	Component project activity design document form
	(Version 08.1)

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

BASIC INFORMATION	
Title of the CPA	Aid Africa Uganda CPA 1 (AAUg01)
Scale of the CPA	☐ Large-scale ☒ Small-scale
Version number of the CPA-DD	Version 01
Completion date of the CPA-DD	23/11/2017
Title and UNFCCC reference number of the registered CDM PoA	CDM 7014: Improved Cook Stoves for East Africa (ICSEA)
Title and reference number of the corresponding generic CPA	
Coordinating/managing entity	Improved Cook Stoves for East Africa (ICSEA) Ltd.
Host Party	Uganda
Applied methodologies and standardized baselines	AMS-II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass (version 03) AMS-I.E. Switch from non-renewable biomass for thermal applications by the user (version 06.0)
Sectoral scopes linked to the applied methodologies	1 & 3
Estimated amount of annual average GHG emission reductions	85,854 tCO$_2$e

SECTION A. Description of component project activity (CPA)

A.1. General description of CPA

This CPA shall be active in the production, marketing, distribution and sales of portable/fixed, domestic/institutional, charcoal/firewood improved cook stoves (ICS) not exceeding the small-scale energy limits of 45 MW_{th} for AMS-I.E (Type I), and of 180 GWh_{th} for AMS-II.G (Type II) as set out by the CDM EB.

The ICS may be fuelled with traditional non-renewable biomass or with renewable biomass[1] as a fuel switch to replace the use of non-renewable biomass. In some cases the Supplier Organisations (SOs) may be renewable biomass fuel suppliers, especially if they are organisations that create substantial amounts of biomass waste (such as from processing coffee, flowers, sugar, rice or similar commodities). In some cases however, the stove users may use biomass waste they generate on their own. This CPA will cover the distribution of ICS that may use different fuels during a monitoring period. This will be assessed during the stove usage surveys.

The use of renewable biomass in combination with the ICS may happen:

- For the entire operation period of the ICS or only intermittently;
- For a part of any monitoring period, when the fuel switch occurs during the period
- At some, all or none of the ICS distributed by the SO for a specific CPA.

The CME will only allow AMS-I.E to be used in specific geographical or organisational settings where 100% of the delineated stoves users have switched (or are already using) renewable biomass fuels, based on contractual undertakings given by the SO to the CME. Accordingly, the monitoring of the parameters that are only required for the AMS-I.E. component will be confined to such areas in any one monitoring period. The CME will ensure that a conservative approach is used in such situations, and will ensure that all SO's are aware that the Standard Operating Procedure (SOP), which is part of the PoA's Management Rules, must be complied with.

Aid Africa's improved cook stoves (for both renewable and non-renewable biomass fuel use) will be sold in various sizes and various models. The total number of stoves will be multiplied by the annual average consumption of woody biomass per appliance (tonnes per year) to determine the emission reductions.

These ICS are more efficient in transferring heat to the cooking pots, thus ICS require less fuel to prepare the same meal. This efficiency is translated into fuel savings compared to traditional stoves used in Uganda. By reducing fuel consumption, the CPA reduces greenhouse gas emissions from the use of fuel. In addition the use of non-renewable biomass may also be replaced by the use of renewable biomass from various sources. This reduction in fuel consumption based on the efficiency increase or the replacement of non-renewable biomass is estimated, and corresponding CO_2 emission reductions are calculated from these savings.

For stoves that use AMS-II.G the emission reductions will be based upon an improvement in their thermal efficiency and laboratory test results.

For stoves that use AMS-I.E the emission reductions will be based upon the calculation of the number of appliances multiplied by the annual average consumption of woody biomass (tonnes/year).

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[1] As defined in paragraph 4 of EB23 Annex 18

Aid Africa CPA 1 will be implemented by Aid Africa as the Supplier Organisation (SO) respecting the geographical boundary of Uganda and a maximum energy saving of 180 GWh_{th}/year per CPA. In cases where the number of ICS per CPA exceeds the energy limit, the number of emission reductions (ERs) shall be capped at those generated by ICS saving a maximum of 180 GWh_{th}/year. Any additional ICS shall not be counted.

