

**SMALL-SCALE CDM PROGRAMME ACTIVITY DESIGN DOCUMENT FORM
(CDM-SSC-CPA-DD) - Version 01**



NAME /TITLE OF THE PoA:

African Improved Cooking Stoves Programme of Activities



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

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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).

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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)
23/11/2011
Version 1.0

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 line with CDM methodology AMS. II G v3.0 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 total amount of fuel required for cooking, the replacement of traditional stoves by ICS reduces the amount of GHG emitted into the atmosphere. Certified Emission Reductions (CERs) are calculated following the version 03 of methodology AMS.II.G on the basis of the mass of non-renewable woody biomass saved by the ICSs.

The proposed CPA is a voluntary action undertaken by the Coordinating/Managing Entity (CME), Envirofit International (Envirofit), a company based in the United States of America, and carried out 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. Based on the estimated energy savings, it is envisaged that about 4,000 to 5,000 stoves will be distributed under the CPA.

The proposed CPA will be developed and 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 PoA will result in GHG reductions because it will reduce the consumption of non-renewable biomass in countries 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 CO₂, but also carbon monoxide and particulate matter.

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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” stove³.

- *Biodiversity*: will be improved as the programme 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 addressed⁴.

Social and Economic benefits:

- *Employment*: The programme 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 fuel cost, providing financial savings over the medium-long term. Reduction in wood 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 the required cooking time.
- *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 (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:

The CPA will be implemented using the version 03 of the approved methodology *AMS. II.G - Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass*. This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass.

³ Based on results for the Envirofit CH2200 and CH4400 stoves compared with a traditional metal jiko. See Envirofit product overview available at www.envirofit.org

⁴ UNDP Ghana, Infolink: Environment and Energy, LPG – Substitution for wood fuel in Ghana – Opportunities and Challenges. UNDP Ghana, Accra, 2004.

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Examples of these technologies and measures include the introduction of the 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

The CH2200 stove has an average thermal efficiency of 38.2%, and is therefore significantly more efficient than the stoves to be replaced; it also reduces carbon monoxide emissions by around 63%, making it highly beneficial from a health perspective⁵. 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 perspective⁶.

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;

⁵ Certified test results from testing conducted by the Engines and Energy Conversion Laboratory at Colorado State University available at www.envirofit.org

⁶ Certified by testing conducted by the Engines and Energy Conversion Laboratory at Colorado State University

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- (v) The DO's CDM-specific responsibilities and deliverables during the stove distribution to ensure accurate collection of information from customers; and
- (vi) Provisions outlining the consequences of non-compliance with the above requirements.

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.⁷ 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.

⁷ 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.



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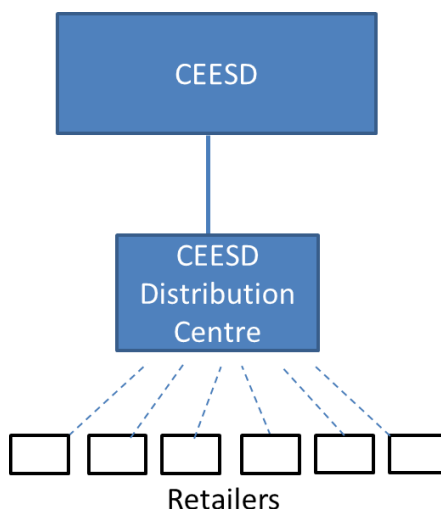


Figure 2: Distribution model - organisational hierarchy

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 (see below).

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 and the Team Leaders can link remuneration to the complete and accurate collecting of information during the distribution of stoves (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.

At least 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 at the time of distribution:

- CPA ID number;
- Name/Identification of end user;
- The phone number of the end-user (if available);
- Second phone number (if deemed to be necessary – eg. close relative);

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- Serial ID number of stove;
- Geographical location (fixed address if possible, or alternatively using GPS coordinates or some other appropriate means of locating the household – eg. address of the customer's local community church or name and address of local community leader etc);
- Date of distribution;
- Category of old stove being replaced: combination of the replaced stove type and fuel type (this is required to confirm that only charcoal stoves are being replaced);
- Category of new stove replacing old stove: combination of stove model and fuel type.

