Component project activity design document form
(Version 09.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the CPA	Ghana Improved Cookstove Project by EWP in Republic of Korea – CPA 018
Scale of the CPA	☐ Large-scale ☒ Small-scale
Version number of the CPA-DD	Version 01.4
Completion date of the CPA-DD	27/10/2020
Title and UNFCCC reference number of the registered CDM PoA	[Title] Ghana Improved Cookstove Project by EWP in Republic of Korea [Reference Number] 10576
Title and reference number of the corresponding generic CPA	[Title] Ghana Improved Cookstove Project by EWP in Republic of Korea – CPA # [Reference Number] Generic CPA 001
Coordinating/managing entity	Climate Change Center
Host Party	The Republic of Ghana
Applied methodologies and standardized baselines	**Applied methodologies**: AMS-II.G. "Energy efficiency measures in thermal applications of non-renewable biomass", (Version 10.0) **Standardized baselines:** Not applicable
Sectoral scopes	03 – Energy Demand
Estimated amount of annual average GHG emission reductions	36,653 tCO_2e per annum

SECTION A. Description of component project activity (CPA)

A.1. Purpose and general description of CPA

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The purpose of this CPA is to reduce woodfuel (firewood and charcoal) consumption of households by distributing and using improved cook stoves (hereinafter referred to as "ICS"), thus the programme contributes to reducing greenhouse gas (GHG) and provides a healthy environment and sustainable development of Ghana. In this CPA 018, the project ICSs will be distributed to about 15,000 households located in 29 districts of North East, Upper East and Upper West region, and the name of the districts are stipulated in "A.2. Location of CPA".

By aiming at reducing pollution resulting from the inefficient use of biomass, it is expected that this proposed CPA will control rapid forest loss and improve the quality of life of Ghanaians. According to the Ghana national report [1], biomass energy is widely used by many households and commercial entities. It accounts for about 40% of the primary energy supply of Ghana, but little attention has been paid to its sustainable development and use over the years. Indeed, the demand for wood puts Ghana's forests under immense pressure and has severe consequences on the ecosystem as a whole. Deforestation rate of 2% [2] in Ghana is the highest in Africa, with current levels of wood fuel consumption far exceeding forest growth.

As the CME, Climate Change Center (CCC), manages to produce and distribute high thermal efficient ICSs to selected beneficiaries (households) in Ghana at no cost. The program is subsidized by the Korea East-West Power Company (EWP). This CPA does not receive any public funding from Parties included in Annex I to the Convention. In the baseline scenario, households continue to using woodfuel in traditional and/or conventional cook stoves. The project ICS are more efficient, emits less emissions, needs less woodfuel and safer than baseline stoves such as traditional (including three stone) and/or conventional cook stoves. Thus, this activity will lead to reduce CO_2 emissions. The estimated annual average GHG reduction in this CPA 018 is [36,653] tCO_2e/yr, and for the crediting period the estimated GHG reduction is [256,572] $tCO_2e/7yr$.

The project ICS is similar to the 'Jiko type' cook stove already existing on the market in Africa, but local name is "Gyapa" in Ghana. All project ICS produces in Ghana and made of cast iron and ceramic material which is portable. The efficiency of project ICS is remarkably improved, thus the cost to a household of buying fuel decreases. The colour of the project ICS is Grey/Ash whiles ICS on the market is usually black. Each ICS is embossed with a unique serial number that also traces back to the manufacturer of the ICS.

This proposed CPA is a small-scale project (Type II) because the proposed project activity would not have occurred anyway due to the investment barrier according to "TOOL21: Demonstration of additionality of small-scale project activities" (Version 13.0) as mentioned in the PoA-DD. Furthermore, the ICS to be distributed in this CPA is "microscale CDM unit", thus the demonstration for threshold conditions and debundling check are not required in line with the paragraph 124(m) and (n), "Standard: CDM project standard for programmes of activities" (Version 02.0) (hereinafter referred to as the "project standard"). In the case of CPAs solely composed of "microscale CDM unit" as defined in the methodological tool "TOOL19: Demonstration of additionality of microscale project activities" (Version 09.0), 95/10 confidence/precision shall be applied for sampling survey in all cases. Furthermore, this CPA is a microscale project since energy saving of each project unit is lower than 600 MWh/y which is equivalent to 1,800 MWhth/y under TOOL19. As per ex ante emission reduction calculation, energy savings per each CPA stove amount to 11.76 MWh_{th}/y (refer to emission reduction calculation sheet).

[1] Energy Commission of Ghana, 2018 Energy (Supply and Demand) Outlook for Ghana (April 2018)

[2] Food and Agriculture Organization of the United Nations, State of the World's Forests 2007 (2007)

A.2. Location of CPA

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In this proposed CPA, the physical/geographical location of the CPA 018 will be limited to the North East, Upper East and Upper West region in the Republic of Ghana consisting of 29 districts. The districts listed are as follows;

- **The 29 Districts in North East, Upper East and Upper West Region:** Bunkpurugu Nakpanduri District, Chereponi District, East Mamprusi District, Mamprugu Moagduri District, West Mamprusi District, Yendi Municipal District, Bawku Municipal District, Bawku West District, Binduri District, Bolgatanga Municipal District, Bongo District, Builsa North District, Builsa South District, Garu Tempane District, Kassena Nankana East District, Kassena Nankana West District, Nabdam District, Talensi District, Dafiama Bussief District, Jirapa District, Lambussie Karni District, Lawra District, Nadowli-Kaleo District, Nandom District, Sisaala West District, Sissala East District, Wa East District, Wa Municipal District, Wa West District

