilities • confirms that the ICS to be distributed under the CPA have not and will not be distributed under any other carbon project (CDM project, PoA or voluntary carbon market project) • cedes the DO's rights to the carbon credits generated from CPAs under the PoA to the CME	Contractual agreement in place between the DO and the CME including the CDM-specific responsibilities of the DO (e.g. in an Annex to the contract). If the CME is implementing the CPA itself, then this is not necessary.	Yes (An additional annex to the contract between the CME and the DO relating to the CDM responsibilities of the DO has been provided)
14.	Local Stakeholder Consultation	A Local Stakeholder Consultation (LSC) must be conducted prior to inclusion of the CPA in the PoA. If a LSC has already been done at the national level for the first CPA in the country, and the LSC covered the issues relevant to this CPA, then the LSC does not need to be done again.	Copy of the report for the LSC that was conducted either for the first CPA in the country or for the particular CPA to be included in the PoA.	Yes (LSC report has been provided)
15.	Environmental Analysis	An Environmental Analysis must be conducted prior to	If required, a copy of the EIA or exemption that	Yes

		inclusion of the CPA in the PoA. If the Environmental Analysis has already been done at the national level for the first CPA in the country, and the analysis covered the issues relevant to this CPA, then the analysis does not need to be done again. Similarly, if an exemption has been obtained from a government agency exempting the CME from having to conduct an Environmental Impacts Assessment for the first CPA, then this shall count for all subsequent CPAs.	was obtained either for the first CPA in the country or for the particular CPA to be included in the PoA. If neither of these is required, then CPA-DD should indicate whether there has been any environmental analysis undertaken already for the first CPA. If not, then environmental analysis must be undertaken in the CPA-DD.	(Environmental Analysis is included in Section C and proof that no EIA was required by the EPA has been provided)
16.	CPA crediting period does not exceed PoA life	The duration of the crediting period of each CPA to be included in the PoA shall not exceed the end date of the registered PoA.	CPA-DD shall indicate the duration of the CPA crediting period, either for a single 10 year crediting period or a 7 year renewable crediting period. The final date for which CERs can be credited shall be no later than 28 years after the date of registration of the PoA.	Yes (As indicated in Section A.4.4 the final crediting date for this CPA is in September 2022)
17.	Baseline parameters to be established at CPA level	Each CPA shall demonstrate how the baseline parameters that are to be calculated at the CPA level have been determined, and shall do so applying the following the approaches: a) f_{NRB}: as per the approach outlined in detail in Annex 3 or using default values where available/approved by the host country DNA; b) B_{old}: as per the approach outlined in Section E.6.2,	CPA-DD shall outline the approach and provide supporting documents including copies of any official government reports, statistics or literature sources used for determining parameters. If local surveys or representative sampling are used then copies of questionnaires, sampling design etc shall be provided.	Yes (Approach taken is as follows: a) f_{NRB}: as detailed in Section B.5; with separate excel file and supporting references provided; b) B_{old}: as detailed in Section B.5 and Annex 3, with supporting

		applying Option (a) of paragraph 7 of AMS-II.G v.3, using either historical data or a survey of local usage; c) n_{old}: as per the approach outlined in E.6.2, applying Option 2 of paragraph 6 of AMS-II.G v.3, using either national statistics, literature values or through representative sampling.		references provided; c) n_{old}: as detailed in Section B.5 and Annex 3, with supporting references provided.)

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

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

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

Yes, the CPA-DD in section B.2. proves that the CPA meets all eligibility criteria of the PoA.

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

Yes, since no mandatory laws and regulations in the Host Country (Ghana) exist requiring the introduction of ICS.

In case of micro-scale CPA:

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

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

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

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

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

Yes, since the individual stove stays below this threshold, as demonstrated in the emission reduction calculation spreadsheet.

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

Yes, as outlined in section A.2. of the CPA-DD.

Therefore the additionality of the CPA has been demonstrated.

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

The project boundary is the geographical area where the ICS are installed and in use and this is restricted to the geographical boundary of Ghana, which is located within the geographical boundary of the PoA. The table below illustrates the GHG emissions sources included:

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

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Data / Parameter:	$Q_{biomass}$
Data unit:	Tonnes/year
Description:	Annual average biomass consumption per appliance
Source of data used:	Historical data taken from literature, as allowed by the methodology.

Value applied:	4.36
Justification of the choice of data or description of measurement methods and procedures actually applied :	Requirements as per methodology AMS-II.G V.3. The value applied is an estimation based on literature review using the following sources and conservative assumptions: a. Charcoal consumption per household: 726kg/year b. Wood-to-Charcoal conversion factor (IPCC): 6 Notes/sources: a. Value is an average derived from three credible sources (see Annex 3 for details). b. Value is taken from IPCC http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf (page 1.45)
Any comment:	Used for calculation of B_{old} as per paragraph 7 (a) of methodology The available national statistics in Ghana do not provide the amount of biomass consumption per appliance. Therefore literature values have been used to determine average household biomass consumption (see Annex 3). Literature also suggests that the vast majority of households in Ghana (around 80%) will tend to use only one principal stove, cooking one dish at a time; when they have a second stove this will serve as a back-up stove[20]. On this basis, the approach taken is to assume that one stove is replaced per household/institution/SME and that this stove accounts for the average household biomass consumption. If more than one stove is then found to be in use in a household during monitoring, this will be accounted for in the emissions reductions by: firstly, reducing the baseline consumption value in line with the continued use of baseline stoves; and secondly, by excluding any additional ICS stoves from N_{all} as outlined in Section B.6.1.

Data / Parameter:	$f_{NRB, y}$
Data Unit:	Fraction
Description:	Fraction of biomass saved by the project activity in year *y* that can be established as non-renewable biomass using national or local statistics, survey results, studies, maps or other sources of information, such as remote-sensing data
Source of data used:	FAO and IPCC

[20] See for example: Nielsen, P., Naeraa, R., Karlsson, K. Energy conservation options for cooking with biomass in Ghana; Technical University of Denmark; Lyngby, 1996 (page 6); and Quaye, W. and Stosch, L. A study of fuel consumption of three types of household charcoal stoves in Ghana, Ghana Journal of Agricultural. Sciences. 41, 85-93: 2005 (Table 8, page 91); and Energica. "Pre-feasibility study for an improved cook stoves project in Northern Ghana" (Author unknown) submitted to Danish Energy Agency, 2009 (page 16).

Value applied:	0.99
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per applied methodology AMS-II.G, v.3, f_{NRB} is calculated by applying the following formula: $f_{NRB} = \frac{NRB}{(NRB + DRB)}$ NRB: Non-renewable woody biomass DRB: Demonstrably renewable woody biomass NRB and DRB are determined based on FAO and IPCC data. The detailed calculation and the related references are provided Section B.5.2 below.
Any comment:	-

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/tonne
Description:	Net calorific value of the non-renewable biomass that is substituted
Source of data used:	AMS-II. G V.3, page 2
Value applied:	0.015
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as prescribed by methodology applied
Any comment:	-

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

Data / Parameter:	η_{old}
Data unit:	Efficiency
Description:	Efficiency of the system being replaced
Source of data used:	AMS-II. G v.3
Value applied:	0.101
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is a weighted average of the two default values taken from the methodology AMS-II.G V.3 for conventional (0.1) and improved (0.2) cook stoves, based on an estimated penetration of ICS of 1% in Ghana, which is derived from 2008 WHO data (see Annex 3).
Any comment:	See Annex 3 for full details of assumptions.