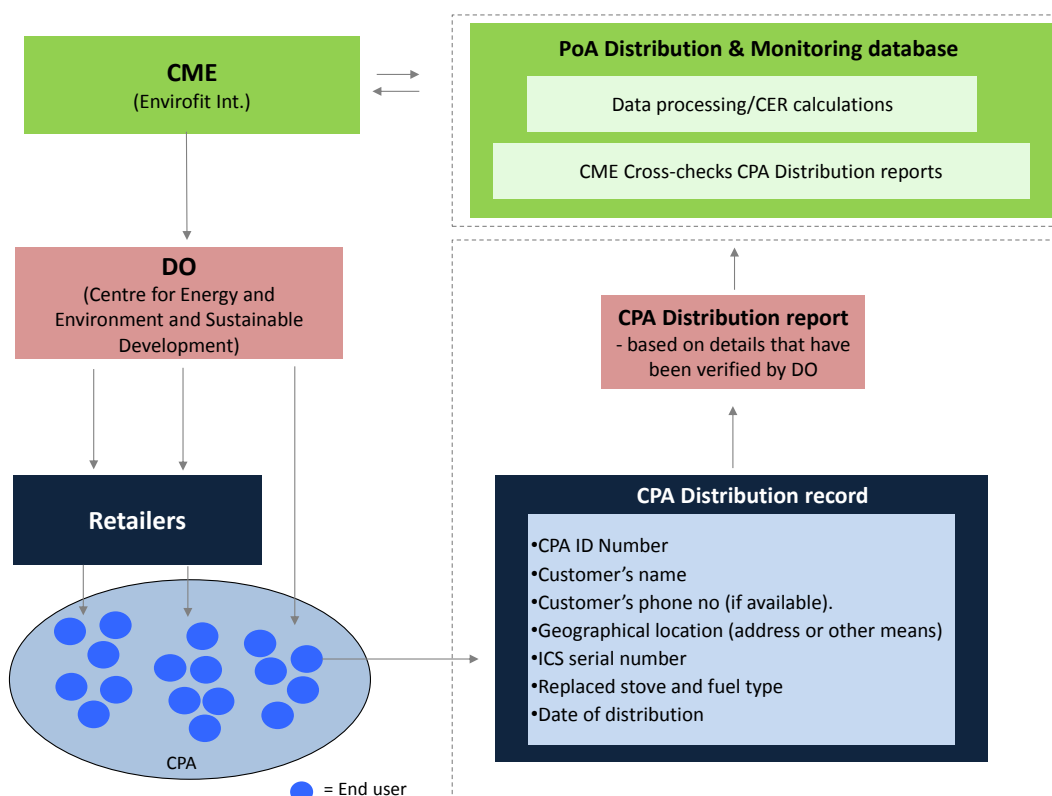


Figure 3: Operational structure and key responsibilities for data collection

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.

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

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Transfer of information to the CME

The data contained in CPA Distribution Records will be compiled by the DO into a CPA Distribution Report. This Report will be provided to the CME in a format to be defined by the CME (for example, in an Excel spread sheet or similar data sheet format). The DO will provide a CPA Distribution Report to the CME on a regular basis.

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, as the DO, will be 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 for 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.

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 the claims made by DOs. 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”.

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 the latter. A copy of the PoA Distribution and Monitoring Database will be kept in an electronic format.

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

African Improved Cooking Stoves Programme of Activities - CPA No. 00001 (Ghana)

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, but is limited to the territorial area of the host country, Ghana.



Figure 4: Map of the Republic of Ghana (source: CIA World Factbook, 2011)

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. This information will be stored securely by the CME in the PoA Distribution and Monitoring Database and will be available at DOE at during verification.

