Component project activity design document form
(Version 08.1)

BASIC INFORMATION	
Title of the CPA	Distribution of Improved Cook Stoves in Sub-Saharan Africa-Nigeria-CPA-003
Scale of the CPA	☐ Large-scale ☒ Small-scale
Version number of the CPA-DD	02
Completion date of the CPA-DD	23/02/2018
Title and UNFCCC reference number of the registered CDM PoA	Distribution of Improved Cook Stoves in Sub-Saharan Africa 9007
Title and reference number of the corresponding generic CPA	Distribution of Improved Cook Stoves in Sub-Saharan Africa-[insert country name]-CPA-XXX
Coordinating/managing entity	C-Quest Capital Malaysia Global Stoves Limited
Host Party	Republic of Nigeria
Applied methodologies and standardized baselines	AMS-II.G. ver. 4 - Energy efficiency measures in thermal applications of non-renewable biomass
Sectoral scopes linked to the applied methodologies	Sectoral scope 3: Energy demand
Estimated amount of annual average GHG emission reductions	37,980 t CO_2e

SECTION A. Description of component project activity (CPA)

A.1. General description of CPA

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The proposed small-scale CPA involves the promotion and distribution of up to 11,254 domestic fuel-efficient improved cook stoves (ICS) in Nigeria. The ICS disseminated through this programme will replace the prevailing inefficient three-stone fires, or traditional pot supports[1] with ICS which combust wood more efficiently and improve thermal transfer to pots, hence saving fuel and lowering greenhouse gas emissions.

C-Quest Capital Malaysia Global Stoves Limited (CQC) is the Coordinating / Managing Entity (CME) for the POA in which this CPA is to be included. SOSAI Renewable Energies Company (SOSAI) will implement this CPA - hence acting as the CPA Implementer of this CPA. SOSAI will manage and coordinate activities of local partners, the promotion and installation of the ICS and also provide all necessary marketing and promotion assistance to partners. SOSAI is also responsible for monitoring activities of this CPA. Ecoeye Co., Ltd. and Korean Parties provide all implementation cost for all ICS under this CPA. Ecoeye Co., Ltd. and Korean Parties provide stove subsidy to provide ICS for free of charge to household using baseline stove and operation & maintenance cost of ICS production and distribution for CME and CPA implementers to operate this CPA in financially sustainable condition. Carbon finance will be used to facilitate the purchase, installation and marketing of stoves, and will enable the provision of the ICS at low/no cost to households; without carbon finance, these activities would not take place.

The end user will be informed that carbon finance is being generated by the use of the ICS, and this finance is in turn used to facilitate the access to ICS (eg. subsidize the price of the ICS) and helps to cover project implementation costs. The ICS customer will confirm via a Registration Card[2] with/to the CPA Implementer that he/she is a household, that his/her participation in the project is voluntary, that they are transferring rights to the CERs generated by the ICS to the CME and that they previously did not own an ICS. The Registration Card can be either in a form of hard copy or electronic copy depends on the means (Direct contact or Indirect contact) chosen by the CPA implementer to collect end-users' information. The CPA implementer is allowed to use either one or both means to gather information from ICS end user. The Registration Card will contain the necessary information regarding the ICS, the user and the field team information, allowing one (eg. the CME or the DOE) to easily trace and identify each ICS when needed. This information will be stored by the Project Implementer in hard copy and/or in an electronic data management system, or monitoring database, and backed up by the CME, in order to ensure no double counting of ICS.

The CME and CPA Implementer will manage and coordinate the promotion and installation of the ICS. CPA Implementer will manage and coordinate activities of local partners, and also provide all necessary marketing and promotion assistance to partners. CPA Implementer will also coordinate the monitoring of this CPA.

SOSAI will be installing (together with households) fixed stoves assembled locally. Installation will be done by households under the instructions of field team in the rural communities which SOSAI has access to. SOSAI is committed to continue using existing and trained staff and project areas where the projects are located to disseminate the new TLC-CQC Rocket Stove, taking advantage

[1] Traditional pot supports as used in the PoA is taken to include tripods for open fires and various inefficient traditional charcoal stoves (where applicable).

[2] The term 'Registration Card' as used in this CPA as per the PoA is taken to include electronic data recording/transfer mechanisms such as Short Message Service (SMS) and/or Information and Communication Technologies ('ICT' – such as PDAs). Information contained in the Registration Card and means of transferring this to the CME is explained in Part II Section A of the POA-DD and further described in this same paragraph in Section A.3 of this CPA-DD.

of SOSAI extensive network with farmers. New staff dedicated full time to promoting the new TLC-CQC Rocket Stove will be recruited to join the Project overtime.

CQC is the CME of the POA and has been the leader in the development of POAs under the CDM CQC's staff has over 20 years of experience with ICS, having been involved and leading key operations to provide funding through multiple instruments for improved cook stove distribution in different countries. These operations have proven successful and introduced consumers to the opportunity of ICS. CQC staff has established working relationship with major international stove producers and have been involved in the development of registered methodologies and PDDs and POA-DDs for ICS.

According to an ex-ante calculation, the proposed CPA will contribute to an emissions reduction equivalent to 37,980 tonnes of CO_2 per annum in Nigeria. Being type II project activity, the CPA will not exceed a total of 180 GWh_{th}/yr of thermal energy savings.

The proposed CPA contributes to the sustainable development of the local and national economy in a number of ways:

i. Environmental

- The CPA will help significantly reduce Nigeria's greenhouse gas emissions over its lifetime.
- The CPA will help reduce the use of non-renewable biomass from forests in Nigeria, thus assist in conserving existing forest stock and the protection of natural forest eco-systems and wildlife habitats.
- The protection of standing forests will also help protect watersheds that regulate water table levels and prevent flash flooding.

ii. Social

- Considerably less time will need to be spent collecting wood fuel for the family home thereby reducing the work burden on rural families and presenting alternative opportunities for economic development.
- The amount of indoor pollutants from the burning of biomass in the family home will be reduced. Less carbon dioxide, carbon monoxide and particulates will be emitted due to the decrease in total biomass burned and an increase in the temperature of combustion.
- The stove provides a safer method for combusting biomass for cooking, helping to reduce burn injuries, especially for children, in the family home.

iii. Economic

- This CPA will develop a section of Nigeria's rural economy, in the rural assembly, distribution, maintenance and monitoring activities.
- Household expenditures on cooking fuel will be reduced through the use of the ICS.
- Saved household labor can be diverted to more productive economic activities.
- Strengthening the employee base of partner organizations and creation of direct local employment opportunities in operational and management roles, as well as future assembly and/or manufacturing initiatives.

The proposed CPA will deliver a long-term, secure and simple contribution to sustainable development in Nigeria that, without carbon finance, would not exist.

A.2. Location of CPA

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The CPA will take place in Nigeria. As outlined in the Part II Section A.1 of the SSC-PoA-DD "CPAs will be defined as the sum of identified locations of in-use ICS installed or distributed to consumers previously using three stone fires or traditional pot supports, based on the detailed sales or registration record described above (ie. Registration Card). The sum of the location of

these ICS will define the spatial boundary of the SSC-CPA, which in turn will fall entirety within the geographical boundary of the SSC-PoA and within a single country or region included in the PoA specific to the fuel-type of each CPA (specified in Section A.7 of each CPA-DD).

As a result, the boundaries described below may include multiple CPAs from the proposed PoA.

Map of Nigeria (Kano and Kaduna States highlighted in red)
Source: http://en.wikipedia.org/wiki/Kaduna_State

Nigeria Wood boundaries include all areas (rural, peri-urban and urban) in the states of Kano and Kaduna.

Kano and Kaduna State, Nigeria (areas in red on the map above, right side)	
Kano State	
Northern Point Latitude: 12.566667° Longitude: 08.483333°	Western Point Latitude: 11.483333° Longitude: 07.683333°
Eastern Point Latitude: 11.550000° Longitude: 09.350000°	Southern Point Latitude: 10.533333° Longitude: 08.733333°
Kaduna State	
Northern Point Latitude: 11.483333° Longitude: 08.100000°	Western Point Latitude: 10.450000° Longitude: 06.083333°

Eastern Point Latitude: 10.333333° Longitude: 08.783333°	Southern Point Latitude: 09.000000° Longitude: 08.550000°

A.3. Technologies/measures

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TLC-CQC Rocket Stove proposed under this CPA is a type of single pot fixed cook stoves. The TLC-CQC Rocket Stove is a simple design with basic features. The design uses a total of 16 readily available building bricks that are made by the household using locally available clay. The average size of the brick used on the TLC-CQC Rocket Stove which is produced using a standard mold is 22.5cm x 11cm x 6.5cm. The bricks are mortared together using locally available material (clay soil, cow dung, and sand) for better insulation and heat loss reduction. The mud mortar is a mix of 5 liters clay, 5 liters sand, 5 liters manure with 5 liters of water.

Metal components have been added to optimize combustion and heat transfer. To aid the combustion process a Grate and a Stick Support have been added. The grate is made from heat corrosion resistant cast iron and sits at the bottom of the combustion chamber. It allows the firewood to rest on it while allowing airflow underneath the firewood to improve combustion. A metal stick support is placed in front of and slightly into the opening of the stove and acts as a firewood feeding platform and also ensures airflow while feeding the fuel into the combustion chamber. To aid the process of heat transfer a Pot Skirt is added, made from galvanized iron sheet metal.

According to independent stove efficiency tests performed by Aprovecho Research Center on the TLC-CQC Rocket Stove, the WBT results yielded an average thermal efficiency of 25.66%. To boil 5 liters of water, the TLC Rocket stove took an average of 761 grams of fuel to boil when starting with a cold stove, an average of 564 grams of fuel to boil when the stove was hot, and an average of 461 grams to carry it through the simmer phase.

Technical Specifications – TLC-CQC Rocket Stove	
Thermal efficiency	25.66%
Size (stove)	Depth: 35 cm Width: 35 cm Height: 28 cm
Size (combustion chamber)	Depth: 12 cm Width: 12 cm Height: 28 cm

This CPA is only replacing wood-fuel stoves, not charcoal stoves.

Figure 1 below shows the TLC-CQC Rocket Stove:

A.4. Coordinating/managing entity

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C-Quest Capital Malaysia Global Stoves Limited will be the coordinating/managing entity of the PoA.

A.5. Parties and CPA implementers

Parties involved	CPA implementers	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
Republic of Nigeria (host)	SOSAI Renewable Energies Company	No
Republic of Korea	Ecoeye Co., Ltd	No

A.6. Public funding of CPA

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No public funding from Annex I parties to the United Nations Framework Convention on Climate Change (UNFCCC) are envisaged to be made available for the proposed CPA. If public funding from Annex I parties to the UNFCCC is provided, the CME shall confirm that the funding is not diversion of Official Development Assistance (ODA)[3].

[3] Official development assistance (ODA) is defined in the *OECD Glossary of Statistical Terms* as follows: Flows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 percent (using a fixed 10 percent rate of discount). By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ("bilateral ODA") and to multilateral institutions. ODA receipts comprise disbursements by bilateral donors and multilateral institutions (*OECD Glossary of Statistical Terms*).