Due to the use of renewable biomass from various sources as part of the project activity, the total thermal capacity of all ICS distributed and installed shall not exceed the limit of 45 MW_{th} output per CPA.

During the first crediting year, this CPA is expected to generate an estimated 43,675 tonnes of CO_2e reductions from 17,876[2] ICS on average per annum in the first crediting period. These figures are estimates for a section of the CPA that is expected to only apply AMS-II.G with the Aid Africa 6-Brick Wood Stove model using non-renewable biomass in its first crediting period.

During the first crediting year, this CPA is expected to generate an estimated 85,854 tonnes of CO_2e reductions from 12,305[3] ICS on average per annum in the first crediting period. These figures are estimates for a section of the CPA that is expected to apply a combination of AMS-II.G and AMS-I.E with the Aid Africa 6-Brick Wood Stove model using renewable biomass in its first crediting period

With its open access concept, the PoA allows in principle both local manufacturers and importers of stoves to become part of the PoA, and technology/equipment transfer may occur on the CPA level.

Aid Africa is a SO under the 7014 Improved Cook Stoves for East Africa (ICSEA) SSC-PoA, with this being its first CPA.

This CPA will disseminate ICS over the entire territory of Uganda. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements. This will at least include stove serial number, customer name, address, date of sale, and where practical and appropriate also GPS coordinates.

The unique identification of the CPA is the code AAUg01: AA for Aid Africa as the Supplier Organisation (SO), Ug for Uganda and 01 is the number of this CPA.

A.2. Location of CPA

AID AFRICA ORGANISATION, registration number S. 5914/7121 under the Non-Government Organisation Registration Act, CAP. 113 of the Republic of Uganda, P.O. Box 583, Jinja, Uganda.

It is the Supplier Organisation and implementer of this SSC-CPA. The contact details of the implementer are provided in Annex 1.

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[2] 'Calculation of N_y max.' sheet of the Aid Africa CPA CER calculation_ver 01_Aid Africa 6-Brick Wood Stove. These values can change during the course of actual implementation as long as the CPA reaches the threshold defined in the applied methodology under which the stove falls.

[3] 'Calculation of N_y max.' sheet of the Aid Africa CPA CER calculation_ver 01_Aid Africa 6-Brick Wood Stove. These values can change during the course of actual implementation as long as the CPA reaches the threshold defined in the applied methodology under which the stove falls.

This CPA will disseminate ICS over the entire territory of Uganda. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements. This will at least include stove serial number, customer name, address, date of sale, and where practical and appropriate also GPS coordinates.

Map of Uganda

A.3. Technologies/measures

1. Technologies and measures being employed and/or implemented by the CPA

This CPA shall initially distribute the Aid Africa 6-Brick Wood Stove illustrated in Figures 1 & 2 below, but may distribute other models of ICS that meet the minimum thermal efficiency requirement of 20%.