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

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

01/02/2012 (expected starting date of the CPA)

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

21 years.

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

Renewable crediting period.

A.4.3.1. Starting date of the crediting period:

01/07/2012

The expected crediting period starting date is the date of inclusion of the CPA in the PoA or the date when the first ICS unit has been distributed, whichever is the latter.

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

7 years, renewable twice

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

Project Year	Annual estimation of Emission Reductions (in tonnes CO₂e)
1 (July - December 2012)	5,515
2 (2013)	11,030
3 (2014)	11,030
4 (2015)	11,030
5 (2016)	11,030
6 (2017)	11,030
7 (2018)	11,030
8 (July - December 2019)	5,515
Total Emission Reductions (tonnes of CO ₂ e)	77,207
Total Number of crediting years	7
Annual average over the crediting period of estimated reductions	11,030

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See provided Annex for emission reduction calculation for more detailed information on the underlying assumptions and the estimated number of stoves to be distributed in the CPA.

A.4.5. Public funding of the CPA:

No public funding or ODA was diverted for the implementation of the CPA.

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, 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		

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1	Technology requirements	The ICS applies one of the following fuel types: • Wood fuel • Charcoal	Technical specification of ICS provided	Yes (Charcoal stove as specified in manufacturer's product description)
2		The ICS has a minimum efficiency of 20% (AMS II.G, Version 3, para 1)	Technical specification of ICS provided	Yes (Average thermal efficiency as certified in tests by CSU: CH4400: 31.4% CH2200: 38.2%)
3	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 AMSII.G. V 03 are shown to exist in the country	Yes (see Annex 3)
4	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.	Yes (Ghana)
5	Start date	The CPA start date shall be after the PoA validation start date.	The start date of the CPA will be specified in each CPA-DD.	Yes (01/02/2012)

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6	Additionality of CPAs	<p>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):</p> <p>1. If the CPA size is below 60 GWh_{th}/year:</p> <p>(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</p> <p>(b) The project activity is an emission reduction activity with both conditions (i) and (ii) satisfied;</p> <p>(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</p> <p>(ii) End users of the subsystems or measures are households/communities/SMEs.</p> <p>2. If the CPA size is between 60 and 180 GWh_{th}/year, then it can be demonstrated that at least one of the barriers discussed in Section A.4.3. also applies to the CPA as required by the additionality approach outlined in Section E.5.2. Once this has been demonstrated for the first CPA in each country, further CPAs in that country can use this proof as a reference when demonstrating additionality.</p>	<p>In the case of test 1: 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.</p> <p>In the case of test 2: For the first CPA in each country it shall be demonstrated that at least two of the criteria in section E.5.2. are met. (This shows that barriers outlined in Section A.4.3 apply)</p>	<p>Yes</p> <p>(According to test 1 for micro-scale CPAs, the CPA size is below 60 GWh_{th}/year and the project activity is an emission reduction activity with both conditions (b) (i) and (ii) satisfied;</p>
7	SSC Limit for CPAs	<p>The annual energy savings of each CPA shall not go beyond the limits of 180 GWh_{th}/year over the entire crediting period.</p> <p>In the case of using option 1 to prove additionality under Eligibility Criteria 6, the limit shall be 60 GWh_{th}/year over the entire crediting period.</p>	<p>The maximum number of ICS will be determined in each CPA-DD depending on the technology used. If a CPA exceeds the applicable limit, the claimable emission reduction shall be capped at the</p>	<p>Yes</p> <p>(The annual energy savings are not beyond the limits of 60 GWh_{th}/year over the entire crediting period – see emissions reduction spreadsheet).</p>