A.7. History of CPA

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The proposed CPA is neither registered as a CDM project activity nor included in another registered CDM PoA. The proposed CPA also is not a project activity that has been deregistered.

This CPA has the potential for boundaries to overlap with other CPAs, however any individual household in the proposed CPA will only represent a single independent subsystem/measure (stove) in this PoA; it will be confirmed through the distribution process that no household previously owned an ICS and through the monitoring process that each household is not already involved in any other CPA or CDM project involving the distribution and/or installation of ICS (as outlined in Part I section B.2 of PoA defining eligibility criteria for inclusion of CPAs). When a new ICS Registration Card is filled out, or sent via SMS or ICT, the customer will acknowledge that they previously used a three-stone fire or traditional pot support and did not previously owned an ICS and is therefore not part of any other ICS program in order to be included in the CPA. Registration data collected will be verified by spot-checks. This will ensure that no customers will be included in a new CPA if they already own an ICS.

Each CPA will have a set of serial numbers so a project participant or verifier can easily determine that any stove identified in any household is affiliated with one and only one CPA. No individual serial number can be in more than one CPA, so it will not be possible for one stove to be counted in two different CPAs. In addition, each CPA will be cross-checked with other CPAs in this PoA and with CPAs in any other PoA or in a CDM project activity operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary carbon schemes to ensure that the CPA is not included in any other PoA, CDM project activity or voluntary carbon project activity.

A.8. Debundling

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According to the Guidelines on assessment of de-bundling for SSC project activities (version 03) published as annex 13 of the meeting report of EB 54 the CPA is exempted from performing a de-bundling check i.e. considered as being not a de-bundled component of a large scale activity if the following condition applies:

10. *If each of the independent subsystems/measures (e.g. biogas digester, solar home system) included in the CPA of a PoA is no greater than 1% of the small scale thresholds defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e. considered as being not a de-bundled component of a large scale activity.*

Each of the improved cook stoves included in the CPA is not greater than 1% of the small-scale threshold of 180 GWh thermal energy savings per year.

The ICS distributed under this CPA do not exceed 1.8 GWh thermal energy savings per year.

The thermal energy savings of the ICS is approximately 0.01599 GWh_{th}/year.

Hence, the condition is fulfilled.

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

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The approved small-scale baseline and monitoring methodology used is AMS II.G, version 4, *Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass*.

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

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	Source	GHG	Included?	Justification/Explanation
Baseline	Combustion of nonrenewable fire wood for cooking (three stone fire or traditional pot support)	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available
		N_2O	No	Minor source of emissions and limited data available
Project activity	Combustion of nonrenewable fire wood for cooking (ICS)	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available
		N_2O	No	Minor source of emissions and limited data available

B.3. Establishment and description of baseline scenario

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According to the methodology, it is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs. In this particular project, the baseline is the avoidance of non-renewable biomass, which actually has a higher emissions factor than many fossil fuels. As a result, using the default EF of 81.6 tCO_2/TJ is conservative.

B.4. Estimation of emission reductions

B.4.1. Explanation of methodological choices

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The choice of methodology for a typical SSC-CPA will be AMS II.G Version 04. The activities of each SSC-CPA will entail the distribution/installation of improved cooking stoves, which result in energy efficiency improvements to some application of non-renewable biomass, as required by AMS II.G Version 04.

In the absence of the project activity, for the purposes of emissions reductions, the baseline is assumed to be the use of fossil fuels to meet similar thermal needs. In this case, as per AMS II.G Version 04, the default emissions factor of 81.6tCO_2/TJ is applied. In addition, Version 4 allows a default leakage adjustment factor of 0.95 to be applied to B_{old} to account for leakages. This PoA will also use this default.

Because of the nature of traditional baseline stoves in use in the countries part of this POA including three stone fires and traditional pot supports it is not possible to ensure that these are disposed of. Therefore, this PoA will monitor the continued use of baseline stoves amongst users of ICS that are in operation in order to ensure that fuel-wood consumption of those stoves is excluded from B_{old} (option (b) Paragraph 20 AMS II.G Version 4.0).

According to the methodology, $B_{y,savings}$ may be calculated in a number of ways (as per Options 1, 2 and 3 in Paragraph 6) and this PoA will allow the use of Option 2 in CPAs under this POA. Option 1 is excluded because of the need to perform a Kitchen Performance Test, which will not be used in this PoA. Option 3 is excluded because WBTs tend to be more accurate and easier to implement than controlled cooking tests, and WBTs can use a default for the original efficiency (thus efficiency tests only have to be conducted once on ICS). In all instances, the possible variation in performance of stoves of different vintages will be accounted for in calculating $B_{y,savings}$.

This PoA will use equations 1 (adjusted for leakage) and 3 (with B_{old} adjusted for second stove use) of methodology AMS-II.G version 04.0. A detailed explanation of how emissions reductions are estimated is included in section D.6.3 of Part II of this document.

B.4.2. Data and parameters fixed ex ante

Data/Parameter	**B_{old}**
Data unit	tonnes/year
Description	Quantity of woody biomass used in absence of the project activity (per stove) from fire wood in the country/region and fuel-type specified in the CPA as defined below
Source of data	Baseline survey,
Value(s) applied	5.1136
Choice of data or measurement methods and procedures	The baseline survey assessed the average woody biomass usage per household per annum amongst users of 3-stone fires, / pot support according to interviews in Nigeria. This data was gathered according to: Standard for Sampling and Surveys CDM Project Activities and Programme of Activities
Purpose of data	Calculation of baseline emissions
Additional comment	For the purposes of calculating ex-ante emission reductions a baseline adjustment factor has been applied to B_{old} to account for fuel-wood used in a second baseline stove for the 51% of households in the baseline study who reported using a second stove at least once per week. This baseline adjustment factor is based on the mean number of stoves used per household averaged across the entire baseline sample, calculated to be 1.23 stoves/household. The value of B_{old} applied in this PoA-DD for wood fuel baseline stoves (5.1136 tonnes/year) incorporates this baseline adjustment factor.

Data/Parameter	**η_{old}**
Data unit	Fraction
Description	Efficiency of 3-stone fire or traditional pot support cooking method (system being replaced)
Source of data	Methodology default
Value(s) applied	0.10
Choice of data or measurement methods and procedures	AMS II G version 4, paragraph 6, option 2
Purpose of data	Calculation of baseline emissions
Additional comment	

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	Independent Report following the EB 67 Annex 22 guidance
Value(s) applied	0.93
Choice of data or measurement methods and procedures	The f_{NRB} is calculated as per EB 67 Annex 22 guidance.

Purpose of data	Calculation of baseline emissions
Additional comment	

Data/Parameter	**$NCV_{biomass}$**
Data unit	TJ/t
Description	Net calorific value of non-renewable biomass that is substituted
Source of data	IPCC default
Value(s) applied	0.015
Choice of data or measurement methods and procedures	AMS II.G, version 4
Purpose of data	Calculation of baseline emissions
Additional comment	

Data/Parameter	**$EF_{projected\_fossilfuel}$**
Data unit	tCO_2/TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	IPCC default
Value(s) applied	81.6
Choice of data or measurement methods and procedures	AMS II.G, version 4
Purpose of data	Calculation of baseline emissions
Additional comment	

Data/Parameter	**L**
Data unit	Fraction
Description	Leakage Adjustment Factor
Source of data	default
Value(s) applied	0.95 – Version 4 of AMS IIG
Choice of data or measurement methods and procedures	A net to gross adjustment factor (0.95 default) is applied in order to adjust B_{old} to account for leakages as per paragraph 13 (a) of the methodology.
Purpose of data	Calculation of leakage
Additional comment	

B.4.3. Ex ante calculation of emission reductions

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As per the SSC-POA-DD, the SSC-CPA will calculate emission reductions thought the application of the following equations:

$$ER_y = B_{y,savings} * f_{NRBy} * NCV_{biomass} * EF_{projected\_fossilfuel} * L$$

Where:

ER_y Emission reductions during the monitoring period y in tCO_2e

$B_{y,savings}$ Total biomass that is saved in tonnes during the monitoring period (*y*)

$fNRB_{,y}$	Fraction of biomass saved by the project activity in monitoring period y that has been established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable biomass by similar consumers. The IPCC default value is selected (81.6 TCO_2/TJ)
L	A net to gross adjustment factor (0.95 default) is applied above (equation (1) of AMS II.G, version 4) in order to adjust B_{old} to account for leakages as per paragraph 13 (a) of the methodology.

Calculating $B_{y, savings}$

According to the AMS II.G (version 4) methodology, $B_{y,savings}$ may be calculated in a number of ways (as per Options 1, 2 and 3 in Paragraph 6) and this PoA will allow the use of Option 2 in CPAs under this POA. Option 1 is excluded because of the need to perform a Kitchen Performance Test, which will not be used in this PoA. Option 3 is excluded because WBTs tend to be more accurate and easier to implement than controlled cooking tests, and WBTs can use a default for the efficiency of the traditional cooking systems (thus efficiency tests only have to be conducted over ICS). In all instances, the possible variation in performance of stoves of different vintages will be accounted for in calculating $B_{y,savings}$.

Option 2.

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

Where:

B_{old}	Quantity of wood fuel used in the absence of the project activity in tonnes
η_{old}	A default value of 0.10 may be optionally used if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney;
η_{new}	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol.

To account for stoves which have been in operation for fractions of the monitoring period, the following formula is used:

$$Ny,i = \sum_{j=1}^{J_y} n_{y,\,j} \times t_{y,\,j}$$

Where:

$N_{y,i}$	Total number of stoves in operation for a full monitoring period equivalent within each SSC-CPA
$n_{y,j}$	Number of ICS operating in monitoring period *y* for j days,
j	days since installation or distribution of the ICS (or start date of monitoring period for ICS installed/distributed in prior monitoring periods), until end of monitoring period
$t_{y,j}$	Fraction of monitoring period *y* that the stove is in operation ($t_{y,j}$ = j/J_y). Note, for ICS installed in prior monitoring periods $t_{y,\,j}$ = 1.
J_y	Total number of days in the monitoring period *y*

For the purposes of calculating ex-ante emission reductions a baseline adjustment factor has been applied to B_{old} to account for wood fuel used for the 51% of households in the baseline study who reported using a second stove at least once per week. This baseline adjustment factor is based on the mean number of stoves used per household averaged across the entire baseline sample, calculated to be 1.23[4]. The value of B_{old} applied in this PoA-DD for wood fuel baseline stoves (14.01 kg/day) incorporates this adjustment factor.