Data / Parameter:	η_{new}
Data unit:	Efficiency
Description:	Efficiency of the system being deployed
Source of data used:	The efficiency will be based on manufacturer's specifications for the purposes of ex-ante emissions reduction calculations. During monitoring, the efficiency will be determined on the basis of sampling, using the Water Boiling Test (WBT) protocol.
Value applied:	36.3%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value chosen is a simple average of the efficiency of the three stove models to be distributed as part of this CPA. The average thermal efficiencies of the stove models indicated in Section A.4 are: • CH2200: 38.2% • CH4400: 31.4% • CH2300: 39.4% This is a conservative approach, since the pilot testing in early 2012 showed that the CH2300 – the most efficient of the three stoves – is the most popular model, due to its tailored design (more suited to local pots). Thus it can be expected that more CH2300s will be sold during the distribution than the other less efficient models. All the stoves manufactured by Envirofit International have been tested in accordance with the "Emissions and Performance Test Protocol", with emissions measurements based on the stove testing protocol developed by Colorado State University (available at www.eecl.colostate.edu).
Any comment:	During monitoring, WBTs will be carried out for a sample of installed ICSs that are in operation during each monitoring period. The WBTs will be conducted in line with the guidance provided by the CME and according to a methodology supported by an appropriate international body such as PCIA.

Data / Parameter:	LAF

Data unit:	Fraction
Description:	Net to gross adjustment factor to account for leakages
Source of data used:	AMS-II. G version 03
Value applied:	0.95
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as prescribed by methodology applied
Any comment:	-

B.5.2. Ex-ante calculation of emission reductions:

Application of the methodology:

1. Governing equation for emission reduction

The equation for calculation of emission reductions is:

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

Where:

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

Where:

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

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

- A trend showing an increase in time spent or distance travelled for gathering fuelwood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area;
- Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area;
- Increasing trends in fuel wood prices indicating a scarcity of fuel-wood;
- Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass.

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

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

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

See further below for determination of the value of f_{NRB}.

$B_{y,savings}$ is estimated using option 2 of the methodology AMS-II.G version 3.

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

Where:

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

activity.

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

Thus,

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

Where:

LAF	Net to gross Adjustment factor (0.95) applied in accordance with paragraph 13 and 23 of AMS-II.G v. 03
N_{all}	Total number of stoves installed (number)
$Q_{biomass}$	Average annual biomass consumption per appliance (tonnes/ year).
SOF	Stove Operation Fraction (SOF) (% of stoves operating or replaced by equivalent in-service appliance[21]). The parameter SOF is applied to meet the requirements of the methodology as outlined in its paragraph 16 and will be measured ex post using survey/ user feedback in each monitoring period. The CME will select a sample of stoves from the PoA Distribution and Monitoring Database and visit the premises which received these stoves.
μ_{old}	Average amount of woody biomass consumption that is consumed through the continued use of old stoves (kg/year) (to be established through sampling). This value is divided by 1000 to convert kg/year to tonnes/year
f_{old}	Fraction of end users that are still using their replaced stoves during the monitoring period (established through sampling)
$Stove_{year}$	Calculated average stove operation years in the monitoring period (years). If stoves have been operating for 365 days then $Stove_{year}$ = 1.0. If less than 365 days, then $Stove_{year}$ is represented as a fraction of 365 (eg. 180 days= 0.5).

Determination of DRB, NRB and f_{NRB}

[21] For example, if an end user has purchased an Envirofit stove and it is found to be defective within the warranty period they will be entitled to a replacement stove.

FAO data together with IPCC data has been used to determine f_{NRB} in Ghana as is done by applying the following steps:

Step 1: Demonstrably renewable woody biomass[22] (DRB)
According to AMS.II.G Version 3 woody biomass[23] is "renewable" if one of the following two conditions is satisfied:

I. The woody biomass is originating from land areas that are forests[24] where:

(a) The land area remains a forest; and

(b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and

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

II. The biomass is woody biomass and originates from non-forest areas (e.g., croplands, grasslands) where:

(a) The land area remains as non-forest or is reverted to forest; and

(b) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and

(c) Any national or regional forestry, agriculture and nature conservation regulations are complied with.

The following argument will demonstrate that none of the conditions above is satisfied.

According to FAO[25], there are indications that Ghana has never successfully practiced sustainable forest management. The forests have been depleted and degraded and the sector is now characterized by excessive harvesting of logs over and above the Annual Allowable Cut (AAC), reduction in standing volumes of species, dwindling resource base, species depletion and loss of biodiversity. The driving engines that have shaped the structure and composition of the forestry identified as logging, unsustainable farming, annual bushfires, surface mining and infrastructural development. Underlying these driving engines are forest policy failures, unrealistic forest fee regimes, external prices of timber and weak institutional structures.

[22] This definition uses elements of annex 18, EB 23.

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

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

[25] http://www.fao.org/docrep/003/ab567e/AB567E03.htm

Furthermore, the figures extracted from Table T1 of FAO (2010)[26] clearly indicate that the forest area has decreased dramatically with time. According to the report, 21% (4,940,000 ha) of Ghana was forested. Between 1990 and 2010, Ghana lost an average of 250,800 ha or 3.4% per year. In total, between 1990 and 2010, Ghana lost 33.7% of its forest cover or around 2,580,000 ha.

Table 1: Forest and other wooded land in Ghana

FRA 2010 categories	Area (1000 hectares)			
	1990	2000	2005	2010
Forest	7 448	6 094	5 517	4 940
Other wooded land	0	0	0	0

Source: FAO (2010): Global Forest Resource Assessment 2010, Country Report Ghana, page 7.

- **Therefore, conditions (I (a) and II (a)) above are not satisfied.**

There is also strong evidence that forests and other wooded land that is used for wood harvesting whether it is for industrial roundwood or fuelwood sourcing is not sustainably managed. The FAO Forest Resource Assessment 2010 country report for Ghana shows a declining trend of carbon stocks in Ghana due to deforestation taking place. If forests or other wooded land was sustainably managed, carbon stocks and growing stock would not systematically decrease over time. However, this trend (32.5% and 33.7% reduction respectively) can clearly be seen from the tables below.

Table 3: Carbon stock in living forest biomass in Ghana

FRA 2010 Category	Carbon (Million metric tonnes)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Carbon in above-ground biomass	454.8	375.2	341.2	307.2	n/a	n/a	n/a	n/a
Carbon in below-ground biomass	109.2	90.1	81.9	73.7	n/a	n/a	n/a	n/a
Sub-total: Living biomass	***564.0***	***465.3***	***423.1***	***380.9***	***n/a***	***n/a***	***n/a***	***n/a***

Source: FAO (2010): Global Forest Resource Assessment 2010, Country Report Ghana, page 29.