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			stated limit.	
8	Exempted from de-bundling	Each improved cook stove reduces less than 1.8 GWh _{th} /year ⁸ .	Specific energy savings for the applied ICS estimated using Excel sheet or similar tool.	Yes (see emissions reduction calculations spread sheet)
9	Contractual agreement	The DO has signed a contractual agreement with the CME to participate in the PoA. This agreement: <ul style="list-style-type: none"> defines the ownership of the carbon emission reduction rights covers the DO's distribution and monitoring related responsibilities 	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)	Yes (see confidential Annex to the contract between the CME and the DO relating to the CDM responsibilities of the DO)
10	Sampling	Sampling to be undertaken as part of the CPA is to be done in line with the requirements of the applied methodology AMS II G V3.0, and the latest applicable guidelines/standards for sampling and surveys.	As specified in the sampling plan in the CPA-DD and/or according to the sampling requirements specified at PoA level	To be developed during validation for inclusion in final version
11	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 DO/CME b) Affirmation by funding party	Yes (The CPA is not receiving any funding from Annex I parties)

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:

⁸ According to the “Guidelines on assessment of debundling for SSC project activities, v03 (EB 54, Annex 13, par. 10) for determining the occurrence of debundling under a Programme of Activities (PoA)”, if each of the independent subsystem/measures included in the CPA of a PoA is not larger than 1% of the small scale threshold defined by the methodology applied, than that CPA of PoA is exempted from performing de-bundling check, i.e. considered as being not a de-bundled component of a large scale activity.

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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 small-Scale CPA: (not applicable for this CPA)

For small-scale CPAs, in the case of the first CPA to be included in a new country that is added to the PoA post-registration, at least two of the following criteria must also be satisfied:

- a. The country is classified as an LDC;
- b. Lack of access to capital without carbon finance - as demonstrated by a letter from a major investor or lender or other appropriate documentation;
- c. At least one of the barriers in Section A.4.3. can be demonstrated to also apply in that country. For example, this could be done by providing a reference document from a credible source, no older than seven years, that supports the demonstration of the barrier.

All subsequent CPAs in that same country can reference the demonstration of additionality in the first CPA.

In case of micro-scale-CPA:

The CPA is considered additional if it satisfies the micro-scale additionality requirements according to the latest guidelines:

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

- a. The geographic location of the project activity is a LDC/SID or special underdeveloped zone of the host country as identified by the Government before 28 May 2010; or
- b. The project activity is an emission reduction activity with both conditions (i) and (ii) satisfied;
 - i. Each of the independent subsystems/measures in the project activity achieves an estimated annual emission reduction equal to or less than 1.8 GWh_{th}/year; and

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

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

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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. 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 ₂ O	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 ₂ O	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 or survey of local usage, as required by the methodology.
Value applied:	4.36

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Justification of the choice of data or description of measurement methods and procedures actually applied :	<p>Requirements as per methodology AMS-II.G, version 3.</p> <p>The value applied is an estimation based on literature review using the following sources and conservative assumptions:</p> <ol style="list-style-type: none"> Charcoal consumption per household: 726kg/year Wood-to-Charcoal factor (IPCC): 6 <p>Notes/sources:</p> <ol style="list-style-type: none"> Value is an average derived from three credible sources (see Annex 3 for details). Value is taken from Methodology AMS II. G v03
Any comment:	Used for calculation of B_{old} as per paragraph 7 (a) of methodology

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
Value applied:	0.68
Justification of the choice of data or description of measurement methods and procedures actually applied :	<p>As per applied methodology AMS II.G, version 3, f_{NRB} is calculated by applying the following formula:</p> $f_{NRB} = NRB / (NRB + DRB)$ <p>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 in a separate confidential spread sheet.</p>
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 version 03, page 2
Value applied:	0.015
Justification of the choice of data or description of	Default value as prescribed by methodology applied

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measurement methods and procedures actually applied :	
Any comment:	-

Data / Parameter:	$EF_{\text{projected fossilfuel}}$
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 version 03, 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:	Fraction
Description:	Efficiency of the system being replaced,
Source of data used:	AMS-II. G version 03
Value applied:	0.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default value taken from the methodology AMS-II.G version 03 based on only conventional stoves being replaced under this CPA.
Any comment:	Conservative approach to avoid exceeding microscale limit on number of stoves to be distributed.