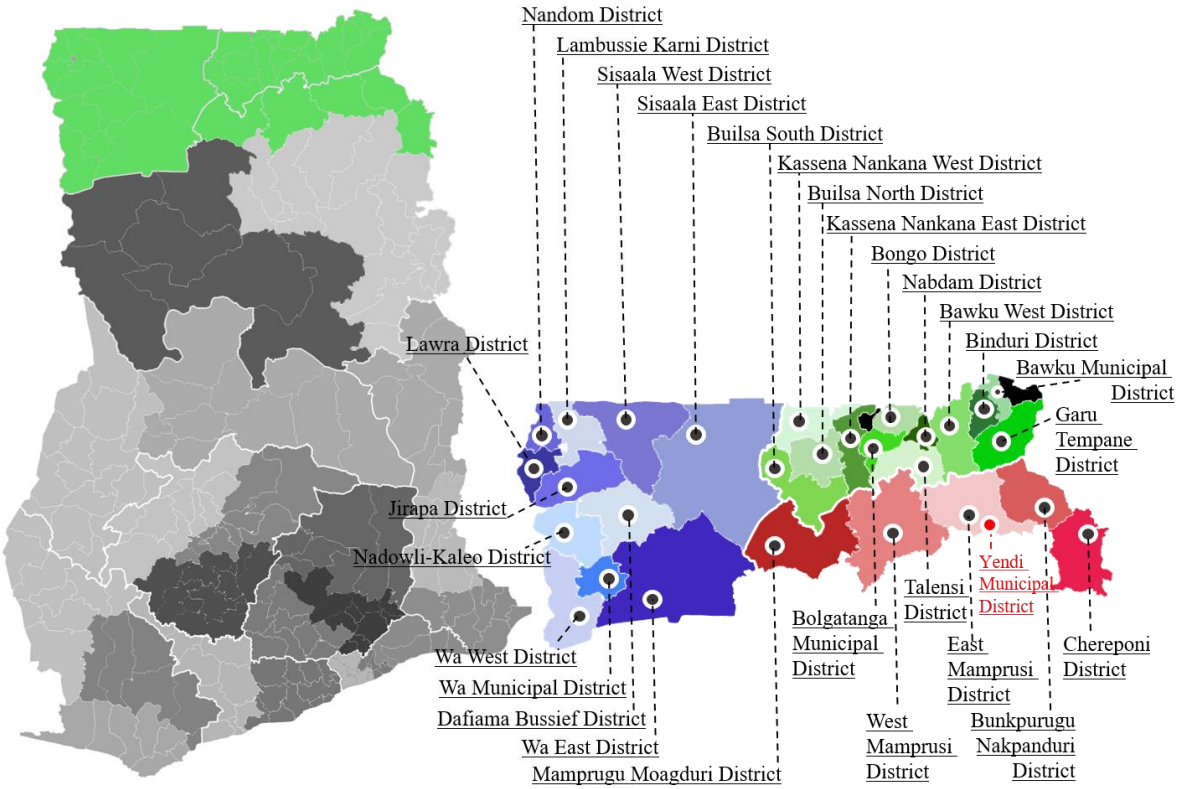

Figure 1. CPA 018 Map of North East, Upper East and West Region (left) and its districts (right)

A.3. Technologies/measures

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The CPA includes dissemination of high efficiency improved charcoal-fuel based cooking stoves for meeting the thermal energy need of beneficiary households. The ICSs will replace three stone or conventional inefficient cookstoves. The ICSs in this CPA provide significantly improved combustion efficiency and thermal (heat) transfer to cooking pots, as compared to a three stone or a conventional cookstove. The ICS is mainly made of a combination of cast iron and ceramic material. The ICS' design is similar to the 'Jiko type' stove already existing on the market in Africa. The metal and ceramic material ICS is portable, whereas, the clay/brick, or clay/stone (conventional) stove is

generally high mass and location fixed. The ICS' efficiency is remarkably improved, thus the cost to a household of buying fuel decreases. The location information of each ICS will be recorded in the electrical database tool.

Life span of the cookstove

The proposed ICS has a life span of five years.

Size of the cookstove

The size of the cookstove would be uniform throughout the period of the project, and product specification is as below;

- Pot Type Support; Flat or Round, Sandglass Shaped
- Unit Size(cm): Top Diameter 32.0cm (±1), Height 27.0cm (±1)
- Thickness of the Metal Body: 0.4mm gauge and above
- Thickness of the clay liner: 3.5cm (±1.0)
- Unit Weight: about 10 kilograms
- Assembly type: Fully Assembled
- Fuel Type: Charcoal
- Thermal Efficiency: 32% (avg, WBT)
- Pot Diameter Capacity: up to 30cm (recommended)
- Estimated Lifespan: up to 5 years

Thermal efficiency/testing

Due to the materials used for the stove, the ICS efficiency level set for the cookstove is 32%. The efficiency test is implemented at the authorized laboratory in Ghana.

Ceramic liners

The liners need to be of good material which is very suitable and can largely help with achieving the thermal efficiency. The natural material needed for the manufacturing of the liners needs to be acquired from a source that is environmentally safe and friendly. Site for the raw material needs to be inspected and the necessary documents from the appropriate authorities are in place. These checks are to avert any issues which would crop up and slow or in worst case scenario, stop the project entirely.

Metal component

The metal sheet that would be used in forming the cookstove need to be of aluminium zinc composition (aluminium zinc material) with a thickness level of 0.4mm gauge and above. However, the thickness level also can be modified upon the required thermal efficiency. The metal parts of the cookstove should be rounded as much as possible to prevent injury to end users. The handles should be metal reinforced so as to serve as an insulation in case the cookstove is hot.

Identification/embossment

There will be a serial number that would be embossed on each of the cookstoves. This serial number would be used for data collection, monitoring and evaluation. A unique colour would be used in colouration so that the project cookstoves are different from all the others on the market.

ICS	Efficiency	Materials	Portability	Type of Fuel
	32%	Cast Iron & Ceramic Material	Easily Movable & Portable	Charcoal

In Ghana, the ICSs were locally manufactured, and the ICS efficiency was measured by a national standards body. The thermal efficiency of ICS is 32% and the process of the ICS production in this CPA is as follows:

1. Cutting	2. Rounding	3. Attaching	4. Binding	5. Drying I
				
6. Painting	**7. Drying II**	**8. Embossing**	**9. Checking**	**10. Storage**
				

Most of the firewood and charcoal are used as primary cooking fuel, and this is commonly used with cookstoves in Ghana. ICSs which will be distributed in this CPA are heated by charcoal, and are a substitute for traditional and conventional cookstoves in about 15,000 households. The prevalent baseline fuel for traditional or conventional cookstove is woodfuel (firewood and charcoal).

A.4. Coordinating/managing entity

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Climate Change Center (CCC) is the CME on the program. CCC was established in 2008 and has been mainly dedicated to climate change response especially in Asia and Africa.

A.5. Parties and CPA implementers

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Parties involved	CPA implementers	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
The Republic of Ghana (Party)	The Ministry of Energy, Ghana	Yes

A.6. Public funding of CPA

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The program is subsidized by the Korea East-West Power Company (EWP). This CPA does not receive any public funding from Parties included in Annex I to the Convention.

A.7. History of CPA

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The CME confirms that the proposed CPA is neither registered as a CDM project activity nor included in another registered CDM PoA, and this proposed CPA is not a project activity that has been deregistered. The CME declares that the proposed CPA was not a CPA that has been excluded from a registered CDM PoA. In addition, this CPA is not under a registered CDM PoA whose crediting

period has expired (hereinafter referred to as “former project”) exists in the same geographical location as the proposed CPA.

A list of former projects in the proposed CPA boundary is shown in the following table. The data for this table were obtained by UNFCCC database for PAs and PoAs [3] (04 Sep, 2020). When CDM project reference number from the data are not available, those are excluded. As a result, it is founded that 5 former projects have similar tech/measure such as ICS among the 13 former projects.

No.	Ref. No.	CDM Type	Meth. Type	Project Type	CPA Status	Cook Stove
1	10430 [4]	PoA	AMS-II.G.	Stoves	All 2 CPAs	√
2	9007 [5]	PoA	AMS-II.G.	Stoves	All 8 CPAs	√
3	5342 [6]	PoA	AMS-II.G.	Stoves	All 15 CPAs	√
4	8438 [7]	PoA	AMS-II.G.	Stoves	All 5 CPAs	√
5	7359 [8]	PoA	AMS-I.E.	Stoves	All 43 CPAs	√
6	7893 [9]	PoA	AM0025	Composting	One fixed	-
7	10320 [10]	PoA	ACM0002	Solar PV	All 4 CPAs	-
8	7522 [11]	PoA	ACM0002	Solar & wind & other	One renewable	-
9	9136 [12]	PoA	ACM0001	Landfill power	One renewable	-
10	10276 [13]	PA	AMS-III.G.	Landfill flaring	-	-
11	5381 [14]	PA	AM0025	Composting	-	-
12	8896 [15]	PA	AM0009	Oil field flaring	-	-
13	9360 [16]	PA	ACM0007	Single to Combined	-	-

It is hereby declared that the proposed CPA will not lead to the discontinuation or modification of the former projects and does not decrease the GHG emission reduction or net anthropogenic GHG removals by the former PoA, and that the proposed CPA complies with the following conditions:

- a) It utilizes both a different measure and a different technology from those of the former project. ☞ *The project ICSs in this proposed CPA has unique serial numbers to this PoA and are not included in any of the former project listed above.*