Table 4: Growing stock from forest in Ghana

Year	1990	2000	2005	2010
Forest area (1 000 ha)	7 448	6 094	5 517	4 940
Growing stock in forest and plantation (mio m^3)	423	352	321	291

Source: FAO (2010): Global Forest Resource Assessment 2010, Country Report Ghana, page 22.

According to FAO[27], at the beginning of the twentieth century Ghana had a total of about 8.6 million ha forested area, both inside and outside government gazetted lands. Currently forests outside forest reserve land have almost disappeared, leaving only the government gazetted forest reserves. It is estimated that the area of forested land left is about 1.6 million ha. The report further states that the rate of forest clearing outside forest reserves is such that intact forests have virtually disappeared except within forest

[26] http://www.fao.org/docrep/013/al543E/al543e.pdf

[27] http://www.fao.org/DOCREP/006/J0628E/J0628E53.htm

reserves and in small patches of sacred groves near villages. The proportion of forests outside forest reserves declined from 20 per cent in 1955 to 5 per cent in 1972 (Forestry Department Annual Reports 1952 - 1972). Deforestation has been quite rapid between the periods 1950 and 1987. Nearly 75 per cent of the original forested land has been cleared by 1987.

These overall forest depletion figures are supported by a UNDP report on the potential for substituting LPG for woodfuel in 2004[28]. The report concluded that: "Ghana's reliance on wood fuel has become a serious threat to the ecosystem of the country. Ghana's tropical forest area is today 25 percent of its original size. Yet, almost 2% or 22'000 hectares of forest are depleted every year." "Today, forest growth in Ghana is less than half of fuel wood demand. This makes fuel wood an unsustainable energy option."

- **Therefore, conditions (I (b) and II (b)) above are not satisfied.**

The history of forest policies and resources management in Ghana dates back to 1906 when legislation was enacted to control the felling of commercial tree species and the creation of the Forestry Department in 1908. Concerns and agitations from major stakeholders and growing global interests in forest loss culminated in the revision of the old forest policy and eventually, the Forest and Wildlife policy in 1994 (MLF, 1994). The overall aim of the Forest and Wildlife Policy, 1994, is conservation and sustainable development of the nation's forest and wildlife for maintenance of environmental quality and perpetual flow of benefits to all parts of society.

A 2005 paper[29] discusses the historical background of the forestry policies in Ghana. The paper states that several major social, environmental and economic issues that are crucial for a sustainable management of forest resources in Ghana did not receive adequate attention in the 1994 Forest and Wildlife Policy.

An analysis conducted by Friends of the Earth Ghana[30] of the 1994 Ghana forest and wildlife policy reveals a number of challenges impeding the achievement of the policy aims. The paper cites fair access to forest resources, fair benefit sharing, corporate exploitation, and greater participation in forest policy-making and management as major governance challenges arguing that this has a direct bearing on the government's ability to enforce the laws that restrict industry's access to resources, develop rules that will facilitate greater communal access to timber and non-timber forest products, and to enforce the revenue sharing schemes set out in the Constitution of Ghana. It further argues that stakeholders have pointed out that there is a disconnect between official policy and legislation, citing collaborative forest management as an important component of the 1994 Policy, which has still not been captured in legislation.

The available literature indicate a challenge in implementing the 1994 policy, therefore though the policy exists, it is not enforced.

- **Therefore, conditions (I (c) and II (c)) above are not satisfied.**

[28] UNDP Infolink, 2004: ENVIRONMENT AND ENERGY. Liquefied Petroleum Gas (LPG) Substitution for Wood Fuel in Ghana – Opportunities and Challenges. A Brief Analysis of the LPG Sector in Ghana, p2-3

[29] Emanuel Boon et al, 2009 available at http://www.iaia.org/iaia09ghana/documents/cs/CS2-2_Boon_etal_An_Assessment_of_Forest.pdf

[30] http://www.ug.edu.gh/fos/vbrp/climate/REDD_in_Ghana.pdf

Step 2: Non-renewable biomass:
Non-renewable woody biomass (*NRB*) is the quantity of woody biomass used in the absence of the project activity (B_{old}) minus the *DRB* component, as long as at least two of the following supporting indicators are shown to exist:

- A trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area;

Proof:
According to the Ghana Energy Commission's Draft Bioenergy Policy (2010)[31], charcoal and fuelwood are produced commercially far from the major consumption centres and are transported by road over distances of more than100 kilometres.

A similar trend is evident in the more remote parts of the country. A study[32] conducted in Gushengu District of the Northern Region of Ghana to investigate charcoal production revealed that a significant effect of charcoal production in the study area was the longer distance travelled by producers to obtain wood to burn. The result shows that the forest and tree species used for charcoal production are diminishing. Women and children who traditionally collect firewood and charcoal for domestic cooking also now walk longer distances to source firewood and charcoal.

- Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area;

Proof:

As shown in Table 3 above, according to FAO data (2010) the carbon stock contained in forests (above-ground biomass and below-ground biomass) has steadily declined in Ghana since 1990, falling by roughly 30% over the period to 2010.

Following the above assessment which clearly indicates that there is no DRB since none of the three conditions are satisfied, one could argue that DRB = 0 and thus NRB = 1**.** However, in order to be conservative it is considered that in some cases, woody biomass may be sourced from dead wood or from locally practiced agro-forestry systems. We will further consider the proportion of woody biomass harvested for fuelwood in our calculation.

The calculated f_{NRB} for Ghana is **0.99** as calculated following the sub-steps below.

Step 3: calculation of f_{NRB}:
The fraction of woody biomass saved by the project activity in year *y* that can be established as non-renewable is:

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

[31] http://new.energycom.gov.gh/downloads/BIOENERGY.pdf

[32] http://www.ipublishing.co.in/jesvol1no12010/EIJES2138.pdf

Where:

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

Where NRB = B_y - DRB

Sub-step 3a: Determination of B_y

B_y is the biomass used in tonnes dry matter in year y in the absence of the project activity in the area for which the f_{NRB} is calculated. This can be either a whole country or a region within it. B_y is calculated using the two following approaches, of which the more conservative result shall be applied.

Approach 1: Based on volumetric wood harvest data and converted to tonnes using the appropriate Biomass Conversion and Expansion Factor for wood removal as:

$$B_y = H_y * BCEF_R$$

Where:

H_y	Volumetric wood harvest in m^3/yr in year y. National and regional data from literature or published reports can be used. FAO data can also be used.[33]
$BCEF_R$	Biomass Conversion and Expansion Factor for conversion to wood removals[34] in ton/m^3. IPCC values can be used.

Approach 2. Calculating Total Annual Biomass Removals (R_y) and use it as a proxy for B_y in line with the SSC WG information note contained in their thirty fifth meeting report annex 20[35].

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

Where:

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

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

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

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

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

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

Where:

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

The table below illustrates the calculation of B_y using the two approaches.