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	Default value as prescribed by methodology applied

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choice of data or description of measurement methods and procedures actually applied :	
Any comment:	-



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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:

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

Where:

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

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/ survey of local usage.

$$B_{old} = N \cdot Q_{biomass}$$

Where:

B_{old}	Quantity of biomass used in the absence of the project activity in tonnes/ year
N	Total number of systems (number)
$Q_{biomass}$	Average annual biomass consumption per appliance (tonnes/ year).

Furthermore, $N = N_{all} \cdot SOF$

Where:

N_{all}	Total number of stoves installed (number)
SOF	Stove Operation Fraction (% of stoves operating or replaced by equivalent in-service appliance) – to be measured ex post using survey/ user feedback

In compliance with the monitoring requirements of the methodology B_{old} is adjusted for Leakage and average stove operation period during monitoring period, as follows:

$$B_{old} = LAF \cdot N_{all} \cdot SOF \cdot Q_{biomass} \cdot Stove_{year}$$

Where:

LAF	Net to gross Adjustment factor (0.95) applied in accordance with paragraph 13 and 23 of AMS-II. G version 03
$Stove_{year}$	Calculated average stove operation years in the monitoring period (years)

Where:

$$f_{NRB,y} = NRB / NRB + DRB$$

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:

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- 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:

- (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.

This will be done at the CPA level for the first CPA in each country. In order to determine the fNRB in a country, FAO will be used wherever possible, complemented with IPCC data if necessary. In cases such data does not exist, fNRB can be established by using national or local statistics, survey results, studies, maps or other sources of information, such as remote-sensing data (refer to CPA-DD for further information).

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

Year	Estimation of project activity emissions (tonnes of CO ₂ e)	Estimation of baseline emissions (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
1 (July - December 2012)	2,224	8,146	407	5,515
2 (2013)	4,447	16,292	815	11,030
3 (2014)	4,447	16,292	815	11,030
4 (2015)	4,447	16,292	815	11,030
5 (2016)	4,447	16,292	815	11,030
6 (2017)	4,447	16,292	815	11,030
7 (2018)	4,447	16,292	815	11,030
8 (July - December 2019)	2,224	8,146	407	5,515
Total Emission Reductions	31,132	114,041	5,702	77,207
Annual average over the crediting period of estimated reductions	4,447	16,292	815	11,030

B.6.1. Description of the monitoring plan:

Data / Parameter:	η_{new}
Data unit:	Fraction
Description:	Efficiency of the system being deployed as part of the project activity
Source of data to be used:	As determined using the Water Boiling Test protocol
Value of data applied for the purpose of calculating expected emission reductions in section B.5	34.8%
Description of measurement methods and procedures to be applied:	Water Boiling Tests (WBTs) will be carried out for a sample of installed ICSs in operation in line with the PoA Sampling Plan.
QA/QC procedures to be applied:	The DO or a third party contractor (Monitoring Organisation) will conduct WBTs in line with the guidance provided by the CME and according to a methodology supported by an appropriate body such as PCIA.
Any comment:	<p>Value chosen for ex-ante estimation corresponds to an assumed 50/50 split in the distribution of two stove models, the CH 4400 and CH 2200 Envirofit stoves. 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 will be used based on the actual distribution numbers of the different stove types.</p> <p>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 sample to all stoves of the same type, distributed within the PoA.</p>

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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
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.
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 - To determine only stoves that are still operating, measured ex-post through survey/ user feedback
Source of data to be used:	Survey of household behaviour
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:	This is measured ex-post by investigation of the number of ICS installations within the sampled ICS which are operational. If for example 90% of the sample is only found to be operational, then SOF is 90%.
QA/QC procedures to be applied:	The CME will provide training, guidelines and monitoring templates to ensure that the DO or another contracted party responsible for monitoring follows appropriate procedures.
Any comment:	-