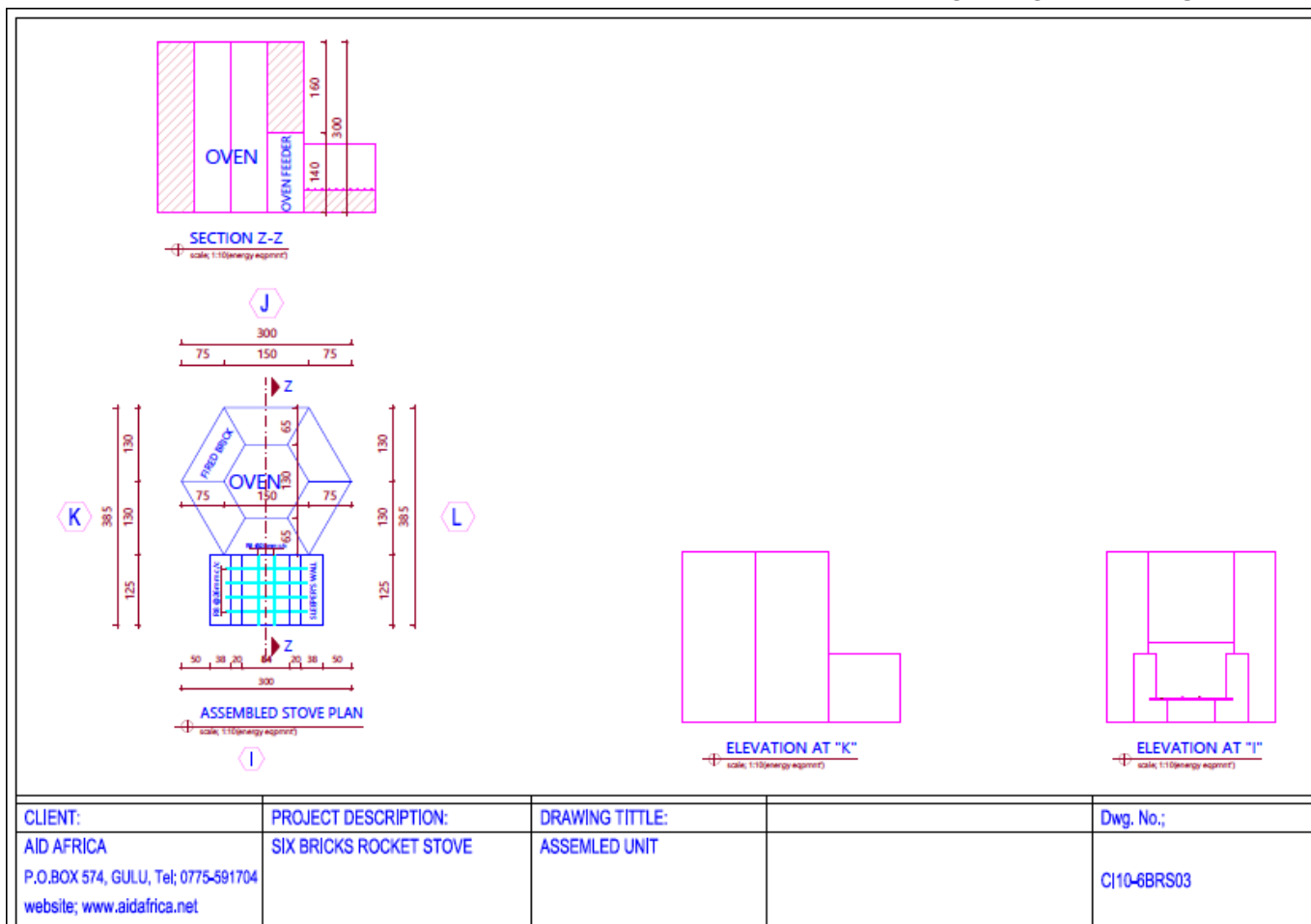Figure 1: Photo of the Aid Africa 6-Brick Wood Stove

Figure 2: Technical specifications for the Aid Africa 6-Brick Wood Stove

a) This CPA includes the introduction of ICS. The stoves are small appliances for efficiency improvements in the thermal application of non-renewable biomass. In addition, the ICS may be fuelled from renewable biomass sources. Accordingly, the following approved small-scale methodologies are applied in combination:

- AMS-II.G, version 03, "Energy efficiency measures in thermal applications of non-renewable biomass"[4]
- AMS-I.E., version 06, "Switch from non-renewable biomass for thermal applications by the user"[5]

b) The CPA shall meet the limits for sales or installations for a specific CPA as provided by ICSEA Ltd to ensure that the small-scale threshold criteria of 45 MW_{th} for AMS-I.E (Type I) and of 180 GWh_{th} for AMS-II.G (Type II) are met.