[3] https://cdm.unfccc.int/Statistics/Public/files/Database%20for%20PAs%20and%20PoAs.xlsx

[4] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/KQXLWC1G6IEY8OHVDFU9S27T5ZNMRP/view

[5] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/XFNYUSZ7QV3L28649RPEJKWMTO5HB1/view

[6] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/4R62VM8H3CFJDZTAXYQEL7I19NBPWO/view

[7] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/V7A06W39LCRF4X8P1BGIJDUEKTS5QH/view

[8] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/2XJUR5NOWHY7T8BDAFM4613CIG9VS0/view

[9] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/L0PSTNX39H6O41MCRBYFQEI7A52ZK8/view

[10] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/D0WPZQAIR12FUOGN873KECT5VJMY9B/view

[11] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/FXRIZMV91W28U4560BSHEYJPCDQL7G/view

[12] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/CIXHT57LSGM9NF6PJ4QW1O0VRKE3U2/view

[13] https://cdm.unfccc.int/Projects/Validation/DB/0P4H4018JBCLCQAHZ9UGEILRCMNUCJ/view.html

[14] https://cdm.unfccc.int/Projects/Validation/DB/FS0Q9R9AKKF8IV7FBFLNC4HY6E8VNM/view.html

[15] https://cdm.unfccc.int/Projects/Validation/DB/JR6FNFCZIUI0PL7Q1FI9IUT0MXYNOE/view.html

[16] https://cdm.unfccc.int/Projects/Validation/DB/3NNVYUOW8T9RIKOEOY2L7NSO4D1NH3/view.html

- b) It does not share or utilize any of the assets of the former project. ☞ *The project ICS in the proposed CPA has unique serial number and colour (i.e. grey and/or ash), so it is easily distinguished from others. This CPA does not share or utilize any assets of the former project.*
- c) It utilizes a different resource type compared to the former project. ☞ *The project ICS in the proposed CPA made of specific materials, so it is distinguished from others. The proposed CPA does not utilize same resource compared to any former project.*

The CME prudently selected target district and households based on the eligibility criterion for inclusion of CPA stated in section F below in order to prevent overlapping with the household from the former project within the same project region and potential risk of double-counting of GHG emission reductions. Thus, a unique serial number is assigned to each ICS in this CPA so that project device of this CPA can be distinguished from the other devices or projects.

A.8. Debundling

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Not applicable. In line with the "Standard: CDM project standard for programmes of activities" (Version 02.0) paragraph 124(n), if the generic CPA consists solely of units that qualify as "microscale CDM unit", these conditions are not required. The ICS in this proposed CPA is "microscale CDM unit", hence the debundling check is not required. Furthermore, there is not an activity with the same coordinating or managing entity, which also managed a large scale PoA of same sectoral scope. The proposed small-scale CPA of a POA is not deemed to be a debundled component of a large-scale activity. As a result, this proposed CPA is eligible to use the simplified modalities and procedures for small-scale project activities according to the Tool20 "Methodological tool: Assessment of debundling for SSC project activities" (Version 04.0).

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

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Methodology AMS-II.G. "Energy efficiency measures in thermal applications of non-renewable biomass" (Version 10.0) [17] is applicable to the CPA 018.

The applied methodology "AMS-II.G." refers to application of the following tools:

- Guideline: "General guidelines for SSC CDM methodologies" (Version 23.0) [18]
- TOOL21: "Demonstration of additionality of small-scale project activities" (Version 13.1) [19]
- TOOL19: "Demonstration of additionality of microscale project activities" (Version 09.0) [20]
- AMS-III.BG.: "Emission reduction through sustainable charcoal production and consumption" (Version 3.0) [21]
- TOOL30: "Calculation of the fraction of non-renewable biomass" (Version 2.0) [22]
- Standard: "Sampling and surveys for CDM project activities and programmes of activities" (Version 08.0) [23]

[17] https://cdm.unfccc.int/UserManagement/FileStorage/1FSPVQM7JWELKHB5U94DXR23TOC6AZ

[18] https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20190916153417994/MethSSC_guid25.pdf

[19] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v13.1.pdf

[20] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-19-v9.pdf

[21] https://cdm.unfccc.int/methodologies/DB/MVOAXD3LGD4ZJEKEERCT39ZLJ3JZA0

[22] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v2.0.pdf

[23] https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20191129115244256/Meth_stan05.pdf

Whereas AMS-III.BG. is not applicable since this proposed PoA does not produce sustainable charcoal. The standardized baseline of the methodology is not applicable to the proposed CPA.

B.2. Project boundary, sources and greenhouse gases (GHGs)

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The project boundary of this CPA 018 is the physical, geographical site of the efficient devices that utilize biomass, and where is distributed as defined by districts. The geographical boundary of the PoA is within the Republic of Ghana. The CPA 018 will be implemented in the North East, Upper East and Upper West region in Ghana which is within the geographical boundary of the PoA. The main emission sources and GHGs to be included in the project boundary are CO_2 emissions generated by woodfuel (firewood and charcoal) consumption.

Source		GHG	Included?	Justification/Explanation
Baseline	Combustion of non-renewable biomass for cooking in baseline devices	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source excluded as conservative measure
		N_2O	No	Minor emission source excluded as conservative measure
Project activity	Implementation of energy efficient ICSs resulting in decrease of combustion of non-renewable biomass for cooking	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source excluded as conservative measure
		N_2O	No	Minor emission source excluded as conservative measure
	Leakage (Diversion of non-renewable biomass saved under the project activity by non-project households that previously used renewable source)	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source excluded as conservative measure
		N_2O	No	Minor emission source excluded as conservative measure

B.3. Establishment and description of baseline scenario

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In 2018, WHO reported that about 76% of households mainly use polluting fuels and technologies (mostly firewood: 41.3%, and charcoal: 31.5%) for cooking. In rural areas of Ghana, polluting fuels are mainly used for cooking (94%). ICSs (Jiko type) which will be distributed in this CPA are heated by charcoal, and are a substitute for conventional cookstoves in 15,000 households. Most of the firewood and charcoal are used as primary cooking fuel and this is commonly used with cookstoves.

As per paragraph 21 of the applied methodology AMS-II.G. (Version 10.0), "It is assumed that in the absence of the project activity, the baseline scenario would be the projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices.". Thus, the prevalent baseline fuel for conventional cookstove is deemed as woodfuel (firewood and/or charcoal).

When estimating reductions using this baseline scenario, the CME applies the adjustment factor of 0.95 in line with the para 34 of AMS-II.G. (Version 10.0) for the amount of non-renewable biomass leakage of project devices. Further leakage emissions occur due to switching from baseline device using firewood to efficient project device using charcoal. These emissions are calculated by using a default value of 0.030 t CH_4/t charcoal in accordance with "AMS-III.BG.: Emission reduction through sustainable charcoal production and consumption".

Thus, it has been envisaged that CPA 018 will adequately support the national as well as sectoral policies and circumstances of the host country by means of reducing deforestation rate with the help of clean and energy efficient cookstove (ICSs).