The percentage of households continuing to use a baseline stove in addition to an ICS will be monitored in order to address paragraph 20 (b) of the AMS II.G (version 4) methodology. The monitored (ex-post) percentage of ICS users continuing to use a baseline stove in addition to the ICS (parameter SS_y) will be compared to the ex-ante percentage found in the baseline (51%) and B_{old} will be adjusted proportionally based on the proportional change in the percentage. The parameter used to calculate ex-post $B_{y,savings}$ will be $B_{old,\ adjusted}$ in order to account ex-post for fuel-wood used in baseline stoves in addition to ICS. This procedure is outlined here:

In order to account for multiple stoves of different ages (*i*), which may have different efficiencies ($\eta_{new,y,\ i}$), this formula can be adapted as follows:

$$B_{y,savings} = B_{old,adjusted}\left(1-\frac{\eta_{old}}{\eta_{new,y,i}}\right)$$

Where:

$N_{y,i}$	Total number of stoves (*i*)[5] in operation for a full monitoring period equivalent within each SSC-CPA
η_{old}	Efficiency of the baseline system/s being replaced. The 0.10 default value is used as the replaced systems are three-stone fires or conventional systems lacking improved combustion air supply mechanism and flue gas ventilation system i.e., traditional stoves.
$\eta_{new,\ y,I}$	Efficiency of ICS of age *i* (fraction)

and

$$B_{old,adjusted} = B_{old} \times \left[\frac{1.23}{1+(SS_y/0.51)\times(1.23-1)}\right]$$

Where:

[4] This factor was\alculated as follows:

1. Each household's fuel consumption datum (only adjusted for seasons) was divided by its corresponding mean number of baseline stoves used. The results of all households in the dataset are averaged to obtain a baseline fuel consumption mean adjusted for seasons AND multiple stove use.

2. The fuel consumption mean only adjusted for seasons (average of all the samples in the database) is divided by the fuel consumption mean adjusted for seasons AND multiple stove use (this is also a average of all the samples in the database) to obtain the multiple stove use adjustment factor (in this case 1.23).

Note that this is slightly different from taking the mean number of stoves used per household across the sample and applying it to the baseline fuel consumption mean adjusted for seasons.

[5] Vintage shall be defined as the "age" of the ICS – ie. Number of years it has been in operation. – ie. all stoves below 1 year (or 365 days) of use belong to vintage 1, all stoves between 1 and below 2 years of use to vintage 2 and so on. Note that *i* will match the efficiency of the stove at a certain "age"; e.g. stoves vintage 2 will be grouped together and WBTs will dictate their $\eta_{new,i.}$

B_{old}	Baseline Quantity of woody biomass used in the absence of the project activity in tonnes
SS_y	is the percentage of households that continue to use baseline stoves simultaneously with ICS at least once per week (see section B.7.1. of the SSC-PoA-DD);

Note in the formula above that wood-fuel baseline data is used when calculating $B_{old,adjusted}$. The value 0.51 is the percentage of households in the baseline study who use a second stove simultaneously at least once per week and 1.23 is the multiple stove adjustment factor, calculated as follows:

$$Multiple\ stove\ adjustment\ factor = \frac{B_{old\ adjusted\ for\ seasons\ and\ multiple\ stove\ use}}{B_{old\ adjusted\ for\ seasons}} = \frac{17.23}{14.01} = 1.23$$

Emissions reductions are then calculated as follows:

$$ER_y = B_{y,savings} \cdot f_{NRBy} \cdot NCV_{biomass} \cdot EF_{projected\_fossilfuel} \cdot L$$

$B_{y,savings}$ per stove = 5.11* (1-.0.1 /.0.2566) = 3.1208 tonnes of wood saved per stove per year
CERs/stove = 3.1208 * 0.93 * 0.015 * 81.6 * 0.95
= 3.3748 t CO_2e per stove

The maximum number of ICS in the CPA will be dependent on the biomass saved by each ICS. As a conservative estimate, $B_{y,savings}$ are estimated based on the unadjusted baseline[6] wood fuel baseline consumption (6.2898 tonnes/stove/year). The CPA size is calculated in the following manner:

11,254 = 180 / (0.015 x 0.277777[7] * 6.2898 x (1-(0.10/0.2566))

Given the maximum of 11,254 stoves in this CPA, total wood savings would be 35,121 tonnes of wood per year. Using the formula below:

$$ER_y = B_{y,savings} \cdot f_{NRBy} \cdot NCV_{biomass} \cdot EF_{projected\_fossilfuel} \cdot L$$

ER_y = 35,121* 0.93* 0.015 * 81.6 * 0.95

= 37,980 tonnes t CO_2e

For each SSC-CPA, certain parameters indicated in the methodology for the calculation of emissions are fixed. Default values have been selected for the following parameters:

1. *NCVbiomass The IPCC default value is selected, as indicated in the methodology (0.015 TJ/tonne) put in unit*
2. $EF_{projected\_fossilfuel}$ The IPCC default value is selected (81.6 TCO_2/TJ)
3. $\eta_{old,\ appliance}$ The Methodology default value for 3-stone fires and traditional pot supports is selected (0.10 if Option 2 is used)
4. The 0.95 leakage adjustment factor is applied in line with AMS II.G version 4

Ex-ante ER calculation using baseline data (per stove):

Methodological	Unit	Data Source	Value

[6] Unadjusted value would be the baseline numbers without account for simultaneous baseline stove use.

[7] This is the conversion factor from terajoules to kilowatt hour, ie. 1 TJ = **277777.77777778** kWh or 0.277777 GWh

Variable			
B_{old}	tonnes/annum	Baseline survey	5.11
L_y	Fraction	AMS II.G Default	0.95
$\eta_{old,\ 3\text{-}stone}$	Fraction	AMS II.G Default	0.1
$\eta_{old,\ I,\ ICS}$	Fraction	Water Boiling Test	0.2566
$B_{y,savings}$	tonnes/annum	Calculated	3.1208
$f_{NRB,y}$	Fraction	EB67 Annex22 Default	0.93
$NCV_{biomass}$(TJ/t)	TJ/tonne	IPCC Default Value	0.015
$EF_{projected\_fossil\_fuel}$	tCO_2/TJ	IPCC Default Value	81.6
ERy	t CO_2e /annum	calculated	3.3748

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	37,980	0	0	37,980
Year 2	37,980	0	0	37,980
Year 3	37,980	0	0	37,980
Year 4	37,980	0	0	37,980
Year 5	37,980	0	0	37,980
Year 6	37,980	0	0	37,980
Year 7	37,980	0	0	37,980
Total	**265,860**	**0**	**0**	**265,860**
Total number of crediting years	**7**			
Annual average over the crediting period	**37,980**	**0**	**0**	**37,980**

B.5. Monitoring plan

B.5.1. Data and parameters to be monitored

Data/Parameter	$n_{y,j}$
Data unit	Quantity
Description	Number of stoves still in operation during the monitoring period as determined by the monitoring survey in each stove vintage.[8] This includes total number of stoves distributed/installed in the entire CPA.
Source of data	ICS registration data and data from the Sampling Plan.
Value(s) applied	For the purposes of calculating ex-ante emission reductions, assumption is 11,254 stoves with a dropout rate of zero.
Measurement methods and procedures	The percentage of stoves found to be still in operation in each vintage based on the sampling plan in each monitoring period will be applied to the total number of stoves distributed/installed in that vintage for each monitored CPA (according to the ICS registration records in the monitoring database and the applicable sample frame). The proportion of sampled ICS found to be in operation in each vintage during each monitoring period will be applied to the total number of stoves of that vintage for each monitored CPA when calculating emission reductions. If, based on the sample size selected in any monitoring period, the confidence/precision requirements set out in EB69 Annex 4 are not satisfied, then CPA-Implementers will follow the procedures outlined in the Monitoring Plan (Part II Section B.7.2 of the PoA-DD) to ensure the required level of confidence/precision are met.
Monitoring frequency	Annually
QA/QC procedures	The unique reference number of each stove shall be logged in the monitoring database showing the total number of stoves. Data from the sampling plan will be collected in each monitoring period by trained project staff and applied in the emissions reductions calculations. Internal cross-checks by the CME or CPA implementer will be undertaken as QC.
Purpose of data	Calculation of baseline and project emissions
Additional comment	See Part II section B.7.2 of the PoA-DD for more detail on monitoring procedures.

Data/Parameter	$t_{y,j}$
Data unit	Fraction
Description	Fraction of monitoring period the stove is in operation (days in operation/total days in monitoring period)
Source of data	ICS registration data in monitoring database and length of monitoring period
Value(s) applied	For the purposes of calculating ex-ante emission reductions, assumption is 1.0
Measurement methods and procedures	The fraction will be calculated by dividing the number of days from the registration date of the stove, or the start date of the monitoring period (whichever is later), until the end of the monitoring period by the total number of days in the monitoring period.
Monitoring frequency	Annually

[8] A vintage defines a year of stove distribution and does not necessarily correspond to a calendar year. For example, stoves distributed starting on 01/03/2014 and until 28/02/2015 (a stove distribution period of one year) will belong to the same vintage. The CME shall define the vintage start and end dates, but the period in between these dates will correspond to one year.

QA/QC procedures	The unique reference number of each stove shall be logged in the monitoring database. The date of registration shall be utilized to determine the portion of the monitoring period that the stove has been in operation. Any interruption in the stoves' operation (e.g. where stoves are replaced or drop out) will register as missed operating time in the monitoring database for emissions calculation purposes.
Purpose of data	Calculation of baseline and project emissions
Additional comment	See Part II section B.7.2 of the PoA-DD for more detail on monitoring procedures.

Data/Parameter	$\eta_{new,i}$
Data unit	Fraction
Description	Continuing efficiency of ICS
Source of data	Efficiency tests in each monitoring period
Value(s) applied	An efficiency of 0.2566 will be used as an ex-ante calculation for this CPA.
Measurement methods and procedures	The tests will be coordinated by the CME and undertaken following WBT protocol 4.3.2 (or more recent version at the discretion of the CME) by a trained professional working for the CME or CPA Implementer or an experienced third party.
Monitoring frequency	Annually
QA/QC procedures	The WBT Protocol 4.3.2 or a more recent version will be used at CME discretion
Purpose of data	Calculation of project emissions
Additional comment	See Part II section B.7.2 of the PoA-DD for more detail on monitoring procedures

Data/Parameter	SS_y
Data unit	Percentage
Description	The percentage of ongoing baseline stove use within the population of in-use ICS in each vintage during a monitoring period.
Source of data	Monitoring of ongoing baseline stove use will be undertaken using the sampling approach outlined in Part II section B.7.2 of the PoA-DD (to meet EB69 Annex 4 confidence/precision requirements).
Value(s) applied	This will be a monitored parameter, so will only be available ex-post. As a conservative approach to ex-ante calculations, the percentage of households in the baseline study using a second stove at least once per week (51%), resulting in a mean total household stove usage 1.23. This ex-ante baseline adjustment factor has been applied to Bold in order to subtract fuel-wood used in these second stoves resulting in the B_{old} estimate of 5.11 tonnes/year applied for the purpose of calculating expected emission reductions in section B.4.3 of the CPA-DD.