This CPA may distribute, track and maintain fixed or portable, domestic or institutional stoves burning non-renewable charcoal or firewood, or any renewable biomass fuel. Each stove model will have an initial rating test certificate that passes the Water Boiling Test for a thermal efficiency rating of above 20% as well as a safety test.

If and when the CPA, or defined stove user groups, make a switch from non-renewable biomass to renewable biomass, the CME's Standard Operating Procedure (SOP) will be followed by the CPA to ensure that the use of renewable biomass will adhere to the AMS-I.E requirements as described in Section A.6 of the PoA-DD.

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c) In accordance with paragraph 4 of AMS-II.G (version 03), 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, and this baseline is applied in all SSC-CPAs.

Similarly in accordance with paragraph 10 of AMS-I.E (version 06.0), 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, and this baseline is applied in all SSC-CPAs.

However, the baseline scenario for the AMS-I.E methodology or the approved combination of methodologies will be calculated as per the guidelines for the consideration of interactive effects for the application of multiple CDM methodologies for a Programme of Activities, EB68 Annex 3, paragraph 14(a).

2. As per the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities" it is required to demonstrate that there are no cross effects between the technologies/measures to be applied. CDM EB at its 68th meeting has approved the application of combination of methodologies AMS-II.G and AMS-I.E (refer paragraph 16 of "General guidelines for SSC CDM methodologies" (version 19.0)). Hence, the combination of these methodologies can therefore be applied without further assessment of cross effects.[6]

3. ICS are more efficient than traditional stoves as they reduce heat loss. Domestic and institutional ICS models have been shown to use significantly less wood fuel to cook the same amount of food in comparison to traditional stoves. During the life of the CPA, research and development work may result in more efficient ICS. These shall be included in the CPA, subject to the appropriate baseline studies, standardised baselines and tests proving real and measurable quantities of wood fuel saved.

   The ICS are both portable as well as fixed built-in models. The specific designs and models provided under the CPA will be tested and rated by the testing organisations(s) under authorisation from the CME. The tests will ensure that the respective models meet standardised safety and efficiency requirements and that their emissions reductions are rated according to the approved monitoring methodologies. The baseline traditional domestic and institutional stove for firewood in Uganda is the three stone fire, and for charcoal the traditional metal stove, such as the metal sigiri in Uganda. These have a high fuel consumption due to, among other things, their lack of an improved combustion air supply and of a flue gas ventilation system.

4. The baseline scenario is a continuation of current practice, thus identical to the scenario existing prior to the implementation of the CPA.

5. With the open access nature of the PoA, the CME promotes knowledge about new stove and fuel technologies to the CPAs and to many agencies of the Party that support both local manufacturers and importers of stoves to become part of the PoA, and technology/equipment transfer may occur on the CPA level.

A.4. Coordinating/managing entity

Improved Cook Stoves for East Africa Limited is the coordinating/managing entity of the PoA.

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[6] http://cdm.unfccc.int/UserManagement/FileStorage/NCLGIQTKVB3856UZP4O1AMDRF90XW7

A.5.   Parties and CPA implementers

Parties involved	CPA implementers	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
Uganda (host)	Aid Africa – CPA Implementer	No

A.6. Public funding of CPA

No public funding or ODA has been received for the implementation of the CPA[7].

A.7.   History of CPA

This small-scale CPA is neither registered as an individual CDM project activity nor is it part of another registered PoA.

Procedures according to A.4.4.1. (ii) of PoA-DD	Results
Before submitting a new CPA for inclusion to a DOE, the CME will carry out a search on the UNFCCC CDM registry to ensure that the proposed CPA is not included in another registered PoA, or registered as a CDM project activity.	As verified on 05/09/2016 through a review of the UNFCCC website, the CME confirms that this small-scale CPA is neither registered as an individual CDM project activity nor is part of another registered PoA.
The SO must certify that the proposed CPA is not registered under another CDM project activity	Aid Africa provided a certificate declaring on 09/09/2016 that the proposed CPA is not registered under another Clean Development Mechanism project activity or as a CPA of another PoA. Aid Africa is aware that it must not distribute the same improved cook stove under another PoA or CDM project activity[8].