B.4. Estimation of emission reductions

B.4.1. Explanation of methodological choices

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According to the para 22 of AMS-II.G. (version 10.0), emission reductions are calculated as:

$$ER_y = \sum_i \sum_j ER_{y,i,j} - LE_y$$

Where:

Parameter	Description
i	Indices for the situation where more than one type of project device is introduced to replace the pre-project device
j	Indices for the situation where there is more than one batch of project device
ER_y	Emission reductions during year y in tCO_2e
$ER_{y,i,j}$	Emission reductions by project device of type i and batch j during year y in tCO_2e
LE_y	Leakage emissions in the year y

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossilfuel}$$

Where:

Parameter	Description
$B_{y,savings,i,j}$	Quantity of woody biomass that is saved in tonnes per cookstove device of type i and batch j during year y
$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y
μ_y	Adjustment to account for any continued use of pre-project devices during year y
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted
$EF_{projected\_fossilfuel}$	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers

According to the para 27 of AMS-II.G., option 3 for water boiling test (WBT) including leakage is calculated as:

$$B_{y,savings,i,j} = B_{old,i,j} \times L_y \times [1 - \left(\frac{\eta_{old,i,j}}{\eta_{new,i,j}}\right)]$$

Parameter	Description
$B_{old,i,j}$	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type i and batch j
L_y	Leakage adjustment factor

$\eta_{old,i,j}$	Efficiency of the device being replaced
$\eta_{new,i,j}$	Efficiency of the device of each type i and batch j implemented as part of the project activity

$B_{y,savings,i,j}$ shall be determined using option 3 (equation 6 in particular) as per para 27 of the methodology AMS-II.G. (Version 10). The loss in efficiency of the project device type i shall be determined based on para 32(a) of the methodology. $B_{old,i,j}$ shall be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, thereby eliminating the need for ex-post surveys to determine leakages, as per para 34 of the methodology. Project activities switching from baseline device using firewood to efficient project device using charcoal shall take into account the leakage effects related to the charcoal production. A default value of 0.030 t CH_4/t charcoal used in accordance with AMS-III.BG. "Emission reduction through sustainable charcoal production and consumption". The CME calculated the national f_{NRB} value in Ghana as per the "TOOL30: Calculation of the fraction of non-renewable biomass" (Version 02.0) and it is made ex ante at the time of inclusion of CPA. The ex-ante calculation of emission reductions is described in section I.6.3.

B.4.2. Data and parameters fixed ex ante

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Data/Parameter	$B_{old,p}$
Data unit	tonnes/person/year
Description	Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices
Source of data	Official statistics; a) Charcoal consumption: "Food and agriculture organization of the united nations, the charcoal transition, FAO (2017): 139." b) Firewood consumption: "Energy Services for the Millennium Development Goals, UNDP (2005): 36 & CDM-SSCWG42 Annex 5 (2013): 7
Value(s) applied	a) Charcoal: 0.180 tonnes/year b) Firewood: 0.500 tonnes/year
Choice of data or Measurement methods and procedures	-
Purpose of data	To calculate baseline emission
Additional comment	-

Data/Parameter	$N_{p,HH}$
Data unit	Number
Description	Average number of persons served per household prior to project implementation
Source of data	National value: "Ghana Maternal Health Survey 2017, Ghana Statistical Service (2017): 10"
Value(s) applied	3.8
Choice of data or Measurement methods and procedures	-
Purpose of data	To calculate baseline emission
Additional comment	-

Data/Parameter	$B_{old,HH}$
Data unit	tonnes/household/year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices
Source of data	Calculated using by official data
Value(s) applied	a) Charcoal: 4.104 tonnes/year b) Firewood: 1.900 tonnes/year
Choice of data or Measurement methods and procedures	$B_{old,p}$ times $N_{p,HH}$ a) Charcoal: 1.080 tonnes/year X 3.8 person/HH ※ 0.180 ton/capita/year × 6 $m_{wood}/m_{charcoal}$ = 1.080 b) Firewood: 0.500 tonnes/year X 3.8 person/HH
Purpose of data	To calculate baseline emission
Additional comment	-

Data/Parameter	$B_{old,i,j}$
Data unit	tonnes/year
Description	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type i and batch j
Source of data	Calculated using by official data
Value(s) applied	a) Charcoal: 4.104 tonnes/HH/year b) Firewood: 1.900 tonnes/HH/year
Choice of data or Measurement methods and procedures	$B_{old,HH} \div N_{d,HH}$ a) Charcoal: 4.104 tonnes/year ÷ 1 ICS/HH b) Firewood: 1.900 tonnes/year ÷ 1 ICS/HH
Purpose of data	To calculate baseline emission
Additional comment	According to the methodology, $B_{old,i,j}$ equals $B_{old,HH}$ when only one project device per household is distributed. In this CPA, only one ICS (Jiko type) will be distributed to one household, thus $B_{old,i,j}$ equals $B_{old,HH}$.

Data/Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
Source of data	Using by national data, official statistics or reports as below; 01. Average Fuel Consumption per Household - Charcoal consumption per capita: The Charcoal Transition, p.139 - Firewood Consumption per capita: Energy Services for the Millennium Development Goals, p.36 / CDM-SSCWG42 Annex 5, p.7 - Household size: Ghana Maternal Health Survey 2017 p.10 02. Estimated Number of Households - 2015 Labour Force Survey Report, Table 2.1 03. Population Estimate (As at mid year 2020): - 2020 World Population Review 04. Extent of Forest - Total Forest Area in Ghana: Global Forest Resources Assessment 2020, Ghana. p.16 05. Forest area within protected areas - Global Forest Resources Assessment 2020, Ghana. p.41 06. Non-domestic woody biomass consumption - TILASTO (Based on FAOstat) 07. Wood density for Tropical Africa - West Africa - Djagbletey et al., 2020 and calculated 08. Above-ground biomass growth(tonnes d.m./ha-yr) - IPCC- Agriculture, Forestry and Other Land Use , (Volume 4, Table 4.9) 09. Distribution of total forest area by ecological zone: - FAO - Geography, Climate and Population, Ghana / The Challenge of Sustainable Forest Management, FAO 1995 10. Established area (forest area ≤ 20 yrs), forest area ≥ 20 yrs (calculated) - National Forest Plantation Development Programme,2017. (pg 2).
Value(s) applied	79.80%
Choice of data or Measurement methods and procedures	Calculated as per the “TOOL30: Calculation of the fraction of non-renewable biomass”.
Purpose of data	To calculate baseline emission
Additional comment	The value is fixed at the CPA level. (Refer to Emission Reduction Sheet)

Data/Parameter	$EF_{projected\_fossilfuel}$
Data unit	tCO_2e/TJ
Description	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers
Source of data	AMS-II.G. Version 10.0
Value(s) applied	63.7
Choice of data or Measurement methods and procedures	Default value specified by the methodology, AMS-II.G. (Version 10.0)
Purpose of data	To calculate baseline emission
Additional comment	The value is fixed ex-ante.

Data/Parameter	$NCV_{biomass}$
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass, briquettes or charcoal used in project devices
Source of data	AMS-II.G. Version 10.0
Value(s) applied	0.029
Choice of data or Measurement methods and procedures	IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried' may be used if fuel used in project device is also woody biomass. If fuel used in the project device is charcoal, 0.029 TJ/tonne may be used. Project device is ICS, and it's generated by charcoal fuel based.
Purpose of data	To calculate baseline emission
Additional comment	-

Data/Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of the device being replaced
Source of data	Default value as per applied methodology, AMS-II.G. (Version 10.0)
Value(s) applied	10%
Choice of data or Measurement methods and procedures	In this proposed CPA, the ICS will be replacing with a three-stone fire or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney, thus default value of 0.1 will be applied.
Purpose of data	To calculate baseline emission
Additional comment	-

Data/Parameter	L_y
Data unit	Fraction
Description	Leakage adjustment factor
Source of data	Default value as per applied methodology AMS-II.G. version 10.0
Value(s) applied	0.95
Choice of data or Measurement methods and procedures	As per the methodology AMS-II.G. version 10.0, $B_{old,i,j}$ can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.
Purpose of data	To calculate baseline emission
Additional comment	The value is fixed ex-ante.