Measurement methods and procedures	A survey will be conducted asking households if they use a baseline stove at least once per week in addition to their ICS, as per the monitoring plan outlined in Part II Section B.7.2 of the PoA-DD. SS_y will be calculated in each monitoring period as follows: the number of sampled households per vintage with in-use ICS that also continue to use a baseline stove divided by the total number of in-use ICS in that vintage sample. The values obtained from each vintage will be applied to stoves of the same vintage in the CME records for the purpose of calculating emissions reductions. This parameter will be used to calculate the ex-post baseline adjustment factor in each monitoring period, as outlined in section D.6.3. This parameter is used to address paragraph 20 (b) of AMS II.G (version 4) methodology. Internal cross-checks by the CME or project implementer will be undertaken as QC.
Monitoring frequency	Annually
QA/QC procedures	A survey will be conducted asking households if they use a baseline stove at least once per week in addition to their ICS, as per the monitoring plan outlined in Section D.7.2 of this CPA-DD. SS_y will be calculated in each monitoring period as follows: the number of sampled households with in-use ICS that also continue to use a baseline stove divided by the total number of in-use ICS in the sample.
Purpose of data	Calculation of baseline emissions
Additional comment	See Part II section B.7.2 of the PoA-DD for more detail on monitoring procedures This parameter is used to address paragraph 20 (b) of the AMS II.G (Version 4) methodology.

B.5.2. Sampling plan

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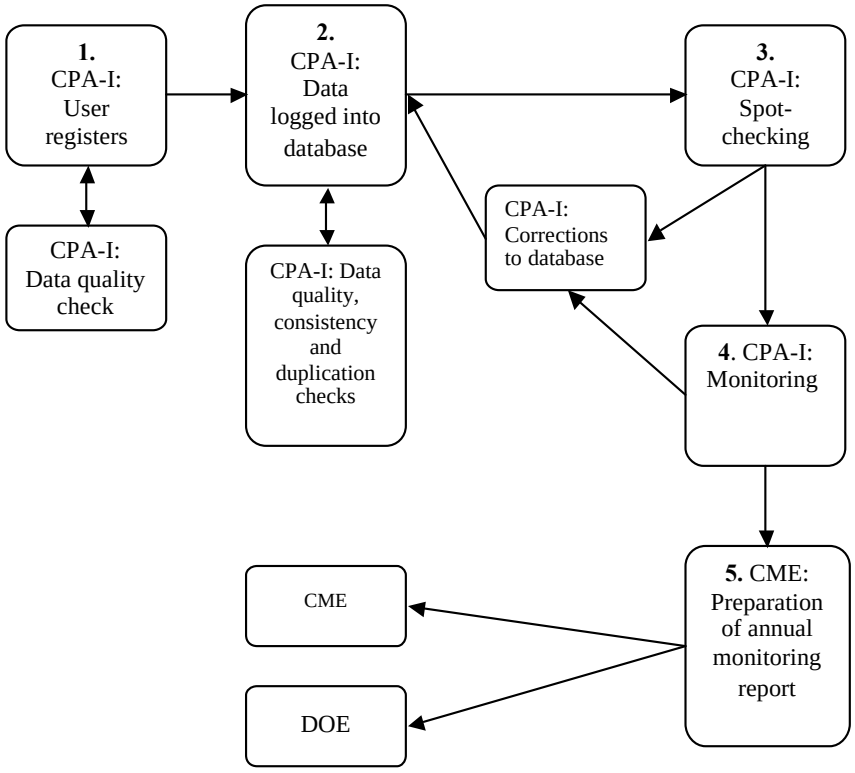
The Monitoring Plan applied in this SSC-PoA involves a number of key elements that ensure that the CME and CPA-Implementer have high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Certified Emission Reductions (CERs) following AMS II.G version 4 on the basis of the amount of non-renewable biomass saved by the ICS in the project activity. The key elements are the following:

- Data collection procedures
- Distribution and Monitoring Database
- Spot Checking of ICS (ongoing)
- Sample Plan for the Monitoring Survey
- Data Quality, Consistency and Duplication Checks
- Monitoring Reporting

The below flow-chart illustrates the roles and responsibilities of the parties during the implementation of the monitoring plan for the SSC-CPA. In the below flowchart, the CPA implementer is abbreviated to “CPA-I”, and can be CQC or another party authorized by the CME. CQC is the CME.



Below is the description of the above steps on the flow-chart.

1. **CPA-I: User registers stove:** CPA implementer will collect/receive the necessary information requested on the Registration Card from the user. Means of collecting this information may be through a physical Registration Card filled by CPA-Imp staff, retailers, end-users or partner organization's staff, or through the use of ICTs or SMS. CPA Implementers' staff shall double check the accuracy of information provided, and request for field staff additional clarifications if needed;
2. **CPA-I: Data logged into database:** CPA implementer trained staff will input the data in the database either manually (if data collected from physical Registration Card) or this will be automatically input if data was collected using ICTs or SMS. CPA implementer staff shall double check the information included on the database and check for duplications. Any duplicate information shall be investigated and errors corrected or excluded from the database if it is a true duplicate entry.
3. **CPA-I: Spot- checking (ongoing):** CPA implementer field staff will randomly select units included in the database and visit or contact the stove users to cross-check the information on the database with the factual evidence in the field. Any inconsistencies found (eg. change in the address of a user) will be updated on the database, and in the case ICS are found to be no longer in use, they will be clearly marked as such and excluded from emission reductions calculations.
4. **CPA-I: Monitoring:** CPA implementer will follow the requirements as per POA-DD to collect the necessary information for a monitoring report.
5. **CME: Preparation of monitoring report:** the CPA implementers or the CME will prepare the final monitoring report to be provided to the verifier DOE for verification of emission reductions. A copy of the monitoring report will remain with the CME.

The CME will coordinate and manage each CPA Implementer and assist them in implementing each element of the monitoring plan. Monitoring plan shall be elaborated in accordance with the Sampling Plan below.

Sampling plan:
As per the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 07.0,* the sampling plan is the following:

(a) Sampling design

Due to the large number of ICS envisioned to be distributed as part of the CPAs to be included in the PoA, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling will be undertaken as part of a PoA-wide Sampling Plan (by grouping and sampling across CPAs) that is designed in line with the requirements of the "Standard for sampling and surveys for CDM project activities and programme of activities".

(i) Objectives and Reliability Requirements:

The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the crediting period, and with 95/10 confidence/precision (as per paragraph 20 of EB 69 Annex 4) for annual and 95/5 for biennial sampling across CPAs[9]. In case a single CPA is sampled, 90/10 confidence/precision for annual and 95/10 confidence/precision shall be required for biennial sampling[10] (as per Methodology AMS-II.G version 04 paragraph 21).

Monitored Parameters:

Parameter	Description of Parameter
$n_{y,j}$	Proportion of ICS still in operation
SS_y	Percentage of continued baseline stove use among ICS households in the database
$\eta_{new,y,i}$	Thermal Efficiency of operational ICS

(ii) Target Population:

- The target population for the proportion of ICS still in operation ($n_{y,j}$) are the stoves in the CME database records (still in operation or not) for which emissions reductions are to be accounted in the monitoring period in question.
- The target population for the percentage of continued baseline stove use among ICS households (SS_y) are households with operational ICS in the CME records database for which emissions reductions are to the accounted in the monitoring period in question.
- The target population for efficiency of new appliances ($\eta_{new,i}$) is the set of stoves still in operation in the CME records database for which emissions reductions are to the accounted in the monitoring period in question.

(iii) Sampling Frame

[9] Methodology AMS-II.G version 04 paragraph 21 requires a 95/10 confidence/precision for biennial sampling. However, a more conservative approach is used (95/5 confidence/precision) for biennial sampling across CPAs.

[10] Single CPA sampling will only be applicable when a Primary Sampling Unit only consists of one CPA.

The PoA is to be implemented in Senegal, Ghana, Nigeria and Malawi. The sampling will take into account the country in which the CPA is implemented, and separate sampling will be made for each country. To ensure the homogeneity of the CPAs included in a single sampling plan, two sampling frames shall be defined. In overall, all CPAs will have the same group of end users which is household. Thus, it is expected that the geographical locations do not have influence on the parameter of interest. Therefore, all these 3 parameters can be assumed to be highly homogeneous for each ICS model regardless of how the end user group and distribution/installation location is defined.

1) Sampling frame for proportion of ICS still in operation (***ny,j***) and percentage of continued baseline stove use among ICS households in the database (***SSy***)

The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: the Registration Card 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 PoA. The Registration Card is used to populate the stoves Database and the Monitoring Survey follows the EB69 Annex 4 "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities".

The POA is open to different CPA Implementers and different models of ICS in different countries and regions (clusters). As per "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities", version 07.0, for the use of a single sampling plan covering a group of CPAs, provided the homogeneity of population can be demonstrated, or differences are taken into account in the sample size calculation, a 95/10 confidence/precision is applied for annual sampling. A 95/5 confidence/precision shall be achieved for biennial sampling for sampling across CPAs.[11] In case a single CPA is sampled, 90/10 confidence/precision for annual and 95/10 confidence/precision shall be required for biennial sampling[12].

The first step is to identify the Primary Sampling Units. Primary sampling units are CPAs which have:

1. The same CPA Implementer
2. The same ICS model
3. Same country and fuel-consumption cluster (if applicable[13]) within that country

Ie. CPAs with the same CPA Implementer, same ICS model and same country and same cluster within a country[14] can therefore be grouped together and form a Primary Sampling Unit. In the event the POA has CPAs with two different CPA Implementers using the same ICS model in the same country and cluster within that country, these form two different Primary Sampling Units. Same is true if the same CPA Implementer has two different ICS models being implemented in the same country and cluster within that country – this will form two Primary Sampling Units. Again, two Primary Sampling Units will be formed if the same CPA Implementer is distributing the same ICS model in two different countries or two different clusters within the same country.

The below schematics illustrate one of the examples used above, and assuming a single country and cluster is selected. This is justified by the fact that CPA Implementer might vary in terms of

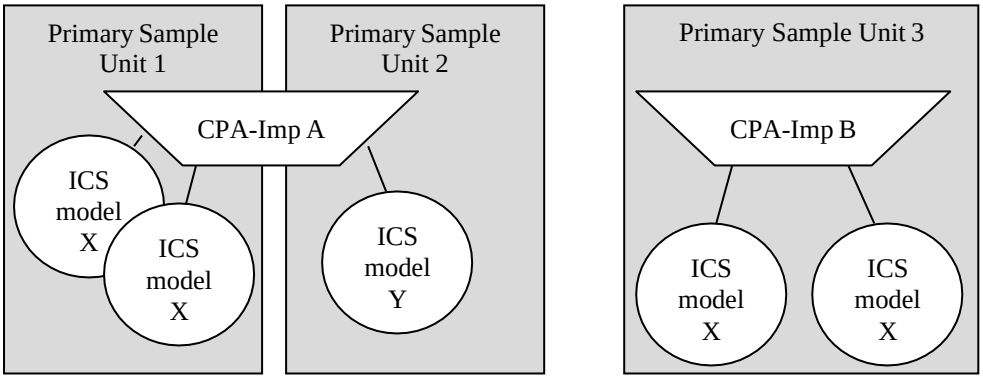
[11] As previously explained, this is a conservative approach.

[12] As per Methodology AMS-II.G version 04 paragraph 21.

[13] Only applicable for Ghana Charcoal and Nigeria Charcoal, where 3 and 4 clusters have been defined respectively.