Data / Parameter:	μ_{old}
Data unit:	Tonnes/year
Description:	Amount of woody biomass for the continued use of old stoves
Source of data to be used:	Survey of household behavior

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Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	This is measured ex-post by household survey and according AMS II.G v03. The survey will be done on the basis of the end user's estimation of the amount of wood or charcoal used per day, the number of times per week/month/year.
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:	A value of 0 will be applied for estimating emissions reductions ex-ante. This is conservative from the point of view of limiting the number of stoves distributed (N_{all}) to ensure the micro-scale threshold is not breached.

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 hence the CPA Distribution Reports 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 (ex-post monitoring).

The CME will oversee ex-post monitoring activities by providing guidance and training to the parties involved, which could include its own staff, the DO (CEESD) or other parties (for example, a local marketing firm or university based in Ghana) that are contracted by the CME – “Monitoring Organisations”. This will ensure that the correct procedures are carried out during monitoring activities.

The persons carrying out such activities (Monitoring Agents) will be provided with instructions and resources (*Monitoring Manual, monitoring templates*) to ensure procedures are correctly followed. The DO is required to allow the CME reasonable access to information required in the implementation of the PoA Monitoring Plan and shall make available staff and contractors for consultations or as otherwise required by the CME to carry out the PoA Monitoring Plan.

During ex-post monitoring, the Monitoring Agents will perform the following checks:

Check (parameter)	Method envisaged	Timing envisaged
Efficiency of project stoves (η_{new})	Carrying out Water Boiling Tests (WBTs)	Bi-annually
Check if project stoves are operational and in use (SOF)	Observation and interview with end user, asking them if project stoves are still operational and being used.	Annually
Check if there is any on-going use of replaced stoves	Observation and interview with end user, asking them if they continue to use the stove that was intended to be replaced, or if they acquired another similar stove after purchasing the ICS.	Annually

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If replaced stoves are being used, then estimate the continued use of the replaced stove (μ_{old})	Interview with end user, asking them to estimate the amount of charcoal used per day in the old stove, the number of days per week the old stove is used, and then converting this into a kg amount (e.g. by weighing using scales).	Annually (if required)
--	--	------------------------

The results of the checks will be recorded by the Monitoring Agents in the CPA Monitoring Record (a paper-based document) using the templates provided by the CME. The various CPA Monitoring Records shall then be compiled into a CPA Monitoring Report by the Monitoring Organisation. This Report will be transferred to the CME in a soft copy format when the current round of ex-post monitoring activities has been completed. Either the originals of the CPA Monitoring Records or scanned copies of each Record will also be provided to the CME to enable cross-checking – as requested by the CME.

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. In line with the methodology, if biomass fuel is found to be consumed in replaced stoves, this amount (μ_{old}) will be excluded from B_{old} and considered when calculating $B_{y,savings}$.

Figure 5 below provides a graphical illustration of the ex-post monitoring activities to be carried out in the Monitoring plan.