B.4.3. Ex ante calculation of emission reductions

>>

In this CPA, two types of woodfuel (firewood and charcoal) are used as baseline, and project ICS is only used by charcoal fuel. Thus, two fuels of $B_{old,HH}$ and $B_{y,savings,i,j}$ are calculated respectively, and also the emission reduction is calculated separately by baseline fuel. Below is the emission reduction in the first year of CPA:

$B_{old,HH\_charcoal}$ = 4.104 tonnes/HH/year

= 180 kg/capita/year X 6 X 3.8 person/HH

- $B_{old,p}$ = 0.180 tonnes/HH/year [24]
- $m_{wood}/m_{charcoal}$ = 6 kg of wood for 1 kg of charcoal
- $N_{p,HH}$ = 3.8 [25]

$B_{old,HH\_firewood}$ = 1.900 tonnes/HH/year
= 500 kg/capita/year X 3.8 person/HH

- $B_{old,p}$ = 0.500 tonnes/HH/year [26]
- $N_{p,HH}$ = 3.8

According to the methodology, $B_{old,HH}$ equals $B_{old,i,j}$ when only one project device per household is distributed.

$B_{y,savings,i,j\_charcoal}$ = 2.680 tonnes/HH/year
= $B_{old,i,j} \times L_y \times [1 - \left(\frac{\eta_{old,i,j}}{\eta_{new,i,j}}\right)]$
= 4.104 tonnes/HH/year × 0.95 × [1-(0.1/0.32)]

- $B_{old,i,j\_charcoal}$ = 4.104 tonnes/HH/year
- L_y = 0.95
- $\eta_{old,i,j}$ = 10%
- $\eta_{new,i,j}$ = 32%,

$B_{y,savings,i,j\_firewood}$ = 1.240 tonnes/HH/year
= $B_{old,i,j} \times L_y \times [1 - \left(\frac{\eta_{old,i,j}}{\eta_{new,i,j}}\right)]$
= 1.900 tonnes/HH/year × 0.95 × [1-(0.1/0.32)]

- $B_{old,i,j\_firewood}$ = 1.900 tonnes/HH/year
- L_y = 0.95
- $\eta_{old,i,j}$ = 10%
- $\eta_{new,i,j}$ = 32%,

As per methodology and SSC_789[27] (14 Aug, 20), the calculated values for the ICS efficiency rate for 5 years are applied in this CPA. The stove efficiency decreases linearly over time, i.e. at a constant rate which is equal to the difference between the initial and final efficiencies divided by the lifespan of the project device in number of years. The final value after the end of the life span will be set as 20%. The life span of project ICS is 5 years and efficiency at the first year is 32%. Thus, efficiency of project ICS will be linearly reduced by 2.4%. Project ICS efficiency rate and $B_{y,savings,i,j}$ for every year are calculated as below;

[24] Food and agriculture organization of the united nations, the charcoal transition, (2017): 139

[25] Ghana Maternal Health Survey 2017, (2017): 10

[26] Food and agriculture organization of the united nations, the charcoal transition, (2017): 139

[27] https://cdm.unfccc.int/methodologies/SSCmethodologies/clarifications/17080

[Year] Day	[Year 1] Day 1 – 365	[Year 2] Day 366 - 730	[Year 3] Day 731 - 1095	[Year 4] Day 1096 - 1460	[Year 5] Day 1461 - 1825
ICS Efficiency Rate (%)	32.0	29.6	27.2	24.8	22.4
$B_{y,savings,i,j\_charcoal}$ (tonnes/HH/year)	2.680	2.581	2.465	2.326	2.158
$B_{y,savings,i,j\_firewood}$ (tonnes/HH/year)	1.240	1.195	1.141	1.077	0.999

The number of users who switched baseline fuel from firewood to charcoal are estimated as 30% in this CPA, and leakage due to fuel switch to charcoal has been considered for these stoves. These emissions are calculated by using a default value of 0.030 t CH_4/t charcoal in accordance with "AMS-III.BG.". Thus, emission reductions (hereinafter referred to as "ER") of this CAP for the first year are as follows;

First Year ER by switching charcoal to charcoal fuel for 10,500 ICSs (70% of 15,000 ICSs)
= 33,188 tCO_2e/year
= $fNRB \times NCV_{biomass} \times EF_{projected\_fossilfuel} \times B_{y,savings} \times N_{y,i\_charcoal} \times \mu_y$
= 79.80% × 0.029 TJ/tonne × 63.7 CO_2e/TJ × 2.680 tonnes/HH/year × 10,500 × 80%

- $f_{NRB,y}$ = 79.80%
- $NCV_{biomass}$ = 0.029 TJ/tonne
- $EF_{projected\_fossilfuel}$ = 63.7 tCO_2e/TJ
- $B_{y,saving,i,j\_charcoal}$ = 2.680 tonnes/HH/year
- $N_{y,i,j\_charcoal}$ = 10,500
- μ_y = 80%

First Year ER by switching firewood to charcoal fuel for 4,500 ICSs (30% of 15,000 ICSs)
= 6,247 tCO_2e/year
= $fNRB \times NCV_{biomass} \times EF_{projected\_fossilfuel} \times B_{y,savings} \times N_{y,i\_firewood} \times \mu_y - Leakage_{\_firewood}$
= 79.80% × 63.7 CO_2e/TJ × 0.029 TJ/tonne × 1.240 tonnes/HH/year × 4,500 × 80% - 334 tCO_2e

- $f_{NRB,y}$ = 79.80%
- $NCV_{biomass}$ = 0.029 TJ/tonne
- $EF_{projected\_fossilfuel}$ = 63.7 tCO_2e/TJ
- $B_{y,saving,i,j\_firewood}$ = 2.396 tonnes/HH/year
- $N_{y,i,j\_firewood}$ = 4,500
- μ_y = 80%
- $Leakage_{firewood}$ = 334 tCO_2e

First Year $Leakage_{firewood}$ for 4,500 ICSs (30% of 15,000 ICSs)
= 334 tCO_2e/year
= $\left(\eta_{old,i,j} \div \eta_{new,i,j}\right) \times B_{old,i,j\_firewood} \div 6\text{ kg} \times SMG_{y,b} \times 25\ CO_2/CH_4 \times N_{y,i,j\_firewood}$
= (32% ÷ 10%) × 1.900 tonnes/HH/year ÷ 6 kg × 0.03 t CH_4/t × 25 CO_2/CH_4 × 4,500 ICSs

- $\eta_{old,i,j}$ = 10%

- $\eta_{new,i,j}$ = 32%
- $B_{old,i,j\_firewood}$ = 1.900 tonnes/HH/year
- $6kg$ = a default wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis)
- $SMG_{y,b}$ = Specific methane generation for the baseline charcoal generation process in the year y (tonnes CH_4/t charcoal product); a default value of 0.030 t CH_4/t charcoal used.
- $N_{y,i,j\_firewood}$ = 4,500

First Year ER for 15,000 ICSs
= 39,434 tCO_2e/year
= 33,188 tCO_2e/year ($ER_{\_charcoal}$) + 6,247 tCO_2e/year ($ER_{\_firewood}$)

Estimated total ER in the first year for 15,000 ICSs is 39,434 tCO_2e/year as below, and consecutive years reflected ICS decreased rate with same equation above are calculated in emission reduction sheet.