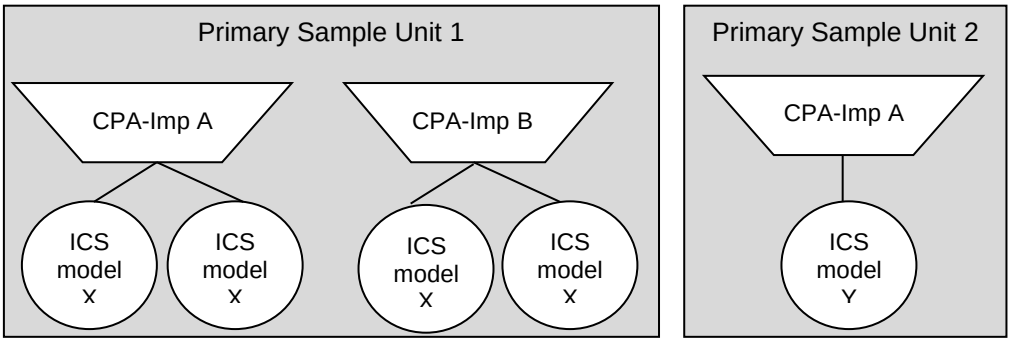
[14] Clusters may or may not be present at the country level. In those cases where fuel-consumption clusters are not defined in a given country because fuel-consumption baseline studies did not find regional differences in fuel consumption, Primary Sampling Units shall be applied at the country level.

performance and it is important for the CME to collect and monitor accurate data for each CPA Implementer distributing each stove model.



2) Thermal Efficiency of operational ICS ($\eta_{new,i}$)

The thermal efficiency of operational ICSs shall vary in accordance with its model, but not within different CPA Implementers. The thermal efficiency of the ICS is expected to change over the time. Hence for parameter $\eta_{new,i}$ the Primary Sampling Unit shall be defined as the group of ICSs of the same model, same vintage, and located within the same country and within the same fuel-consumption cluster in that country. If the same CPA Implementer has two different ICS models being implemented in the same vintage within a country – this will form two Primary Sampling Units. Two primary sampling units will be formed by ICS if the population has two vintages and all other factors (Stove model and CPA Implementer) remaining equal. The below schematics illustrate one of the examples used above assuming two ICS models in one vintage and implemented by two CPA implementers within the same country.



For example, different CPA Implementers are implementing CPAs using ICS model "Y" for the past 3 years in the same country and cluster within that country. In order to evaluate the thermal efficiency of the different vintages of the same stove "Y", the primary group shall consist of all ICSs implemented in different CPAs under the POA (regardless of CPA Implementer) which are of the same vintage and same model – in this example there are three primary sampling units which are: 1) ICSs of Model Y and vintage 1 (less than one year in operation); 2) ICSs of Model Y and vintage 2 (between one and two years of operation); and 3) ICSs of Model Y and vintage 3 (between two and three years old in operation).

(iv) Sampling Method:

Simple Random Sampling will be used and samples will be randomly selected from the primary sampling units as illustrated above. To ensure a random selection of ICS, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its unique ID number. Each ICS can thus be allocated a Sample Selection Number in each monitoring period, starting at 1 and increasing up to the total number of ICS in the Database for that pre-defined

sampling frame. Applying the random number generators, the ICS can then be randomly chosen from the defined population up to the required sample size calculated by the CME.

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

$n_{y,j}$: Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use (Yes/No)
SS_y: Interview with end user and visual inspection to determine if a baseline (replaced) stove is still being used in addition to ICS (Yes/No)
$\eta_{new,i}$: ICS will be tested using WBTs (ICS thermal efficiency)

The efficiency of ICS ($\eta_{new,i}$) as determined by the water boiling test evaluated during the monitoring period. The efficiency of ICS will be determined across CPAs using the same stove model, same vintage, and same country and cluster within country (Primary Sample Unit). Using the formulas in the section "Sample Size" below, the CME will randomly sample the required number of ICS from the primary sampling units. It is important to note that all monitoring parameters must take into consideration --and be conducted for-- each ICS vintage. As an illustrative example, consider a PoA that distributed a single ICS manufacturer/model in the same country and cluster within that country, but had two vintages: 75% of the total ICS distributed have been in use for less than 365 days (ie. vintage 1) and 25% have been in operation for over 365 days but less than 730 days (ie. vintage 2). In this case, 2 Primary Sampling Units shall be formed with each sampling unit represents one vintage. For each vintage, a number of ICSs are to be randomly selected and sampled and the sample sizes are to be determined using the below equations. The mean value of the monitoring parameter of each vintage shall be used for calculating emission reductions for all stoves of vintage *i*. For example, if $\eta_{new,i}$ for stoves of vintage 1 is 26% and for vintage 2 is 24%, then all ICS which have been in use for less than a year (vintage 1) will use a thermal efficiency of 26% in its calculations, while stoves vintage 2 will use 24%. Likewise, if $n_{y,j}$ in vintage 1 is 80% and in vintage 2 is 90%, all ICS in vintage 1 will use the $n_{y,j}$ value of 80% and all ICS in vintage 2 will use the value of 90%. If the monitoring period spans across more than one stove vintage (e.g. in the case of biennial monitoring or when the stove belonged to a vintage for a fraction of the monitoring period and to a different one in another fraction of the monitoring period), parameters $n_{y,j}$, SS_y and $\eta_{new,i}$ shall be weighted to the days in operation in each vintage during that monitoring period. For avoidance of doubt, in every monitoring period, all ICS vintages will be sampled and the monitoring parameter values for each vintage shall be established and used for the calculation of emission reductions for that monitoring period.

(v) Sample Size:

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 confidence/precision for annual[15] and 95/5 confidence/precision for biennial sampling.[16] In case a single CPA is sampled, a 90/10 confidence/precision is required for annual sampling and 95/10 confidence/precision shall be required for biennial sampling.[17]

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using the required reliability (confidence/precision) levels, the samples will be randomly selected from each Primary Sampling

[15] As per EB 69 Annex 4 Section V paragraph 20, footnote 18.

[16] Methodology AMS-II.G version 04 paragraph 21 requires 95/10 confidence/precision for biennial sampling. Using a 95/5 confidence/precision is a conservative approach

[17] As per Methodology AMS-II.G version 04 paragraph 21.

Unit. There are three parameters that will be estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($n_{y,j}$), the fraction of baseline stoves in use within the population of operational ICS during a monitoring period (SS_y), and the average ICS efficiency, ($\eta_{new,i}$). Of the three parameters to be monitored, two are proportions/percentages (SS_y and $n_{y,j}$) and one is a mean value $\eta_{new,i}$.

In order to calculate the required sample size estimates, values for the proportions, mean values, and standard deviations are required. As per Guideline for Sampling and surveys for CDM project activities and programmes of activities, version 04.0, there are different ways available to obtain the estimates of the parameter of interest:

(a) Refer to the result of previous studies and use these results;
(b) In a situation where information from previous studies is not available, a preliminary sample as a pilot could be conducted and use that sample is used to provide the estimates;
(c) Use best guesses based on the researcher's own experiences.

For the registration/inclusion purpose of CPA-DD, option C shall be applied. For the first monitoring period, values from a pilot study shall be applied. For the following monitoring periods, the estimates shall be adjusted taken into account the results of the previous monitoring period(s) or the result from recent pilot study which is conducted after the previous monitoring periods.

As the PoA is implemented in more than one country, for illustration purpose of sample size calculation in CPA-DD, the sample size calculation given below is based on the scenario in Nigeria as this is the host country for this CPA-DD.

To estimate the number of sample sizes for parameters $n_{y,j}$ and SS_y the following equation[18] is used.

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

Where:

n	= Sample size
N	= Population size (Total number of households/ICS)
p	= Expected proportion
1.96	= Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)
0.1	= Represents the 10% relative precision

The following assumptions are made to exemplify the sample size calculation for parameters: $n_{y,j}$, SS_y, and $\eta_{newy,,i}$.

1. The population size, N, is taken as 100,000 households. (Assuming one ICS for one household).
2. It is expected at least 80% of ICS still in operation, hence the expected proportion p for $n_{y,l}$ is taken as 0.8.
3. According to Baseline study, it is expected that 51% of baseline stove still in use. As per Standard for sampling and surveys for CDM project activities and programme of activities, a proportion can describe either of the two possible scenarios of the success rate or the failure rate and project proponents may use the larger of the two proportions in the sample size

[18] Equation 1 of Appendix 2, *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities (Version 04.0)*

calculation, which is *p* or (1−*p*). The sample size calculation is therefore based on anticipating a continued use of 51%. Thus, the expected proportion *p* for SS_y is taken as 0.51 which is the value of the larger proportion.

4. The expected mean of ICS thermal efficiency is 0.2566 and its standard deviation is 0.0513.

Sample size calculation:
The calculation of the required sample size for each parameter in the first monitoring period is illustrated below for a 95/10 level of confidence and precision (for biennial monitoring periods the sample sizes will be recalculated using 95/10 or 95/5 confidence/precision values depending on whether a single CPA is sampled or sampling occurs across multiple CPAs). In all cases a conservative approach is taken, however if for any parameter the required confidence/precision levels are not met then the CME will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds.

Parameter $\mathbf{n_{y,j}}$:

Based on the assumptions outlined above, the resulting sampling size for a 95/10 confidence/precision is calculated as:

$$n \geq \frac{1.96^2 \times 100{,}000 \times 0.8(1-0.8)}{(100{,}000-1) \times 0.1^2 \times 0.8^2 + 1.96^2 \times 0.8(1-0.8)} = 96$$

Therefore, in this case a sample size of 96 to be sampled from the primary sampling unit.

In case the resulting sample size to achieve the desired confidence/precision levels is smaller than 30 ICS, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion.

Parameter $\boldsymbol{SS_y}$**:**

Based on the above assumptions, the sample size calculation for a 95/10 confidence/precision would be:

$$n \geq \frac{1.96^2 \times 100{,}000 \times 0.51(1-0.51)}{(100{,}000-1) \times 0.1^2 \times 0.51^2 + 1.96^2 \times 0.51(1-0.51)} = 368$$

The required sample size to be sampled from the primary sampling unit is at least 368.

As in the case of parameter $n_{y,i}$, if the resulting sample size based on the above equation is smaller than 30 ICS, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion.

Parameter $\boldsymbol{\eta_{new,i}}$ **:**

For the purposes of determining sample size in the first monitoring period, the performance of ICS can be categorized into two groups, which are characterized by the range of likely mean efficiency and the likely values of SD relative to the mean, according to the type of ICS. The ICS models that are manufactured in modern factories tend to be very highly efficient (30-50% thermal efficiency) and have been designed to meet stringent efficiency specifications so the standard deviation is expected to be relatively low.

Where key components of ICS (e.g. the combustion chamber and flue) are not manufactured but instead are installed on-site or handmade, then the mean efficiency is expected to be in the range of 20-30% with relatively higher variability.

To estimate the sample size for parameter $\eta_{new,i}$ the following equation[19] is used:

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

Where:

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

n	= Sample size
N	= Population size (Total number of households/ICS)
mean	= Expected mean of ICS thermal efficiency
SD	= Expected standard deviation
1.96	= Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)
0.1	= Represents the 10% relative precision

Based on the above assumptions, the sample size calculation for a 95/10 confidence/precision would be

$$n \geq \frac{1.96^2 \times 100{,}000 \times \left(\frac{0.0513}{0.2566}\right)^2}{(100{,}000-1)\times 0.1^2 + 1.96^2 \times \left(\frac{0.0513}{0.2566}\right)^2} = 15.36$$

If the resulting sample size based on the above equation is smaller than 30 ICS, then as the parameter of interest is a numeric mean value (i.e. not a proportion or percentage) the Student's t-distribution shall be used.