Approach 1	**Parameter**	**Unit**	**Ghana**	**Source**
Biomass removal	**B_y**	**t/year**	**54,218,400**	**Calculated**
Harvest	H_y	(x1000) m3	23,780	FAO Forest Resource Assessment (FRA) 2010. Annex 3 Global Tables, Table 13
BCEF	$BCEF_R$	t/m3	2.28	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.5
Approach 2				
Total Annual Biomass Removals, R	**R_y**	**t/yr**	**38,378,200**	**Calculated**
Annual Change in living Biomass, ΔBM	ΔBM_y	t/yr	(16,000,000)	FAO Forest Resource Assessment (FRA) 2010. Annex 3 Global Tables, Table 11, converted to biomass by dividing by carbon fraction of 0.5 (cf. IPCC GPG)
Mean Annual Increment in Biomass growth, MAI	MAI_y	t/yr	22,378,200	Calculated
Extent of forest, F	F_y	Ha	4,940,000	FAO Forest Resource Assessment (FRA) 2010,Annex 3 Global Tables, Table 2

Growth Rate of Biomass, r	$r_{G,y}$	t/ha/yr	4.53	IPCC. Chapter Table 4.9, Vegetation types from http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.9 and table 4.10

Sub-step 3b: Calculation of Demonstrably renewable woody biomass (DRB)

DRB is calculated as:

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

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

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

Where:

$r_{G,y}$ Growth rate of biomass in tonnes dry matter per hectare in year y. Appropriate IPCC default values may be used[36].

$F_{protected,y}$ Demonstrably protected forest extent in hectare in year y. FAO data may be used to determine this[37].

	Parameter	Unit	Value	Source
Demonstrably renewable biomass (DRB)	DRB	t/year	194,790	Calculated*
Conserved forest areas	$F_{protected,y}$	ha	43,000	FAO Forest Resource Assessment (FRA) 2010, annex 3 Global Tables, Table 6 at http://www.fao.org/docrep/013/i1757e/i1757e.pdf
Annual growth	$r_{G,y}$	t/ha/yr	4.53	IPCC. Chapter Table 4.9, Vegetation types IPCCC chapter 4. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.9 and table 4.10
*DRB = 43,000 * 4.53 = 194,790				

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

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

Sub-step 3c: Calculation of Non-renewable biomass (NRB) and fNRB

$NRB = B_y - DRB$

NRB = 38,378,200 – 194,790
= **38,183,410**

fNRB = NRB/(NRB + DRB)
= 38,183,410/38,378,200
= **0.99**

B.5.3. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO2 e)	Estimation of baseline emissions (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
1 (15th to 31st December 2012)	0	645	0	3,869
2 (2013)	0	15,477	0	15,477
3 (2014)	0	15,477	0	15,477
4 (2015)	0	15,477	0	15,477
5 (2016)	0	15,477	0	15,477
6 (2017)	0	15,477	0	15,477
7 (2018)	0	15,477	0	15,477
8 (2019)	0	15,477	0	15,477
9 (2020)	0	15,477	0	15,477
10 (2021)	0	15,477	0	15,477
11 (January - 14th December) (2022)	0	14,832	0	11,608
Total Emission Reductions	0	**154,770**	0	**154,770**
Annual average over the crediting period of estimated reductions	0	**15,477**	0	**15,477**

B.6.1. Description of the monitoring plan:

Data / Parameter:	η_{new}
Data unit:	Efficiency
Description:	Efficiency of the system being deployed as part of the project activity
Source of data to be used:	As determined through sampling by performing WBTs
Value of data applied for the purpose of calculating expected emission reductions in section B.5	36.3%
Description of measurement methods and procedures to be	Water Boiling Tests (WBTs) will be carried out for a sample of installed ICSs in operation in line with the PoA Sampling Plan.

applied:	For sample size estimation purposes, the thermal efficiency of each ICS model to be distributed will be assumed to vary within a value range of +/- 10% of the certified average thermal efficiency of the stoves: • CH2200: average thermal efficiency: 38.2%; lower bound of 34.8% and upper bound of 42% • CH2300: average thermal efficiency: 39.4%; lower bound of 35.5% and upper bound of 43.3% • CH4400: average thermal efficiency: 31.4%; lower bound of 28.6% and upper bound of 34.5%
QA/QC procedures to be applied:	The CME will provide training and guidance to the DO or a third party contractor (Monitoring Organisation) hired to conduct WBTs in line with cross-CPA sampling to be undertaken as part of the PoA Sampling Plan and according to a methodology supported by PCIA.
Any comment:	Value chosen for ex-ante emissions reductions estimations in B.5 corresponds to a simple average of the thermal efficiencies of the three stoves to be distributed. This is conservative given that the CH2300, with an average thermal efficiency of 39.4% is likely to be more popular than either the CH2200 (38.2%) or the CH4400 (31.4%) based on the end user feedback received during testing of the stoves in early 2012. End users indicated their preference for a stove designed to support a round-bottomed stove, which is why the CH2300 is being introduced for the Ghanian market. During the actual distribution the stove model sold to each customer will be recorded. In line with the methodology, a weighted average value of the efficiency of each model distributed will be used, with the weightings based on the actual distribution numbers of the different stove types. Each WBT conducted during monitoring will be matched with a specific serial ID number of the stove tested. Hence, the stove type (i.e. fuel type and specific laboratory efficiency) can be clearly identified allowing an extrapolation of the results of the sampling to all stoves of the same type, distributed within the PoA.

Data / Parameter:	N_{all}
Data unit:	Number
Description:	Total number of stoves installed
Source of data to be used:	Record of all installations and date of each installation. Individual ICS serial ID numbers will be listed in the PoA Distribution and Monitoring Database.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4,500
Description of measurement methods and procedures to be applied:	Each DO shall maintain CPA Distribution Records which will provide the data used to calculate this parameter. This data will be uploaded to the PoA Distribution and Monitoring Database maintained by the CME.

	During monitoring, if it is found that more than one Envirofit ICS is being used per household, the CME will exclude any such additional ICS from the emissions reduction calculations by removing such ICS from the PoA Distribution and Monitoring Database. This way there will be no double-counting of emissions reductions. This situation is expected to be highly unusual for two main reasons. Firstly, the affordability barrier facing typical households in Ghana means that buying one Envirofit ICS is already a challenge, let alone buying two or more. Secondly, as discussed above in the section relating to the parameter $Q_{biomass}$, households in Ghana typically use one principal stove for cooking, making the benefit of purchasing a second Envirofit ICS questionable, even if they could afford it.
QA/QC procedures to be applied:	The CME will supervise the activities of each DO, and provide training, guidelines and distribution templates to facilitate accurate record keeping during the ICS distribution. The CME will also maintain a record of the stove serial numbers supplied to each DO, and will be able to cross-check these against the CPA Distribution Reports it receives back from the DO.
Any comment:	-