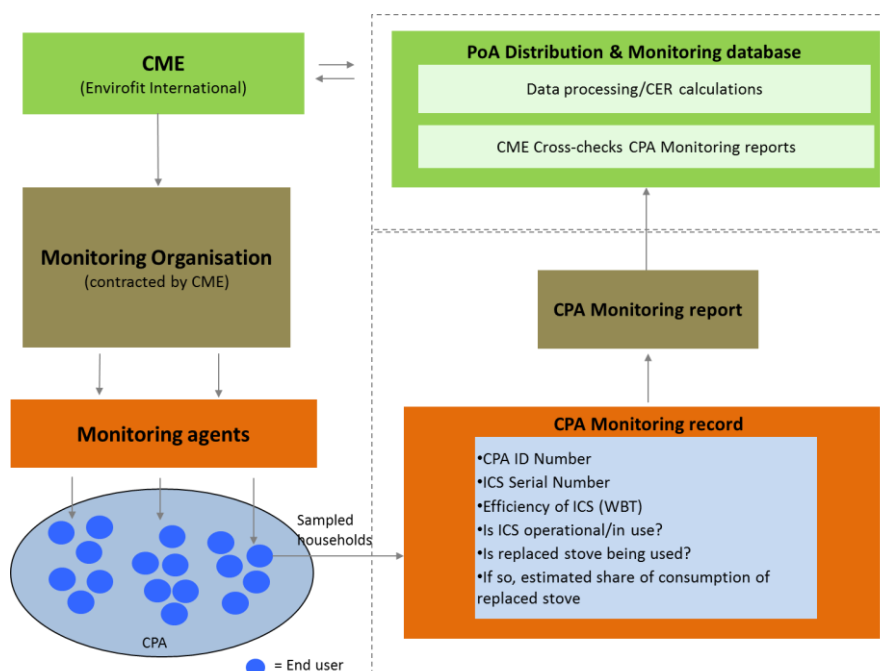


Figure 5: Monitoring plan

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Sampling Plan

A detailed Sampling Plan will be developed for the Monitoring plan including a description of the proposed statistically sound sampling method/ procedure to be used by the party responsible for the monitoring of the amount of emission reductions. This will include verification of:

- Efficiency of project stoves by carrying out Water Boiling Tests (WBTs)
- Check if project stoves are operational and in use (SOF)
- Check if there is any on-going use of replaced stoves
- If replaced stoves are being used, estimate the use accounted for by the old stoves (for example, this could be done on the basis of the end user's estimation of the amount of wood or charcoal used per day, the number of times per week or some other appropriate means of estimation). This value is referred to as the continued use of the replaced stove μ_{old} .

Sampling will be undertaken in line with the requirements of AMS II.G V.03 and the latest version of the "General guidelines for sampling and surveys for small scale CDM project activities". A PoA-wide sampling plan will be developed if allowed by the "Standard for sampling and surveys for small scale CDM project activities".

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:

X 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.

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

Not applicable

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:

Not applicable

SECTION D. Stakeholders' comments

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

X 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:

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Not applicable

D.3. Summary of the comments received:

Not applicable

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

Not applicable

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Annex 1

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

Organization:	Centre for Energy, Environment and Sustainable Development (CEESD)
State/Region:	Ashanti
Postfix/ZIP:	P. O. Box FN793, Kumasi
Country:	Ghana
Telephone:	+233(0)246450842; +233(0)208250357; +233(0)244529589
FAX:	
E-Mail:	info@ceesdghana.org
URL:	www.ceesdghana.org
Represented by:	Edem Cudjoe Bensah
Title:	Bioenergy Coordinator
Salutation:	Ing.
Last Name:	Bensah
Middle Name:	Cudjoe
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Direct FAX:	
Direct tel:	+233(0)322080827 (home)
Personal E-Mail:	edcube353@ceesdghana.org; cudjoe.ebensah@kpoly.edu.gh

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Not applicable.

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Annex 3

BASELINE INFORMATION

Household biomass consumption

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	Value per annum
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 ⁹	Average charcoal consumption per household (kg) (traditional stove)	1.8	650
Average applied	Average charcoal consumption per household (kg) (traditional stove)	2.0	726

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), 1990-2010¹⁰

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

⁹ Available online at <http://www.unccd.int/actionprogrammes/africa/national/2002/ghana-eng.pdf>

¹⁰ <http://rainforests.mongabay.com/deforestation/2000/Ghana.htm#03-deforestation>

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“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 Loss¹¹

“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 ¹²

¹¹ <http://www1.american.edu/TED/ghana.htm>

¹² <http://lcweb2.loc.gov/cgi-bin/query/r?frd/cstdy:@field%28DOCID+gh0092%29>

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Annex 4

MONITORING INFORMATION

The monitoring plan is detailed above.