The sample size for parameter $\eta_{new,y,i}$ is referred to the equation below[20]:

$$n = \left(\frac{t_{n-1} \times SD}{0.1 \times mean}\right)^2$$

Where t_{n-1} is the value of the t-distribution for 95% confidence when the sample size is n. Since the sample size is not known yet, the first step is to use the value for 95% confidence when the sample is large, i.e. 1.96 and then redefine the calculation.

$$n = \left(\frac{1.96 \times 0.0513}{0.1 \times 0.2566}\right)^2 = 15.37$$

Thus n is rounded up to 16.

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[19] Equation 4 of Appendix 2, *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities* (version 04.0).

[20] Equation 38, page 46, *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities* (version 04.0)

The calculation now need to repeat using t-value for 95% confidence and n = 16

$$n = \left(\frac{2.131 \times 0.0513}{0.1 \times 0.2566}\right)^2 = 18.17$$

And n is rounded to 19.

The calculation now need to repeat using t_{n-1} value for n = 19. The process should be iterated until there is no change to the value of n.

t_{19-1}	2.101
n=	17.66
Round up	18

t_{18-1}	2.110
n=	17.81
Round up	18

The repeated calculation shows that n = 18. Thus the sample size to be sampled from the sampling unit is 18.

The sampling for parameter $\eta_{newy,l}$ shall comprise of ICS installed/distributed during the current vintage and oldest vintage. The annual efficiency loss of ICS established from these two vintages may be used to correct the initial efficiency of the ICS installed/distributed later on.

The CME may choose to use the same sample to monitor more than one parameter. According to the Standard for sampling and surveys for CDM project activities and programme of activities, if there is more than one parameter to be estimated, then a sample size calculation should be done for each of them. Then either the largest number for the sample size is chosen as sampling effort with one common survey, or separate sampling efforts and surveys are undertaken for each parameter. For instance, the CME can sample separately SS_y, $n_{y,j}$ and $\eta_{new,i}$ –or a combination of these parameters- in the same sample. Since parameters $n_{y,l}$ and SS_y sharing the same sampling units, CME may choose to have one common survey for these two parameters with largest number of sample size between these two parameters is chosen, then a separate sampling effort may be arranged for parameter $\eta_{newy,,i}$. Sampling more than one parameter in the same sample helps reduce travel needs for monitoring and the associated costs. At the same time this approach ensures the random selection of samples for every parameter.

Oversampling is strongly encouraged, not only to compensate for any attrition, outliers or non-response associated with the sample, but also to prevent a situation at the analysis stage where the required reliability is not achieved and additional sampling efforts would be required. The sample size shown above will be adjusted upwards to account for non-responses, CME shall determine the appropriate non-responses rate based on previous experience.

(b) Data

(i) Field Measurements:

To monitor the number of stoves that continue to be in use ($\boldsymbol{n_{y,j}}$) and the percentage of continued baseline stove use among ICS households in the database ($\boldsymbol{SS_y}$), the data collected will be a representative number of stoves in the database for the monitoring period. The scope is a representative sample of stoves across all CPAs with the same CPA Implementer, same ICS model, same country and cluster within a specific country in this PoA, and same vintage. The method of collecting data will be field surveys of required sample size of ICS users in the database. Frequency of data collection is one survey per monitoring period. Data will be collected from the field surveys, entered in the database and included in the monitoring report. To monitor the

efficiency of the stove at least every two years (as required by the AMS II.G version 4 methodology) a new test will be conducted to determine the rate at which a sample of stoves from a given vintage year deteriorate in efficiency. The method to collect the efficiency data will be the Water Boiling Test.

The table below summarizes field measurement data requirements

Parameter	Timing (indicative)	Frequency (required by AMS II.G –Version 4)	Methods to be applied	Comments on seasonal fluctuation
$n_{y,j}$	Monitoring will likely occur every 12 months	No less frequently than every two years	Visits to the premises, visual inspection and interview with ICS end-user.	Unlikely to be due to any seasonal fluctuation.
SS_y	Monitoring will likely occur every 12 months	No less frequently than every two years	Visits to the premises, visual inspection, and interview with ICS end-user.	Unlikely to be due to any seasonal fluctuation.
$\eta_{new,i}$	Monitoring will likely occur every 12 months, and will include ICS from all vintages for which emissions reductions are to be claimed in that monitoring period.	No less frequently than every two years	Water Boiling Test (WBT) Protocol Version 4.3.2 (or more recent at the discretion of the CME).	Not due to any seasonal fluctuation.

(ii) Quality Assurance/Quality Control:

The CME will apply measures to ensure the required confidence/precision for each sampled parameter is met, allowing for non-response and the possible removal of outliers from the sample, as part of a Quality Control/Quality Assurance system. The choice of measure applied to each parameter will depend on the cost of each data collection approach and logistics required. The CME will determine the most effective measure for each parameter from the following list (illustrated using a required sample size of 20 and an effect of non-response of 2 to 4 ICS[21]):

- Oversampling: Randomly draw a sample of at minimum 24 ICS and collect data from each
- Buffer Group: Randomly draw a sample of at minimum 24 ICS and collect data from only 22 ICS. If this would not result in the required sample size data would be collected from the additional 2 ICS that were selected in the sample.

- Draw an additional sample: Randomly draw a sample of 22 ICS and collect data from these. If the required sample size is not achieved, an additional sample of 2 elements will be drawn and included in the sample.

- Use lower confidence bound (of $\boldsymbol{n_{y,j}}$. or $\boldsymbol{\eta_{new,i}}$) or, with a conservative approach according to

[21] The 2 to 4 values help exemplify variations in response rates. The value of 2 corresponds to higher response rates; the value of 4 is for lower response rates. The actual non-response rates applied to the final sample size shall be determined by CME.

the parameter definitions, the upper confidence bound of SS_y.

The CME may choose to stop monitoring a particular parameter once the required level of confidence/precision has been reached, as long as the calculated minimum number of samples has been achieved. As an example, the following steps could logically be followed for the case of applying a 30% buffer:
1. Visit first 10% of premises required for the 30% buffer. If the number of responses is sufficient to achieve the required reliability level, then stop sampling.
2. If step 1 is not sufficient to achieve the required reliability level, then visit the next 10% of premises (increases the additional sampling to 20% of the 30% buffer). If this additional sampling is sufficient, then stop sampling.
3. If step 2 is not sufficient to achieve the required reliability level, then complete the final 10% of the additional sampling buffer (bringing the total to 30%).

The sampling plan has the following procedures in place to ensure good quality data. The CME will ensure that field personnel have reviewed, understand and have agreed to follow the monitoring plan procedures, including provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response. A quality control and assurance strategy will be documented. Quality control and assurance strategies include addressing non-sampling errors, such as non-response or bias from interviewer. The CME or a competent third party designated by the CME with the proper skills will train the monitoring personnel on how to properly survey households to prevent bias from interviewer. In the case a household refuses to participate, another household will be chosen at random. To reduce interviewer bias, good questionnaire design and well-tested questionnaires will be used.

The calculation of the sample size will be carried out using estimates for parameter proportions, mean values, variances, and standard deviations, as the actual characteristics of the population/sampling frame are unknown. In order to ensure the quality of the sampling results, the CME can draw on the provisions for reliability calculations including estimating the bounds of the confidence interval, the standard error of the mean value or proportion, and the t-value as derived from the t-distribution[22]. In the event that the sampling results do not fulfil the required level of confidence and precision, the CME can undertake additional samples. If the reliability is still not sufficient after raw data and summary statistics are scrutinized and after additional samples have been collected[23], the sampling may be repeated with an increased sample size. Alternatively, the CME may choose to apply the lower bound (or higher bound according to the more conservative approach, as for example in the proportion of end-users who continue to use a baseline stove, SSy) of the sampling results as is allowed for by the methodology (AMS II G v4, paragraph 21).

As the continued use of ICS and the incidence of baseline stove usage among ICS users are binary parameters, there can be no outliers in the sampled data and no treatment for outliers is required. The sample data for $\eta_{new,i}$ is continuous and therefore the presence of outliers is possible. To identify and address outliers for the parameter $\eta_{new,i}$., outliers will be defined as those data points with values greater than three standard deviations from the mean of the sample for each vintage.

Data points identified as outliers according to the above analysis will be examined further to correct for possible transcription and data entry errors, but will be omitted from the analysis if no such administrative errors exist.

(i) Data archiving

Hard copies of the surveys will be kept and the database will have back up. Original stove purchase contracts, information collected from the Registration Card) or other means of

[22] As provided by the *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities* (EB 69, Annex 5 paragraphs 220 to 290)

[23] As per EB 69 Annex 5 paragraphs 258 to 314.

acceptance by the users will be stored in the main office for the coordinating entity. A back-up of the project database will also be stored on an electric medium by the CME. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

(ii) Analysis:

The CME will manage a project database that includes the following data that can be directly attributable to each CPA within the PoA, thereby allowing unambiguous determination of the emission reductions attributable to each CPA:

- A list of households participating in each CPA, including name, community/location, distribution/installation date and unique serial number;
- Testing to ensure that the stoves are still operating above the minimum 20% efficiency required by the AMS II.G (version 4) methodology, by the CPA Implementer, CME or a third party certified by a national standards body or an appropriate certifying agency recognized by it.
- Where replacements are made, assurance that the efficiency of the new ICS is similar to the specified.

Data obtained from the samples will be used to estimate proportions and mean values for the parameters described above. The values will then be factored into the emissions reduction calculations and result in the request for issuance of CERs for that group of CPAs – the primary sampling Units. The parameters are applied for emission reduction calculations as outlined in Part II Section I.6.3 of the PoA-DD. The stoves that are not in use will be excluded from emissions reductions calculations and will not be counted towards the total number of ICS in operation during the monitoring period. The thermal efficiency of new stoves ($\eta_{new,i}$) will be used in the calculation of the per stove emission reduction, which will be multiplied by the number of stoves in operation in the CPA to obtain the emission reductions per CPA.

(c) Implementation:

Sampling for the purpose of emission reduction calculation and elaboration of the monitoring report will occur at the end of each monitoring period. This sampling will be conducted by trained personal either part of the CPA Implementer or CME team, or an experienced third party entity. The credentials and/or training materials for the sampling personal will be provided to the DOE at verification. The maximum length of one monitoring period will be two years (duration, not calendar years), as AMS II.G., version 4, provides the option for annual or biennial monitoring. The CPA Implementer will be responsible for managing household data collection and entry into the project database. Field personnel will receive training on how to properly deal with surveying techniques and reduce errors and sign a document certifying that there is no conflict of interest of those involved in data collection and analysis. If there is conflict of interest, the personnel will not be allowed to participate in data collection and analysis. The project database will record the start and end dates of each monitoring period, and record the emission reductions attributable to each monitoring period. Appropriate record keeping procedures will be implemented to ensure that each monitoring period data set can be transparently attributed to its corresponding CPA, preventing any occurrences of double counting. An internal review of the project database will be able to determine the current status of each SSC-CPA—the duration of previous monitoring periods, the households delivering monitoring data, and current verification activities.