Data / Parameter:	SOF
Data unit:	Fraction
Description:	Stove Operation Fraction – used to determine the share of distributed stoves that are still operating, measured ex-post through sampling
Source of data to be used:	Survey of end user behavior as part of PoA sampling plan
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.95
Description of measurement methods and procedures to be applied:	The actual value to be applied for emissions reduction calculations and request for issuance of CERs will be measured ex-post by investigation of the number of ICS installations within the sampled ICS which are operational. If for example 90% of the sample is only found to be operational, then SOF is 0.9.
QA/QC procedures to be applied:	The CME will provide training, guidelines and monitoring templates to ensure that the DO or another contracted party responsible for monitoring follows appropriate procedures.
Any comment:	A value of 0.95 is assumed for the ex-ante emissions reduction estimation. This assumes that 5% of stoves will either not be found, or will no longer be in use during monitoring. This is seen as conservative because: 1. The customer has paid a relatively high price for the stove compared with the existing alternative, and expects to get a return on this through fuel cost savings over time. If they do not use the stoves, the value of their investment will be lost. 2. Envirofit International offers a 5-year warranty for its stoves and they have an expected lifetime of 7-10 years. Thus there is no technical reason to think the customer will stop using their stove in this timeframe.

	3. With training of the CPA implementer on correct data collection, the incidence of incorrect data capture leading to not finding stoves will be minimised. 4. With customer follow-ups through the CPA implementer, CEESD, and its network of retailers, the CME can ensure that customer data is kept up to date (up to date customer data is also a condition of the 5-year warranty).

Data / Parameter:	μ_{old}
Data unit:	kg/year
Description:	The amount of woody biomass consumption that is consumed through the continued use of old stoves
Source of data to be used:	Survey of end user behavior as part of PoA sampling plan combined with the same source of data as for $Q_{biomass}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5	217.8
Description of measurement methods and procedures to be applied:	The actual value to be applied for emissions reduction calculations and request for issuance of CERs is measured ex-post by estimation of a representative sample of end users using the deployed ICS, as conducted in line with the PoA Sampling Plan. Please see Sampling Plan in PoA-DD for details of the measurement approach. During the survey, the interviewer will conduct an interview with the end user to identify how much the baseline (replaced) stove is being used. The value of μ_{old} will be estimated by comparing the number of meals per month before and after ICS distribution. Where: $u_{old} = \frac{MPM_{after\ ICS}}{MPM_{before\ ICS}} \cdot$ Total annual fuel consumption (kg) Based on the sampling results, an average value for μ_{old} will be determined. The total annual fuel consumption value then needs to be converted from charcoal to woody biomass using the default IPCC conversion factor of 6 (consistent with the approach in B.5.1 for $Q_{biomass}$). The CME will then multiply this value by the fraction of end users continuing to use baseline stoves (f_{old}). The result will be deducted from the total annual biomass consumption and applied to the emissions reduction calculations.
QA/QC procedures to be applied:	The CME will provide training, guidelines and monitoring templates to ensure that the DO or another contracted party responsible for monitoring follows appropriate procedures for the survey.
Any comment:	The value of the parameter μ_{old} cannot be known ex-ante, since even if a replaced

stove is retained the end user may continue to use it frequently, only occasionally or not at all. For the purposes of estimation of emissions reductions, a value has been applied by using a simple scenario-based approach.

If it is assumed that 3 hot meals are typically prepared per day[38], and there are on average 30 days per month, then there are 90 meals per month that are cooked/heated up. On this basis, a number of different scenarios for the proportion of use accounted for by baseline stoves can be defined: high, medium, and low. The value chosen for ex-ante emissions reduction calculations is based on a medium scenario of continued baseline stove usage as described in the table below (note: sources used for deriving the annual charcoal consumption value are detailed in Annex 3 and have been converted to woody biomass using the IPCC default factor of 6).

Estimating the value of uOLD for ex-ante emissions reduction calculations			
Assume 3 hot meals per day, 30 days per month	**MPM**	**Share**	**uOLD (kg/yr)**
Low scenario: 1 meal per month is cooked using old stove	1/90	1.11%	48.40
Medium scenario: 1 meal per week is cooked using old stove	4/90	4.44%	193.60
High scenario: 1 meal per day is cooked using old stove	30/90	33.33%	1452.00

For conservativeness, we have taken the medium scenario value and rounded this up to the equivalent of 5% of the total charcoal consumption per year, multiplied by the IPCC conversion factor of 6, and used this value for ex-ante emissions reduction purposes. Thus μ_{old} = 217.8 kg/year.
This approach is seen as conservative, since many end users could logically be expected to either discard or otherwise stop using the replaced stove altogether. If some of the users sell or give their replaced stove to a neighbour, relative or friend, such people would logically only use the baseline stove if it is better (newer, more efficient) than their old stove. The emissions reductions resulting from such indirect replacements are not counted in the emissions reduction calculations for this CPA.

Data / Parameter:	f_{old}
Data unit:	Fraction
Description:	The fraction of end users that are still using baseline (replaced) stoves
Source of data to be used:	Survey of end user behavior as part of PoA Sampling Plan
Value of data applied for the purpose of calculating expected	0.1

[38] See for example, Quaye, W. and Stosch, L. A study of fuel consumption of three types of household charcoal stoves in Ghana, Ghana Journal of Agricultural. Sciences. 41, 85-93: (Original scientific paper. Received 30 Jun 05; revised 06 Aug 07.), which estimated 2.9 meals per day based on survey results (p88)

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The actual value to be applied for emissions reduction calculations and request for issuance of CERs is measured ex-post by estimation of a representative sample of households using the deployed ICS, as conducted in line with the PoA Sampling Plan. The survey will be done on the basis of a visual inspection of the household and if necessary an interview with the stove user to confirm whether they are still using a baseline (replaced) stove or not. In the case of this CPA it is anticipated that the majority of end users will stop using baseline stoves once they have started using the ICS. This is based on positive feedback received from local people who have tested the stoves ahead of the CPA implementation. Therefore, sampling will be used to estimate the value of this parameter by applying Option B: Monitoring the fraction of end users *not* using baseline stoves ($f_{non,old}$), where: $f_{old} = 1 - f_{nonold}$
QA/QC procedures to be apl plied:	The CME will provide training, guidelines and monitoring templates to ensure that the DO or another contracted party responsible for monitoring follows appropriate procedures for the survey.
Any comment:	The actual value for this parameter cannot be known ex-ante. For the purposes of ex-ante emissions reduction estimation a value of 0.1 is assumed, which means that 10% of all end users are assumed to continue using baseline stoves.