Year	Year 1	Year 2	Year 3	Year 4	Year 5
Estimated emission reduction for 15,000 ICS (tCO_2e /year)	39,434	37,941	36,187	34,088	31,547

B.4.4. Summary of ex ante estimates of emission reductions

>>

According to the methodology, ex ante estimates of emission reductions for 7 years (crediting period of CPA) are calculated. However, new ICS will be replaced after life span is ended, thus new ICS efficiency, 32%, is applied to calculate ER from 6th year in the crediting period. Total and Annual average ER over the crediting period are calculated as follows;

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	39,768	0	334	39,434
Year 2	38,303	0	362	37,941
Year 3	36,580	0	393	36,187
Year 4	34,519	0	431	34,088
Year 5	32,025	0	478	31,547
Year 6	39,768	0	334	39,434
Year 7	38,303	0	362	37,941
Total	259,266	0	2,694	256,572
Total number of crediting years	7			
Annual average over the crediting period	37,038	0	385	36,653

B.5. Monitoring plan

B.5.1. Data and parameters to be monitored

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Data/Parameter	$\mathbf{N_{y,i,j}}$
Data unit	Number
Description	Number of project devices of type i and batch j operating during year y
Source of data	Stove distribution database and survey records
Value(s) applied	1,500 ($N_{y,i,j\_firewood}$: 4,500, $N_{y,i,j\_charcoal}$: 10,500)
Measurement methods and procedures	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 95/10 confidence precision. A discount shall be applied based on the percentage of devices operational as determined by the sample survey, e.g. if survey shows that 10% of the devices is non-operating, an adjustment factor of 0.95 shall be applied to number of project devices commissioned in a particular batch. Separate samples shall be taken for each batch.
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	To gain and maintain the qualified confidence and precision for monitoring result, the CME will periodically check the ICS status and archive the records to maintain qualified requirements on electric database system during the monitoring period.
Purpose of data	To calculate baseline emissions
Additional comment	-

Data/Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during year y
Source of data	Fraction based on monitoring results
Value(s) applied	80% (estimated, but to be monitored)
Measurement methods and procedures	The sampled households will be checked for presence of baseline stove and if it was being used along with project stove for cooking. For samples where baseline stove was found not being used, μ_y = 1.0. The surveys would be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices. For example, if there were 3 project devices per household and it was determined during the survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.66 is applied for the relevant monitoring period. Another example would be the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.75.
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	Sampling standard shall be used for determining the sample size to achieve 95/10 confidence precision.
Purpose of data	To calculate baseline emissions
Additional comment	-

Data/Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity
Source of data	Test result by WBT method
Value(s) applied	32%
Measurement methods and procedures	The efficiency of the project devices measured by a certifying agent recognized by the Ministry of Energy of Ghana.
Monitoring frequency	Recorded at the time of commissioning/distribution; Adjusted for the loss of efficiency as paragraph 32 of AMS-II.G. (version 10.0)
QA/QC procedures	The efficiency of the project devices will be tested by an appropriate certifying agent recognized by the Ministry of Energy of Ghana. The decrease in efficiency every year is applied 2.4 percent.
Purpose of data	To calculate baseline emissions
Additional comment	-

Data/Parameter	Life Span
Data unit	Number of years
Description	The operating life time of the project device.
Source of data	Manufacturer specification
Value(s) applied	5
Measurement methods and procedures	The value was taken from manufacturer or third party's test report conducted for specific ICS type at the time of commissioning/distribution of ICSs.
Monitoring frequency	Fixed and recorded at the time of commissioning/distribution
QA/QC procedures	Not applicable
Purpose of data	To calculate baseline emission
Additional comment	The project devices will be replaced after the life span has ended.

Data/Parameter	Date of Commissioning of batch *j*
Data unit	Date
Description	The CME may opt to group the device in "batch" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch.
Source of data	Internal records of ICS distribution
Value(s) applied	Refer to the distribution record database
Measurement methods and procedures	Recorded at the time of commissioning/distribution
Monitoring frequency	Fixed and recorded at the time of commissioning of the last project device in the batch
QA/QC procedures	To be recorded in the electrical database tool
Purpose of data	To calculate baseline emission
Additional comment	-

Data/Parameter	$N_{d,HH}$
Data unit	Number
Description	Number of project devices distributed per household
Source of data	Internal records of ICS distribution
Value(s) applied	1
Measurement methods and procedures	Recorded at the time of commissioning/distribution of project devices and it can be crosschecked with user details having ICS number
Monitoring frequency	Recorded at the time of commissioning/distribution
QA/QC procedures	To be recorded and saved in the electrical database tool
Purpose of data	To calculate baseline emissions
Additional comment	-

B.5.2. Sampling plan

>>

According to para 14 of Tool19 “Demonstration of additionality of microscale project activities", (Version 09.0), the unit in this CPA is a “microscale CDM unit”, and CPA sampling plan is designed based on the requirements of the methodology applied and standard (“Sampling and surveys for CDM project activities and programmes of activities”, (version 08.0)). Thus, the survey will be conducted to achieve the confidence / precision of 95/10.

Sampling Objective and Parameter to be monitored:

Due to the large number of ICSs to be distributed as part of the CPAs in this proposed PoA, it is not financially adequate to monitor each individual ICS unit. Therefore, representative sampling will be undertaken across the CPA. The sampling objective for each parameter is to calculate the emission reduction via sampling survey and test.

The parameters to be monitored in each CPA will be ICS efficiency, the number of project devices and fraction of displaced traditional cookstove use. Above all, the target population for the proportion of ICSs still in operation ($N_{y,i,j}$) of this CPA is all households in the CPA database which are using project ICSs to be distributed, and the target population for pre project appliances (μ_y) is the set of old stoves still in use under CPA database.

Target population

According to paragraph 31 of Guideline “Sampling and surveys for CDM project activities and PoAs”, (Version 04.0): *“Target population defines the target population, and describes any particular features associated with it.”.* The target population will be the total population served under the PoA.

Sampling Methodology

One unit of traditional cookstove will be replaced in each household with one type of ICS in this project. The Ghanaian society has a cultural state of being almost the same making it a homogeneous society/population. Hence, the ICS usage pattern will most likely be similar. Since ICS of the same specification is used in a similar usage pattern, simple random sampling method will be applied to group of CPAs. A simple random sample is a subset of a population (e.g. villages, individuals, buildings, pieces of equipment) chosen randomly, such that each element (or unit) of the population has the same probability of being selected.

The sample-based estimate (mean or proportion) is an unbiased estimate of the population parameter. Simple random sampling is conceptually straightforward and easy to implement – provided that a sampling frame of all elements of the population exists. Its simplicity makes it relatively easy to analyse the collected data. It is also appropriate when only minimum information of the population is known in advance of the data collection.

Simple random sampling is suited to populations that are homogeneous. In many instances a large population size and dispersed nature of population may cause a lack of homogeneity, while in some

cases those factors may have relatively low impact on homogeneity (e.g. a large number of biogas digesters located in varying altitudes and temperature zones may be less conducive for simple random sampling to determine the average amount of biogas production per digester, while the usage hours of light bulbs across wide geographic areas and among large populations with similar socioeconomic circumstances connected to a single or similar grid/s may be sufficiently homogeneous for simple random sampling). The costs of data collection under simple random sampling could be higher than other sampling approaches when the population is large and geographically dispersed.