Assessment for Leakage

See Part II Section B.2. According to methodology II.G, version 4, leakage related to the non-renewable woody biomass saved by the project activity shall be assessed on *ex-post* surveys of users and the areas from which the woody biomass is sourced. The methodology offers the alternative that if B_{old} is multiplied a net to gross adjustment factor of 0.95 to account for leakages, surveys are not required. This PoA will use the 0.95 leakage adjustment factor instead of *ex-post* surveys.

The other source of leakage occurs if equipment currently being utilised is transferred from outside the boundary to the project activity. All ICS in the PoA will be newly manufactured/assembled or newly installed. Where second-hand/used ICS are distributed to an end-user the ICS will be from within the project (ie previously newly manufactured/assembled and either a demonstration model or transferred from one end-user within the project to another new or existing end-user). In both of these cases there will no equipment (ICS) being utilized outside the project area (any project non-participant) that is transferred to the project area (included as an ICS in the database) so leakage defined in paragraph 14 of the AMS II.G (version 4) methodology is not considered. Where second-hand/used ICS are transferred within the project area (between end-user project participants) the database will be updated to reflect this change to ensure there is no double counting of ICS.

Disposal of Low Efficiency Appliances and Use of Baseline Stoves
When an ICS is installed the end user receives information explaining that the conventional open fire appliance must no longer be used. Follow-up meetings with end users will ensure that those who have received an ICS are using it properly and that the conventional open fire is no longer in use. As per methodological condition 20 (b), if it is determined that the conventional open fire is still in use and the ICS is also in use, the wood used in conventional open fire will be subtracted from Bold. The number of households continuing to use a baseline stove in addition to their ICS, will be monitored throughout the project lifetime. This will be achieved using a single sample for in-use appliances ($n_{y,j}$) described above, and will meet EB69 Annex 4 confidence/precision requirements. The number of households continuing to use a baseline stove, in addition to their ICS, will be used to calculate the percentage of households with operational ICS that also use a baseline stove (SS_y).

Monitoring Reporting

The CME will assess all monitoring data and produce a monitoring report for each CPA for the DOE to verify corresponding to the preceding monitoring period of all CPAs. This report will present the data relating to the emission reductions generated by those CPAs during the monitoring period.

B.5.3. Other elements of monitoring plan

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Please refer to Section B.5.2.

SECTION C. Start date, crediting period type and duration

C.1. Start date of CPA

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The start date of the proposed CPA is 10/03/2018, or date of first distribution of ICS, whichever is later.

C.2. Expected operational lifetime of CPA

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The CPA is expected to have an operational lifetime of 21 years.

C.3. Crediting period of CPA

C.3.1. Type of crediting period

>>

Renewable crediting period

C.3.2. Start date of crediting period

>>
10/03/2018 or date of CPA inclusion, whichever is later.

C.3.3. Duration of crediting period

>>
7 years, renewable period.

NOTE: Please note that the duration of crediting period of any *CPA* shall be limited to the end date of the *PoA* regardless of when the CPA was added.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

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Given the multi-country nature and the different types/models of ICSs eligible for implementation under this POA, a CPA-level Environmental Analysis is deemed most appropriate.

No negative environmental impacts have been identified from the proposed CPA.

The ICS disseminated in the proposed CPA are expected to present a substantially lower risk to the local and global environment compared to three-stone fires and traditional pot support, and also result in real socio-economic and health benefits to users.

In particular, the activities will result in the following positive environmental impacts:
- The proposed CPA will help to significantly reduce greenhouse gas emissions over its lifetime.
- The proposed CPA will help to reduce the use of non-renewable biomass from forests, helping to conserve existing forest stock and to protect natural forest eco-systems and wildlife habitats.
- The protection of standing forests will also help to protect watersheds that regulate water table levels and prevent flash flooding.

The amount of indoor pollutants from the burning of biomass in the family home will be reduced. Less carbon dioxide, carbon monoxide and particulates will be emitted due to the decrease in total biomass burned and an increase in the temperature of combustion.

D.2. Environmental impact assessment

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An EIA is not required as a part of this program, as illustrated by the following website: http://www.nigeria-law.org/Environmental%20Impact%20Assessment%20Decree%20No.%2086%201992.htm. This EIA Decree states that an environmental assessment of project shall not be required when:

> *(c) the project is to be carried out in response to circumstances that, in the opinion of the Agency, the project is in the interest of public health or safety.*

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

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This information is provided at the PoA level.

E.2. Summary of comments received

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This information is provided at the PoA level.

E.3. Consideration of comments received

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This information is provided at the PoA level.

SECTION F. Eligibility for inclusion

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	Conditions to check the target group of ICS.	Promote and install / distribute ICS in/to residential households in rural, urban, and peri-urban areas [24] that use wood or charcoal fuel following the SSC-PoA specifications[25].	Indication of ICS model to be distributed/installed, geographic scope of distribution/installation, and thermal efficiency tests to confirm model is a high biomass fired cook stove.	This CPA will only distribute TLC-CQC Rocket Stove to residential rural wood-fuel using households. A WBT shows TLC-CQC Rocket Stove has an efficiency of 25.66%, a significant improvement over three stone fires and traditional pot supports used for cooking. Testing results that show this efficiency level have been provided to the validating DOE.
2	Geographical boundaries of CPAs consistent with the geographical boundary of the PoA.	Be implemented entirely within a single fuel-specific geographical boundary (as specified in Part I Section A.5 of the PoA-DD) according to the targeted fuel type,	Self declaration by CPA Implementer indicating single fuel-specific geographical boundary of the CPA. The possible geographic boundaries should be within the limits	The CPA implementer self-declares that all stoves will be sold within the boundary of Nigeria and are wood stoves. A self-declaration was provided to the validating

[24] For the purposes of this PoA, peri-urban areas fall within the definitions of urban areas in each of the countries and are therefore considered like urban areas.

[25] The CME will not certify or test any specific organization (CPA implementer), but it reserves the right, at its sole discretion, to chose CPA implementers based on its track-record and ability to successfully distribute and monitor ICSs. As per eligibility criterion #11, it will require the stove/s used in a particular CPA meets minimum efficiency criteria. The proof of this can be a Water Boiling Test result for the stove model/s identified in the CPA.

		fuel-consumption cluster [26] (if applicable), and host country region[27] of the CPA[28];	outlined in Part I Section A.5 of this document.	DOE.
3	Conditions to ensure that CPAs that will be included meet the small-scale thresholds and remain within those thresholds throughout the crediting period of the CPAs.	Have a maximum energy saving of 180 GWH_{th}/ year throughout the CPA's crediting period to conform with the SSC threshold for type II projects as per EB 61 Annex 21 paragraph 3[29];	Calculations of energy savings per unit and maximum number of stoves that can be added to the CPA. Specification that all stoves included in the CPA will be shown in the CPA database and that ICSs that take the CPA over the 180GWHth/yr energy savings threshold will be excluded from the ER calculations.	The number of stoves in this CPA has been limited to 11,254 stoves, each one saving a tiny fraction of one GWH_{th}/yr. Together the stoves energy savings is less than 180 GWH_{th}/yr. A separate Excel spreadsheet providing this information has been provided to the validator. All stoves distributed under the CPA will be shown on the project database. Any ICS that takes the CPA over the 180GWH_{th}/yr energy savings threshold will be excluded from the ER calculations.
4	Conditions related to the database requirements of ICS user.	Have a database that will uniquely identify and define households in which ICS have been installed or distributed[30]. In addition, each stove itself will be uniquely identified with a serial number clearly starting with "CQC-SSA"	Outline of the status of the database, a database (empty of stoves if no stoves have been added to the CPA), and description of CPA database.	A project database is being developed. This database will include all the information contained on the Registration Card (or ICT/SMS) - including the serial number starting with "CQC-SSA". The database will be sortable by customer name, contact details (if available), stove model, location (address/ geocoordinates), date of

[26] A fuel-consumption cluster is a population that has different fuel consumption patterns than other populations as defined by the fuel-consumption baseline studies attached to the PoA-DD. Each fuel consumption cluster is considered a homogeneous population.

[27] Country regions are defined in the fuel-consumption baseline studies attached to the PoA-DD and may include an entire country.

[28] For avoidance of doubt, each CPA will be restrained to a specific geographically-defined fuel-consumption cluster. For example, data demonstrated three distinct fuel-consumption clusters in Ghana (Greater Accra Area, Urban Southern and Central Regions and Rural Southern and Central Regions). If stoves are distributed in the three, the Greater Accra Area and in urban and rural Southern and Central Regions, the stoves distributed in the Greater Accra Area will belong to different CPAs than stoves distributed in urban Southern and Central Regions than the stoves distributed in rural Southern and Central Regions, even if the stove model distributed and the CPA Implementer are the same.

[29] At time of inclusion, the CME shall provide the DOE with the calculation as per Part II Section A.1 of the POA- DD demonstrating what the maximum number of ICSs is for that CPA so it remains below the small-scale threshold.

[30] Part II Section A.1 of the POA-DD clarifies how the CME collects information and what information it collects from users when ICSs are distributed and how the information is stored in the database. This information and procedures are also described on the CME manual which shall be provided to the DOE at time of inclusion.

				purchase, retailer/distributer, serial number and be available to the DOE upon each verification.
5	Conditions to ensure compliance with the applicability of the applied methodologies.	Comply with the applicability conditions set out in the methodology AMS II.G version 4 "Energy efficiency measures in thermal applications of non-renewable biomass" and further described in Part II Section B.2 of the PoA-DD;	- Thermal efficiency tests of stove to be installed/distributed; - Statement that documentation has been provided to the DOE demonstrating that non-renewable biomass has been used since 31 December 1989 within the CPA boundaries; - Statement on the adoption of a default gross adjustment factor of 0.95 for leakage.	The applicability conditions and other requirements of AMS II.G (version 4) are applied and followed by the PPs. CPA compliance with the three applicability criteria are evidenced by the following: TLC-CQC Rocket Stove installed under this CPA are single pot fixed cook stoves that have an efficiency of 25.66% as per the manufacturers specifications as tested by the WBT, hence over the 20% minimum specified in paragraph 1 of the methodology; supporting documentation provided to the DOE demonstrating that non-renewable biomass has been used since 31 December 1989 within the CPA boundaries; and adoption of default gross adjustment factor of 0.95 for leakage.
6	Conditions to avoid double counting of GHG emission reductions or net anthropogenic GHG removals, such as unique identifications of product and end-user locations.	Do not involve households already using an ICS - including households involved in any other CPA or CDM or other voluntary scheme (such as Gold Standard, VCS, VER+ [31]) project involving the distribution or installation of ICS, and households which have purchased or received an ICS on a commercial or non-commercial basis (e.g. NGO distributed or	- Outline of how each ICS will be uniquely identified - Statement of how CPA will be cross-checked to confirm no double counting with other CPAs, PoAs or projects (in the CDM or other carbon credit schemes) - Statement of how households will confirm that they currently do not own an ICS (whether part of a carbon scheme or not).	Each ICS in each SSC-CPA included in this PoA will be identified by a unique combination of customer name and geographical location, as well as a unique serial number. The serial number will start with an identifier "CQC-SSA" which will allow for a clear distinction between the stoves from this PoA with those of other potential PoAs. No individual serial number can be in more than one CPA, so it will not be possible for one stove to