Data / Parameter:	$Stove_{year}$
Data unit:	Years
Description:	Calculated average stove operation years in the monitoring period. If stoves have been operating for 365 days then $Stove_{year}$ = 1.0. If less than 365 days, then $Stove_{year}$ is represented as a fraction of 365 (eg. 180 days= 0.5).
Source of data to be used:	PoA Distribution and Monitoring Database
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1.0
Description of measurement methods and procedures to be applied:	Each ICS entered into the PoA Distribution and Monitoring Database will be linked to a distribution date (recorded during distribution). Thus for any monitoring period it is possible to calculate the period of time that the stoves included in the emissions reduction calculations for that period have been operating.
QA/QC procedures to be applied:	The CME is responsible for overseeing the collection of data by DOs during distribution, training the DOs in correct data recording practices, maintaining a secure Database, and back up of files contained in the Database.
Any comment:	

Summary of Monitoring activities
As outlined in Section A.4, the CME will enter into a contract with the DO and this contract will include inter alia CDM-specific requirements relating to monitoring activities that occur during the distribution of stoves including the collecting of the necessary data required for ex-post monitoring, and ensuring that the CPA Distribution Records are completed correctly. The information contained in the CPA Distribution Records and the PoA Distribution and Monitoring Database enables the tracking of stoves back to the household level. The CME will manage the PoA Distribution and Monitoring Database, from which a representative sample will be drawn for the purposes of monitoring of parameters after the distribution of ICS has taken place (referred to as ex-post monitoring).

The CME will oversee ex-post monitoring activities and provide guidance and training to the actual persons responsible for carrying out the sampling whenever these are not direct employees of Envirofit International. This includes the use of sub-contractors or the CPA Implementer, CEESD. Two main options are currently foreseen for this: 1) engaging a locally-based marketing firm with experience in conducting door-to-door surveys of consumer behavior; and/or 2) contracting a local university department that has experience in conducting surveys of biomass energy consumption, cooking habits and water boiling tests. If either of these parties are engaged, the training and guidance provided by the CME will ensure that the correct procedures are carried out during monitoring as part of the PoA Sampling Plan and to meet the requirements of the methodology.

The CME will provide the persons carrying out the activities (referred to here simply as Monitoring Agents) with the necessary resources (monitoring templates to be filled out etc). The following checks will be carried out as part of the overall PoA Sampling plan, which is outlined in the PoA-DD. The below is simply a description of the approach to be undertaken and does not replace the PoA Sampling Plan:

Check (parameter)	**Method**	**Frequency required in methodology/envisaged**
Efficiency of project stoves (η_{new})	Carrying out WBTs	At least bi-annually, but likely to be done annually.
Check if project stoves are operational and in use (SOF)	Observation and interview with end user, asking them to demonstrate that project stoves are still operational and being used.	At least bi-annually, but likely to be done annually.
Estimate the amount (kg) of total fuel consumption accounted for by replaced stoves (μ_{old})	Observation and interview with end users to estimate the amount of consumption that is accounted for by the baseline (replaced) stove. This will be done by using a simple means such as estimating the number of meals per day/week/month that the end user cooks using the baseline stove post-ICS receipt compared with pre-ICS receipt.	Not specified in methodology AMS-II.G, but will be done as part of the PoA Sampling Plan either applying Option A (monitored annually) or Option B (monitored once and then fixed).
Estimate the proportion of end users that continue to use baseline stoves (f_{old})	Observation and if necessary interview with end users to determine if they continue to use	Not specified in methodology AMS-II.G, but envisaged to be done annually as part of

	baseline (replaced) stoves. Option being applied for estimation: Option B: Monitoring the fraction of end users *not* using baseline stoves ($f_{non,old}$)	the PoA Sampling Plan

The results of the checks will be recorded by the individuals conducting the field measurements (referred to in the diagram below simply as "Monitoring Agents"), using the CPA Monitoring Record template provided by the CME. The Monitoring Organisation (university or marketing firm) is then responsible for ensuring that the data contained in each individual CPA Monitoring Record is provided to the CME. Either the originals of the individual CPA Monitoring Records or scanned copies of each Record will also be provided to the CME to prove the authenticity of the data. The CME will maintain archives of past CPA Monitoring Records and make these available during verification.

The CME will cross-check the ex-post monitoring information received from the Monitoring Organisation. The data obtained from the ex-post monitoring activities will be kept in the secure PoA Distribution and Monitoring Database, along with the data obtained during distribution, and will be used for calculating the parameters outlined above, which will feed into emissions reduction calculations and made available to the DOE during verification.

Figure 7 below provides a graphical illustration of the ex-post monitoring activities to be carried out in the Monitoring plan.

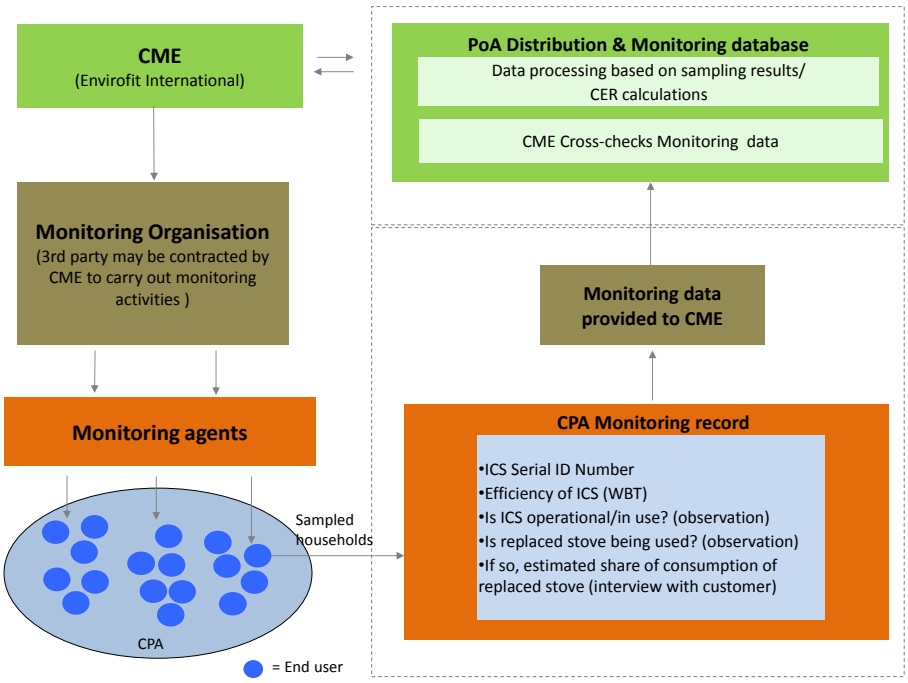

Figure 7: Monitoring plan

Sampling Plan application

Step 1: Pre-check for cross-CPA sampling	This CPA is the first CPA to be included in the PoA, and it will form part of a group of similar CPAs which will all involve the distribution of residential charcoal stoves in Ghana. It will be monitored together with these similar CPAs in line with the Sampling Plan that has been developed at the PoA level.
Step 2: Selection of applicable reliability level	This CPA will be monitored using cross-CPA sampling. As annual sampling is envisaged, 95/10 confidence/accuracy will be applied.
Step 3: Selection of applicable sampling frame	This CPA involves the distribution of portable charcoal stoves to households in Ghana. Based on the three types of stoves to be distributed, the following pre-defined sampling frames apply (see PoA-DD Annex 4, Step 3 for definition of sampling frames): Sampling Frame GHC-1 (appropriate for the CH2200) Sampling Frame GHC-2 (appropriate for the CH4400) Sampling Frame GHC-3 (appropriate for the CH2300)
Step 4: Sample size estimation	The sample sizes can only be estimated once the total population of the cross-CPA group is known for the monitoring period. This will be undertaken during monitoring at the cross-CPA level as part of the PoA Sampling plan. The equations outlined in the PoA Sampling Plan will be applied. For the estimation of sample sizes for sampling ICS efficiency (nnew), the anticipated mean and upper and lower bounds outlined in Section B.6.1 will be applied. A minimum sample size of 30 will be applied as a general principle.