Sampling Size

Since the group of CPAs are assumed to be homogeneous with respect to "μ_y" and "$N_{y,i,j}$", a simple random sampling plan is conducted to estimate the proportional parameters of interest. The below simple sample size shall be determined using the following formula:

$$n \geq \frac{1.96^2 N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.96^2 p(1-p)}$$

Where:

Parameter	Description
n	Sample size
N	Total number of households
p	Expected proportion
1.96	Represents the 95% confidence required
0.1	Represents the 10% relative precision

The sample size for parameter μ_y and $N_{y,i,j}$ will be calculated based on the same equation as mentioned above. However, the efficiency of project ICS is calculated based on certification by a national standards body, and the decrease in ICS efficiency every year is applied 2.4 percent in line with Methodology, AMS-II.G. (Version 10.0)

Sampling Frame

Sample sizes will be sufficient to ensure that the precision of the sample means/proportions are in accordance to the Sampling Frame established for the group of CPAs within the PoA to estimate emissions reductions. In cases where survey results indicate that desired precision is not achieved, the lower bound value of corresponding confidence interval of the parameter value may be used as an alternative to repeat the survey. Alternatively, the survey may be expanded to reach the required confidence/precision.

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

Sampling frame for proportion of ICS in operation ($N_{y,i,j}$):

The sample frame refers to all the information sources in the database. There are two primary mechanisms for data collection: The Registration Process for newly distributed/installed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) that will be used throughout the lifetime of the CPA. The detailed information collected from Registration Process is used to populate the stoves database, and the Monitoring Survey follows Guidelines

"Sampling and Surveys for CDM Project Activities and Programme of Activities" (Version 04.0). It is important that the CME collects and monitors accurate data about the distributed ICSs in group of CPAs.

Sampling frame for continued use of pre-project devices during the year (μ_y):
In line with applied approved methodology AMS-II.G. (Version 10.0), as installing data logger is not practical, a simple random sample within the common survey can be taken to determine continued use of old cookstoves. Its proportional usage by including suitable questionnaire if any use of pre project devices can be monitored in a common survey with other monitoring parameters; There will be two situations 1) project ICS are completely discarded 2) the old stoves used along with project ICS. Hence, in the first case it will be simple multiplication of fraction of total number of project ICS displaced by old cookstoves by total number of cookstoves in the CPAs, to achieve precise results based on survey result sample size calculation can be repeated. However, for the second case, surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when the baseline device is the three-stone fire. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices.

Survey Team and monitoring report:
The CME proposes to have experienced and independent samplers and testers to be involved in the sampling and survey; preference will be to hire local personnel for local language interactions which will enable full understanding of any responses given by users and to record data/results in errorless manner. The survey report will set out the data for emission reduction calculation. The CME will produce a monitoring report.

B.5.3. Other elements of monitoring plan

>>
The CME will establish the monitoring plan guideline to manage and record all data and parameters. In line with the operational and management monitoring implementation, the CME will consider all processes of the CPAs such as serial number allocation, distribution, regular check-up items and ER calculation. The detailed task for the monitoring will be granted to the CME, and they will have all the responsibilities to gather, record and manage the data and parameters to be monitored. In addition, those will be kept and archived on the electrical database tool at least two years after the end of the final crediting period or the last issuance of CERs.

All the data referred to the CPAs will be archived in the electrical database tool, and the purpose of the electrical database tool is to provide a complete solution of data management for production, warehousing, distribution, monitoring and evaluation of improved cookstoves production and distribution in Ghana. The system shall enable data entry, production, storage, distribution and user.

Software summary
The project has several partners, located at different offices in Ghana and South Korea. Some of these offices are the Project Office in Ghana. Others include manufacturers, warehouses and beneficiary communities spread across Ghana. The electrical database tool shall be web based so that project partners can have access irrespective of their location. The electrical database tool has the following 5 management modules: 1. Users Login, 2. Production, 3. Warehousing, 4. Distribution, 5. User Management.

- **Users' login:** This module is used to log authorised users into the system and manage access to various modules. Users shall use their Google ID to log into the system to ensure effective security. Users shall have access to modules only applicable to the role their respective organisations are playing in the project execution. As an example, staff from the Distribution Company shall have access to only the distribution module and a few reports whilst the CI shall have access to Production and Warehousing modules.

- **Production:** This module shall be used by the production manager to place orders of ICS to the various manufacturers. The manufacturers shall also use it to issue subsequent orders to the various clusters and workshops. Orders shall be assigned serial numbers that manufacturers shall emboss on individual stoves. Production numbers shall be inputted into the system in the various workshops so that quantities produced and delivered to manufacturers can be tracked effectively.
- **Warehousing:** This module shall track the delivery of completed ICS to and from various warehouses across the country and will maintain accurate stock levels to ensure effective monitoring.
- **Distribution:** This shall be used for the entry of beneficiary data such as name, GPS location, street address, town, district, ICS serial numbers, etc. This module shall have the capacity of working offline so that distribution data can be entered in areas without adequate mobile internet coverage. Data entered in offline mode will automatically synchronise to the central servers once Internet connection is established. This module shall require the use of a mobile phone so that GPS data could be captured automatically and to offer the possibility of capturing images of beneficiaries.
- **User:** This shall be used to categorise and record incidents during Monitoring surveys. It shall also be used to generate random sample of districts, towns, names, mobile numbers and location addresses to be visited during M&E visits.

The CME will manage the overall monitoring organization, and that will be central linked with a common electronic database of the CME. The CME shall review the efficacy of information gathering techniques and information flow, and assess enumerator and partner feedback to make improvements as deemed necessary.

SECTION C. Start date, crediting period type and duration

C.1. Start date of CPA

>>
07/12/2020 (Expected distribution date)

C.2. Expected operational lifetime of CPA

>>
21 years, 0 months

C.3. Crediting period of CPA

C.3.1. Type of crediting period

>>
Renewable (First crediting period for the CPA 018)

C.3.2. Start date of crediting period

>>
07/12/2020 (Expected distribution date)

C.3.3. Duration of crediting period

>>
The crediting period is 7 years, renewable
The project devices will be replaced after the life span has ended.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The analysis of environmental impact was provided at PoA level.

D.2. Environmental impact assessment

>>
The environmental impact assessment was provided at PoA level.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>
The local stakeholder consultation was carried out for the whole PoA.

E.2. Summary of comments received

>>
Not applicable, since performed at PoA level.

E.3. Consideration of comments received

>>
Not applicable. since performed at PoA level.