[31] VCS is the 'Verified Carbon Standard', and VER+ is the voluntary standard developed by TÜV SÜD.

		government distributed stoves)[32] ;		be counted in two different CPAs. In addition, each CPA will be cross-checked with other CPAs in this PoA and with CPAs in any other PoA or in a CDM project activity operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary carbon schemes to ensure that the CPA is not included in any other PoA, CDM project activity or voluntary project activity. New customers will also be asked to confirm (via Registration Card or similar) that they are households and that they currently do not own an ICS (whether part of a carbon scheme or not).
7	Conditions to confirm that CPAs are neither registered as CDM project activities, included in another registered PoAs, nor the project activities that have been deregistered.	Not be registered as individual CDM project activities nor included in another registered SSC-PoA, as well as in any other voluntary scheme (such as Gold Standard, VCS, VER+);	Statement in Specific CPA indicating that at the time of CPA inclusion, no other CPA using the same name was found in any other PoA or in a CDM project activity operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary schemes.	At time of inclusion of this CPA, no other CPA using the same name was found in any other PoA or in a CDM project activity operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary schemes. The search was conducted by the CME via web on the relevant websites of the registries.
8	Conditions to confirm the approval of CPA by the CME for inclusion of CPA into the PoA.	Be approved by the CME prior to its incorporation into the SSC-PoA;	Declaration from CME that CPA received approval for incorporation into PoA.	CQC has self-declared that this CPA is approved by the CME. A self-declaration was provided to the validating DOE.
9	Conditions to check the start dates of CPAs through documentary evidence.	Be able to provide documentary evidence of the start date[33];	Self-declaration from CME or CPA Implementer stating the starting date of the CPA according to the relevant CDM guidance.	A self-declaration from CPA Implementer was provided to the validator stating that the start date of the CPA will be the latest of 10/03/2018 or when the first stove is distributed (as evidenced in the database),

[32] At time of inclusion the DOE shall confirm that the CPA is using the methods of data collection described in Part II Section A.1 of the POA-DD and in the CME manual, to confirm this eligibility criterion.

[33] The starting date of a CPA could either be the date of first installation of a stove or the date of distribution/installation of the first ICS in each CPA, as evidenced by the Registration Card, SMS or ICT records.

				whichever is later.
10	Conditions to provide an affirmation that funding from Annex I Parties, if any, does not result in a diversion of official development assistance.	Affirm that no funding is coming from Annex I parties or if it does, that this is not a diversion of Official Development Assistance (ODA)[34];	Self-declaration from CME or CPA Implementer	Letters provided to the validator show that investment finance for this first CPA is coming from the private sector and their incentive in participating in the program is based on the project's ability to generate and sell CERs.
11	Specification of the technology/measure and performance specification based on testing/certification.	Ensure that the ICS installed/distributed under the CPA are single pot or multi pot portable or in-situ cook stoves with specified efficiency of at least 20%. The efficiency of the project systems (ICS) are certified by a national standards body or an appropriate certifying agency recognized by it (using the WBT outlined in AMS IIG, Version 4 approved by the CDM Executive Board). Alternatively manufacturers' specifications may be used;	WBT results	TLC-CQC Rocket Stove installed under this CPA are single pot portable cook stoves that have an efficiency of 25.66% as per the manufacturers specifications and as tested by a WBT, hence over the 20% minimum specified in paragraph 1 of the methodology. The WBT results have been provided to the validating DOE.
12	Conditions to ensure the compliance with B_{old} requirements of the applied methodologies.	Use baseline fuel consumption (B_{old}) data from the household fuel survey (as per baseline reports attached to the PoA-DD and further described in Part II Section B.6.2 of the POA- DD) for the country region and fuel-type which is specifically eligible under this POA;	Statement of which baseline included in the CPA will be used in this CPA.	The CPA applies data from Nigeria household wood-fuel survey. The baseline report has been provided to the validating DOE.
13	Conditions to ensure the compliance with f_{NRB} requirements of the applied methodologies.	Use the non-renewable biomass (NRB) fraction (as per NRB Reports attached to the PoA-DD and further described in Part II Section B.6.2 of the POA-DD or CDM default values as per	Specification of the source of f_{NRB} value. The source is included in this PoA.	The CPA applies the f_{NRB} obtained from independent reports. The f_{NRB} study was conducted for Nigeria.

[34] At time of inclusion, the CME shall provide the DOE a signed self declaration letter confirm the use or not use of public funding and in case of use of public funding, confirmation this is not a diversion of ODA.

		EB67 Annex 22) for the country region[35] in which the CPA will be implemented and that is eligible under this POA or develop their own regional level NRB survey in accordance with AMS II.G (version 4). The geographical scope of each CPA must be limited to the geographical scope of the NRB analysis applied in that CPA;		
14	Conditions for the debundling check based on the "Methodological tool: Assessment of debundling for small-scale project activities".	Ensure that the CPA meets the criterion for not being a de-bundled component of a larger project activity and is additional -- the debundling rule does not apply if the ICS as independent subsystem, does not exceed 1% of the SSC threshold [36] (as per guidance EB54 Annex 13 and clarification SSC_233) and a CPA is additional if the ICS does not exceed 5% of the SSC threshold (as per guidance of EB68 Annex 27)[37];	Calculations demonstrating that each of the improved cook stoves included in the CPA is not greater than 1% of the small- scale threshold of 1.8 GWh thermal energy savings per year.	Each of the ICS included in the CPA is not greater than 1% of the small scale threshold of 1.8 GWh thermal energy savings per year. The thermal energy savings of the ICS distributed under this CPA is approximately 0.01599 GWh_{th}/year. Separate Excel spreadsheet has been provided to the validating DOE.
15	Conditions to check the mechanism that transfers the ownership rights of CERs from the ICS user to the CME.	Include a mechanism that transfers the ownership rights of CERs from the ICS user to the CME (or any affiliate it so	Indication of how the mechanism that transfer the ownership rights of CERs will be implemented.	The CPA requires that CPA Implementer collect user data using a Registration Card (or as appropriate through SMS/ICT). Sales Team

[35] Country regions may also include an entire country.

[36] At time of CPA inclusion the CME shall provide the DOE with the calculations as per Section C(e)(ii) of the PoA- DD– confirming that the annual energy saving of an ICS as per cent of SSC threshold remains below 1%. Finally, by meeting the 1%, it is clear that an ICS will not exceed 5% of the same SSC threshold, and shall be considered additional.

[37] As per Paragraph 2(c) of Annex 27 of the 68th meeting of the CDM Executive Board, GUIDELINES ON THE DEMONSTRATION OF ADDITIONALITY OF SMALL-SCALE PROJECT ACTIVITIES (version 9), projects are considered additional if "project activities are solely comprised of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale thresholds. Annex 21 of EB 61 established 60GWh per year as the SSC threshold. The conversion from 60 GWHe to 180 GWHth per year was approved in a clarification by the small-scale working group (SSC_233). Footnote 1 of Annex 27 of EB 68 clarifies that the size of each unit (ICS) has to be below 3000 MWh of energy saving per year which using the same logic of SSC_233 would translate to 9000 MWhth. Thus, if the ICS distributed under a CPA does not exceed 1 % of the SSC threshold (equivalent to 1800 MWhth,per year) and the CPA complies with eligibility criterion 3 (ie. qualify as a SSC CPA), the CPA is considered additional.

		designates), the precise mechanism to be established on a CPA basis. For example, a Registration Card, SMS, ICT or other means, which is signed or received by the end-user upon distribution or installation of the ICS, which shall state that the end-user transfers ownership of the carbon assets to the CME for the life of the stove[38];		and distributers will be instructed to read the transfer ownership of the carbon assets to the end-user and tick a box next to this paragraph to confirm that the user acknowledge that by purchasing the ICS, it is transferring the carbon rights to CME.
16	If the generic CPA applies sampling for the determination of parameter values for calculating GHG emission reductions or net anthropogenic GHG removals, conditions related to sampling requirements for the PoA in accordance with the "Standard: Sampling and surveys for CDM project activities and programme of activities.	Adhere to all requirements related to sampling for a PoA in accordance with Part II section B.7.2 of the PoA-DD;	Indication that CPA follows the sampling requirements outlined in Part II Section B.7.2 of this document.	This CPA follows all of the sampling requirements as specified in in PoA-DD.
17	Conditions to check the distribution mechanisms of the ICS.	Involve the promotion and distribution of ICS through direct distribution/installation, delivery, community distribution events, direct or distribution through commercial/retail outlets;	Description of ICS promotion and distribution methods under the CPA.	This CPA will distribute ICS on a commercial and non- commercial basis to end-users through the CPA Implementers sales team, direct distribution, community events and agent distributers.
18	Conditions related to environmental impact analysis.	CPA shall indicate what type of environmental analysis is undertaken and provide evidence of compliance with national and local (eg. province level) regulations;	Environmental assessment or statement of why an environmental assessment is not needed in the context of the CPA.	In accordance with Nigerian regulations, neither an environmental assessment, nor a license nor any other compliance document is required by the government since it is expected that the CPAs has no significant negative environmental impacts.

[38] Part II Section A.1 of the POA-DD and CME manual further describes the methods and mechanisms mentioned in this eligibility criterion.

Appendix 1. Contact information of CPA implementers

Organization name	SOSAI Renewable Energies Company
Country	Nigeria
Address	No1B Yakubu Gowon Way, Beside Mr Biggs, Kaduna, Nigeria
Telephone	+2348092305719
Fax	nil
E-mail	sosai@sosairen.org
Website	http://www.sosairen.org
Contact person	Habiba Ali

Organization name	ECOEYE Co LTD
Country	Republic of Korea
Address	70 Dusan-ro, Geumcheon-gu, Seoul.South Korea #1503, Hyundai Knowledge Industrial Center B Seoul
Telephone	Office: +82- 2-6480-7346
Fax	n/a
E-mail	sangsun_ha@ecoeye.com
Website	www.ecoeye.com
Contact person	Mr. Sangsun HA

Appendix 2. Affirmation regarding public funding

No public funding from Annex I parties to the United Nations Framework Convention on Climate Change (UNFCCC) is envisaged to be made available for the proposed CPA. If public funding from Annex I parties to the UNFCCC is provided, the CME shall confirm that the funding is not diversion of Official Development Assistance (ODA).

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

The baseline fuel consumption survey of wood-burning stoves in Nigeria was commissioned by CQC to ABHAssociates and is of exclusive use by CQC.

Appendix 4. Further background information on monitoring plan

Not applicable.

Appendix 5. Summary report of comments received from local stakeholders

The information is provided at PoA level.

Appendix 6. Summary of post-registration changes

Not applicable.

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Document information

Version	*Date*	*Description*
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: • 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-

Version	*Date*	*Description*
		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 Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: component project activity, project design document