Sampling will be undertaken in line with the requirements of AMS II.G V.3 and the "Standard for sampling and surveys for CDM project activities and programmes of activities" (EB 65 Report, Annex 2) (the Sampling Standard). The Sampling Standard (paragraph 20, footnote 18) allows for sampling across a group of CPAs, provided the homogeneity of population can be demonstrated, or differences are taken into account in the sample size calculation and 95/10 confidence/precision is applied. Please refer to the PoA Sampling Plan provided in the PoA-DD for more detail.

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:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

The environmental analysis will be undertaken at the CPA level due to the inclusion of multiple countries in the PoA. It is possible that some countries may have different laws relating to environmental impacts and assessments.

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

Environmental benefits:

- *Greenhouse gas reductions:* The CPA will result in GHG reductions because it will reduce the consumption of non-renewable biomass in Ghana where the biomass harvested for fuel use is typically non-renewable.

- *Air quality*: Users (especially women and children) will be exposed to fewer air pollutants through reduced emission of not only CO_2, but also carbon monoxide and particulate matter. Air pollution from cooking with solid fuel is a key risk factor for childhood pneumonia as well as many other respiratory, cardiovascular and ocular diseases.

All the stoves listed under section A.4.2.1 above have been tested in accordance with the "Emissions and Performance Test Protocol", with emissions measurements based on the stove testing protocol developed by Colorado State University (available at www.eecl.colostate.edu). The average CO emissions results show a per cent improvement above 60% in all cases, compared to a metal stove (charcoal stoves) or three stone fire (wood fuel stoves).

- *Biodiversity*: will be improved as the programme reduces pressure on remaining forest reserves in Ghana. Biomass consumption for fuel has been shown to be a major driving factor in the rate of deforestation in Ghana.

No negative impacts can be identified.

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

Ghana does not require an Environmental Impact Assessment for the proposed distribution of ICS. A certificate of registration with the Ghana Standards Board has been obtained.

SECTION D. Stakeholders' comments

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

☐ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

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

A wide range of local stakeholders from both the Ashanti region and from Accra were invited to a consultation meeting that was held on the 14th November 2011 at Alisa conference Hall, Accra Ghana. Stakeholders were identified as those whose activities directly or indirectly impact the project, and those who were to be impacted by the project activities (full lists of attendance are in the Local Stakeholder Consultation Report). Invitation letters were sent by DHL to the individual stakeholders, and an advert inviting the public was placed in the local newspaper. The invitations were welcoming written comments as well as physical attendance. Transport was arranged for some stakeholders who had to travel from Kumasi.

Over 60 stakeholders attended the consultation that was held on the 14th November. The stakeholders were encouraged to voice their concerns/issues in the language they were comfortable with and translation services were provided.

Figure 8: Stakeholders attending the consultation at Alisa conference Hall, Accra Ghana

Figure 9: Group Photo at the end of the consultation

D.3. Summary of the comments received:

The stakeholders expressed a number of interests and concerns relating to the stoves and the distribution programme:

- How they could enjoy the carbon credits,
- whether the project stoves could be locally made and source of raw materials,
- timeframe for the project implementation to cover the whole of Ghana,
- including the project in the school feeding program,
- concern about their capacity to handle heavy weights (cooking is normally done for large families using large pots); and
- Whether local people are to be involved in the distribution and how one becomes a retailer.

Other stakeholders raised concern about the risk of not registering the programme, and further that when the programme of activities is registered, the carbon revenues come only after about 2-3 years upon project start and that the crediting period is limited. What happens with the subsidies after the crediting period is over?

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

The stakeholders were informed that the purchasing price of the stoves will be lower than the actual price it would have been sold without developing this PoA. In addition they expect fuel savings of approximately 50% after purchasing the stove. Therefore, buying the stove and using it, they will enjoy the carbon credits deriving from the project.

It was highlighted that some parts such as the combustion chamber are built using a special alloy which currently may not be locally available. However, in future there are plans to set up an assembly plant to serve the west African region, and this plant will use as much local material as possible.

The programme of activities intends to register the first CPA and target distribution in the two districts in the Ashanti region. When the PoA is registered all other regions can be included. Other distributors can join and help to upscale the roll-out. The program is looking into an aggressive roll-out schedule. First gateway is the registration of the PoA. Later, partners can join the Programme and help to scale-up the geographical area of distribution.

On the concern of the stoves capability to handle weight, the stakeholders were informed that the stove can take the weight of two people of about 80kgs each indicating that they are very strong, but having realised the sizes of the pots and the comments from the stakeholders, Envirofit considers to start manufacturing stoves of the sizes that are required by the users. A lot of stoves on the market are not properly tested and lack of reliable information on emissions. Charcoal stoves might have large carbon monoxide emissions. Envifrofit stoves reduce CO by up to 70%.

Further, it was explained that the Envirofit product line is constantly being improved according to the local requirements. Subsequent to the LSC stakeholder feedback was received from a group of end users who were able to test the Envirofit CH2200 stove. Some of these end users commented that their preferred round-bottomed stoves were not particularly well-suited to the shape of the pot-support on this particular stove mode. In response to this, Envirofit International has made a change to the design of the pot support of the CH2200 to better accommodate the round pots. To differentiate this design from the flat-bottom pot support, which is more suited for East Africa, Envirofit refers to this version of the stove as the CH2300. The efficiency rating of the stove is equivalent to that of the 2200 as it does not differ in design in any other way.

Regarding distribution of the stoves, the stakeholders were informed that the distribution model clearly indicates stoves being sold in the case of the first CPA through local sales man, door to door. This is to create jobs for the local people. The sales man builds up a direct relationship to the customer and supports whenever problems occur in relation to the cook stove. Generally speaking retailers should have high integrity and should service the customer properly. Key is that they are able to collect relevant data when selling the stove to enable carbon revenues to flow and therefore sell the stoves on a subsidized price.

The stakeholders were informed that the PoA will be run for 28 years. During this time new CPAs can be included and hence new stoves can be sold continuously. The discounted stove price is calculated based on the expected carbon revenues assuming the limited crediting period. The user can already enjoy the subsidized price of the stove while the carbon revenues will stream in at a later stage.

The team is aware of the deadline and have a tight timeline to achieve a registration of the programme of activities in time. Validation will start some time in December and registration must be achieved before end of 2012. If the deadline is not achieved, the voluntary market would be the other alternative to sell credits. However, market price is less predictable and stoves might not be able to be distributed for the same price as it would have been possible in the compliance market.