SECTION F. Eligibility for inclusion

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The eligibility criteria for inclusion of CPA 018 is considered in line with the "CDM project standard for programmes of activities" (Version 02.0).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
1	Geographical boundary	All CPAs included in this PoA will be located in the host country – The Republic of Ghana	The ICS location information will be recorded in the electrical database tool.	The geographical boundary of this CPA is North East, Upper East and Upper West region in Ghana, which is within the project boundary of the PoA.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
2	Double counting	Carbon emission reductions claimed by the CPA should be unique and not counted more than once. Each ICS shall be assigned a unique serial number which shall be displayed at the beneficiary location to identify each stove uniquely.	The unique serial number on ICSs will be recorded in electrical database tool.	Each ICS is granted a unique serial number at the time of distribution. This number is also recorded on the Conformity Letter and the electrical database tool.
3	Exclusiveness of CPA	The CPA shall not be previously: 1. Registered as a CDM project activity 2. Included as a CPA in any other registered PoA, or deregistered as a CPA of a PoA	Confirmation by the CME	The CME has reviewed and confirmed with the CI that the districts chosen for this CPA as well as the households in the districts are never involved in other cookstove CDM projects (PoAs).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
4	Specifications of Technology/Measure	Specification of the Technology/measure shall include the type, capacity and other key features of the design of the system. 1. Capacity – The ICS to be distributed in this PoA is "microscale CDM unit", thus the demonstration for threshold conditions is not required. Thermal / combustion energy efficiency is more than 20%. The test result will be submitted to DOE in the specific CPAs. 2. Size or dimension - The type of ICS in this programme is Jiko, and dimension will be as follows, but not limited to: Top diameter 27.0 cm (±1.0) x Height 32.0 cm (±1.0) 3. Operation - The ICS' fuel type is charcoal and portable type. 4. Other key design features – Material will be cast iron and ceramic material. The serial number will be printed on each ICS.	The specifications of Technology/Measure will be presented by the following evidences respectively: 1. The ICS efficiency will be measured or estimated by the one of options as stated in the data/parameter table 11, AMS-II.G. (Version 10), at the time of the inclusion of the CPA, and the test results will be submitted to the DOE. 2. Size or dimension will be written in the ICS manual or instruction. 3. Operation information will be written in the ICS manual or instruction. 4. The ICS manual or instruction gives key design information including ICS material, serial number and other features.	This CPA distributes ICSs to households initially using three stone fire and other conventional devices. The efficiency of ICS is 32% according to the certification by an appropriate certifying agent recognized by Ministry of Energy of Ghana. The efficiency test was conducted based on the Water Boiling Test (WBT) method. In addition, The CME provides ICS specification of technology/measure and manual as evidence materials to prove size or dimension, operation information, design of ICS.
5	Start date	Conditions that the start date of CPA will be after the PoA start date.	Record of end user agreement, registration details, installation report, etc. for the first ICS installed in the CPA.	The start date of this CPA is 07/12/2020, which is the first stove distribution date.
6	Applicability of the methodology	Each CPA complies with the applicability and other requirements outlined in followed methodologies: • AMS-II.G. (Version 10.0) • TOOL19 (Version 09.0) • TOOL21 (Version 13.0) TOOL30 (Version 02.0)	CPA-DDs applying the followed version of methodologies: • AMS-II.G. (Version 10.0) • TOOL19 (Version 09.0) • TOOL21 (Version 13.0) TOOL30 (Version 02.0)	The ICS to be distributed in this CPA has efficiency improvement in thermal applications of non-renewable biomass and can be proved with the third party certification, showing that it has 32% thermal efficiency.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
7	Additionality	In this PoA, the additionality of project activity is demonstrated with the investment barrier in line with para 10 of TOOL21. In addition, according to the TOOL19, the ICS is deemed as "microscale CDM unit".	The ICSs to be distributed in this proposed PoA are free of charge. This content can be obtained from the agreement.	The conformity letter is voluntary distribution agreement between the CI and the ICS beneficiaries. ICS beneficiaries can be provided the ICSs free of charge in line with the agreement.
8	Compliance of each unit with the microscale threshold	According to the Tool 19: Demonstration of additionality of microscale project activities (Version 09.0), each of the units contained in the CPA satisfy the condition to qualify as a microscale CDM unit.	Each CPA will show that microscale CDM unit through emission reduction calculation sheet or corresponding section in CPA-DD.	The amount of energy saving per each ICS is calculated in the CPA-DD and ex-ante emission reduction calculation sheet, and submitted to DOE.
9	Public funding	This program is exclusively subsidized by EWP. Affirmation that public funding from annex 1 parties does not result in a diversion of official development assistance.	Declaration from the CME that no funds for official development assistance will be used for program implementation.	No public funding or ODA was received for implementation of this CPA.
10	Target group and distribution mechanism	The households who have conventional cookstoves are the target group, and the ICSs will be directly distributed through the CME or the CI.	Target group and distribution information to be reported in CPA-DD will be recorded in the electrical database tool.	The ICS users are selected by the CI based on the Target Group defined in the PoA. The user is required to sign the Conformity Letter, which confirms that the user is currently using traditional stoves (Traditional 3 stones or other conventional devices).
11	Sampling	CPAs under the program will adhere to all requirements as mentioned in "Standard: Sampling and surveys for CDM project activities and program of activities" (Version 08.0).	CPAs will follow monitoring plan described in CPA-DD section I.7.2.	Representative sampling will be undertaken in line with the requirements of the AMS-II.G., the applied methodology, and the "Standard for sampling and surveys for CDM project activities and programme of activities" (Version 04.0). Refer to Section B.5.2 of the CPA.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
12	Local stakeholder consultation/ Environmental impact analysis	At the PoA level the LSC is conducted, and no requirements related to environmental impact analysis is required.	Not applicable as performed at the PoA level.	-
13	Combination of Methodologies	Not applicable because the proposed PoA is based on single methodology.	Not applicable. Methodology AMS-II.G. (Version 10.0) applied in this PoA.	-
14	Small-scale threshold check	Not applicable. The ICS to be distributed in this PoA as defined “microscale CDM unit”, the threshold condition is not required.	Not applicable	-
15	Debundling check	Not applicable. The ICS to be distributed in this PoA as defined “microscale CDM unit”, the debundling check is not required.	Not applicable	-
16	CER ownership	Each CPA will assure ownership of the CERs is secured by the CME.	The default contract for end users includes the provision that emission reductions generated under the PoA are owned by the CME.	It is written in the Conformity Letter, thus, end-users can be provided the ICSs in line with the agreement.

Appendix 1. Contact information of CPA implementers

Organization name	Ministry of Energy
Country	The Republic of Ghana
Address	P.O. Box SD 40 Stadium Post Office Accra - Ghana
Telephone	+233 (0) 302 667 090
Fax	-
E-mail	seth.mahu@energymin.gov.gh
Website	www.energymin.gov.gh
Contact person	Ing. Seth Mahu, Deputy Director, Renewable Electricity

Appendix 2. Affirmation regarding public funding

The program is subsidized by the Korea East-West Power Company.Co.Ltd.. The CPA does not receive any public funding from Parties included in Annex I to the Convention.

Appendix 3. Further background information on ex ante calculation of emission reductions

Please refer section B.4.3 of CPA-DD

Appendix 4. Further background information on monitoring plan

Please refer section B.5 of CPA-DD

Appendix 5. Summary report of comments received from local stakeholders

The local stakeholder consultation was carried out for the whole PoA.

Appendix 6. Summary of post-registration changes

Not applicable

Document information

Version	*Date*	*Description*
09.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN); • Make editorial improvements.
08.1	20 October 2017	Editorial revision to remove appendix "Applicability of methodologies and standardized baselines" from the main part of the form which had been mistakenly kept in the previous version.
08.0	28 June 2017	Revision to: • Remove appendix "Applicability of methodologies and standardized baselines" as the appendix is not relevant at the CPA level; • Make editorial improvement.
07.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and PoA-DD forms; • Make editorial improvement.
06.0	24 May 2017	Revision to: • Ensure consistency with the "Standard: CDM project standard for programme of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Component project activity design document form for small-scale component project activities" (CDM-SSC-CPA-DD-FORM); • Make editorial improvement.
05.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
04.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
03.0	25 June 2014	Revisions to:

Version	*Date*	*Description*
		• Include the Attachment: Instructions for filling out the component project activity design document form for CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a CPA implementer and/or responsible person/ entity for completing the CDM-CPA-DD-FORM in A.13. and Appendix 1; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and Appendix 6; • Change the reference number from F-CDM-CPA-DD to CDM-CPA-DD-FORM; • Make editorial improvement.
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project activity design document form" (EB 66, Annex 16).
01.0	27 July 2007	EB 33, Annex 42 Initial adoption.

Decision Document Business	Class: Type: Function:	Regulatory Form Registration

Keywords: component project activity, project design document