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding has been received for the development or implementation of the SSC- CPA.

Annex 3

BASELINE INFORMATION

Household biomass consumption

Official national statistics on charcoal consumption at the household level are not available in Ghana at present. Therefore, literature values have been used. $Q_{biomass}$ is an estimation based on using the three sources outlined below and the Wood-to-Charcoal factor of 6 (IPCC).

Source	Value type	Value per day (kg)	Value per annum (kg)
Quaye, W. and Stosch, L. A study of fuel consumption of three types of household charcoal stoves in Ghana, Ghana Journal of Agricultural. Sciences. 41, 85-93: (Original scientific paper. Received 30 Jun 05; revised 06 Aug 07.) Note: survey was conducted in 2002.	Average charcoal consumption per household (kg) (traditional stove)	1.7	617
Edjekumhene, I., Atakora, S., Atta-Konadu, R., Brew-Hammond, A., Implementation of Renewable Energy Technologies - Opportunities and Barriers; Ghana Country Study; Kumasi Institute of Technology and Environment (KITE), published by UNEP, Risø, 2001, page 74	Average charcoal consumption per household (kg) (traditional stove)	2.5	913
Government of Ghana, Environmental Protection Agency, National Action Programme to Combat Drought and Desertification, (derived from per capita consumption of charcoal 0.43-0.46 kg/person/day) Accra, 2003, page 92[39]	Average charcoal consumption per household (kg) (traditional stove)	1.8	650
Average applied	**Average charcoal consumption per household (kg) (traditional stove)**	**2.0**	**726**

Average baseline efficiency of replaced stoves

There are no recent official Ghanian Government statistics on the penetration of "improved" cook stoves. The available literature suggests that the distribution of improved stoves in Ghana has been patchy at best, with the following observations:

- The Ahibenso stove, which was first introduced in the 1990s with Government support, is now basically unavailable in the marketplace due to a) not having been very popular with end users and b) lack of momentum once funding ran out. It can thus be assumed that there is no penetration of this stove. The estimated efficiency improvement of the stove was in the order of 30-40% over the traditional coal-pot (hence a thermal efficiency of around 0.13-0.14 compared

[39] Available online at http://www.unccd.int/actionprogrammes/africa/national/2002/ghana-eng.pdf

with the default efficiency of 0.1 for the conventional metal coal pot)[40]

- The Gyapa stove, which first introduced by Enterprise Works in 2002, is more popular and is available in markets. However, it is unclear what proportion of the population uses the stoves (numbers cited in the literature are in the order of 150,000-200,000 stoves sold by 2006). The thermal efficiency of Gypas varies widely due to the lack of quality control over local manufacturing, but is estimated at being up to 50% more efficient than a traditional coal pot (0.15 efficiency)[41].

- The Toyola stove, which is essentially a more recent (started in 2006) re-branded version of the Gyapa has been sold in numbers in the order of 150,000 since its introduction. Toyolas have a similar thermal efficiency to the Gyapa-style lined stoves (since it is essentially the same stove) but are being manufactured to higher quality standards.

- UNDP/WHO (2009) estimates a penetration of ICS of just 0.2% nationally in Ghana (slightly higher at 0.3% in urban areas), citing 2008 data on *access* to ICS (rather than actual usage, which could be much lower)[42].

It is impossible to base an estimated penetration rate on the numbers of improved stoves sold in the past since it cannot be known how many were in use at any time in the past. However, using the UNDP/WHO estimates as a guide, even if it were conservatively be assumed that a penetration of ICS of say 1% had been achieved in Ghana, this would suggest a baseline efficiency of 0.101 as shown below when the weighted average of the default values in the methodology AMS II G v3 are applied. Thus the CPA-DD has been amended and the baseline efficiency is set at 0.101.

Stove type	**penetration**	**n_{new}**
Improved stove	1%	0.2
Conventional stove	99%	0.1
Weighted average efficiency		**0.101**

Sources:

1) Ishmael Edjekumhene and Jacqueline C Cobson-Cobbold, Low-carbon Africa: Ghana; KITE, November 2011

2) Kemausuor F, et al. A review of trends, policies and plans for increasing energy access in Ghana. Renewable and Sustainable Energy Review, July 2011. Elsevier. Available online for purchase from www.elsevier.com/locate/rser

[40] Low-carbon Africa:Ghana; Ishmael Edjekumhene and Jacqueline C Cobson-Cobbold, KITE, November 2011, p5

[41] A review of trends, policies and plans for increasing energy access in Ghana; Kemausuor F, et al. A review of trends, policies and plans for increasing energy access in Ghana. Renew Sustain Energy Rev (2011), doi:10.1016/j.rser.2011.07.041, p4

[42] Legros, G., Havet, I., Bruce, N. and Bonjour, S., The Energy Access Situation in Developing Countries; A review focusing on the least developing countries and Sub-Saharan Africa. UNDP/WHO. New York, 2009, p91.

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

Demonstration of NRB in use since December 1989

Between 1990 and 2010, Ghana lost an average of 125,400 ha or 1.68% per year. In total, between 1990 and 2010, Ghana lost 33.7% of its forest cover, or around 2,508,000ha.

FOREST COVER (excluding planted forests) (1000 ha)				ANNUAL CHANGE RATE (Negative number represents deforestation)					
1990	2000	2005	2010	1990-2000		2000-2005		2005-2010	
				1000ha	*percent*	*1000ha*	*percent*	*1000ha*	*percent*
7,398.0	6,034.0	5,357.0	4,680.0	- 136.0	- 1.8	- 136.0	- 1.8	- 135.0	- 2.2

Figure 6: Ghana: Trends in Natural Forest Cover (Deforestation), 1990-2010[43]

In addition the following literature is referenced to the above FAO data:

"Since 1981, the annual rate of deforestation in Ghana has been two percent/year or 750 hectares each year. Ghana's tropical forest area is now just 25 percent of its original size." - TED Case Studies, Ghana Forest Loss[44]

"A century ago, Ghana's tropical hardwood forest extended from about the middle of the country southward to the sea. Moreover, nearly half the country was covered with forests, which included 680 species of trees and several varieties of mahoganies. Most of this wood has been cut. By the early 1990s, only about one-third of the country was still forested, and not all of this was of commercial value. This situation has forced the government to make difficult choices between desperately needed hard currency earnings and conservation. The Forest Resource Management Project, part of the ERP, was initiated in 1988, and in 1989 the government banned log exports of eighteen species. The government later extended the list and imposed high duties on other species, planning to phase out log and air-dried timber exports altogether by 1994" - Felling timber. Forestry is one of Ghana's major industries and sources of exports; Courtesy Embassy of Ghana, Washington [45]

[43] http://rainforests.mongabay.com/deforestation/2000/Ghana.htm#03-deforestation

[44] http://www1.american.edu/TED/ghana.htm

[45] http://lcweb2.loc.gov/cgi-bin/query/r?frd/cstdy:@field%28DOCID+gh0092%29

Annex 4

MONITORING INFORMATION

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