A.8.   Debundling

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[9] 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[10], then that CPA of PoA is exempted from performing de-bundling check i.e. considered as not being a de-bundled component of a large scale activity.

Under the AMS-II.G (Type II) methodology, each ICS included in the CPA leads to energy savings of 0.0100692 GWh_{th}[11] annual electrical energy savings. This is not greater than 1%

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[7] Declaration of Non-Use of Official Development Assistance by Project Implementer, dated 24/08/2017, provided to DOE.
[8] Certification by Aid Africa that the proposed CPA is not registered under another CDM programme of activities, dated 09/09/2016, provided to DOE
[9] EB 54 Annex 13
[10] i.e. 15 kW installed capacity or 0.6 GWh annual energy savings or 0.6 ktCO2e annual emission reductions.
[11] 'De-bundling' sheet of the Aid Africa CPA CER calculation_ver 01_Aid Africa 6-Brick Wood Stove.

of the small- scale threshold of energy savings of 1.8 GWh$_{th}$/year.

Under the AMS-I.E (Type I) methodology, average thermal installed capacity of each ICS included in the CPA is 0.003657 MW$_{th}$[12]. This is not greater than 1% of the small- scale threshold of 0.45 MW$_{th}$.

The ICS using renewable biomass will meet the limits for sales or installations for this CPA in compliance with the small-scale threshold criteria of 45 MW$_{th}$ of installed capacity for AMS-I.E (Type I) and of 180 GWh$_{th}$ of annual energy savings for AMS-II.G (Type II).

SECTION B.   Application of selected methodologies and standardized baselines

B.1.   Reference to methodologies and standardized baselines

- AMS-II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass (version 03.0)[13].
- AMS-I.E. Switch from non-renewable biomass for thermal applications by the user (version 06.0)[14].
- Methodological Tool: Project and leakage emissions from biomass (version 02.0)[15].
- Methodological Tool: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (version 02)[16].
- Methodological Tool: Tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 01)[17].
- General guidance on leakage in biomass project activities (version 03)[18]
- Guidelines for the consideration of interactive effects for the application of multiple CDM methodologies for a Programme of Activities (version 01)[19]

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[12] 'De-bundling' sheet of the Aid Africa CPA CER calculation_ver 01_Aid Africa 6-Brick Wood Stove.
[13] http://cdm.unfccc.int/methodologies/DB/UFM2QB70KFMWLVO7LJN8XD1O2RKHEK
[14] http://cdm.unfccc.int/methodologies/DB/O799FU5XYGECUSN22G84U5SBXJVM6S
[15] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-16-v1.pdf/history_view
[16] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf/history_view
[17] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf/history_view
[18] https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid04.pdf
[19] https://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid49.pdf

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

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

Sources and GHGs for AMS II.G.				
Scenario	Source	Gas	Included?	Justification / Explanation
Baseline	Combustion of charcoal or firewood	CO_2	Yes	Source of baseline emissions
Baseline	Combustion of charcoal or firewood	CH_4	No	Excluded for simplification
Baseline	Combustion of charcoal or firewood	N_2O	No	Excluded for simplification
Project Activity	Combustion of charcoal or firewood	CO_2	Yes	Source of project emissions
Project Activity	Combustion of charcoal or firewood	CH_4	No	Excluded for simplification
Project Activity	Combustion of charcoal or firewood	N_2O	No	Excluded for simplification

Sources and GHGs for AMS I.E.				
Scenario	Source	Gas	Included?	Justification / Explanation
Baseline	Combustion of non renewable firewood or charcoal	CO_2	Yes	Source of baseline emissions
Baseline	Combustion of non renewable firewood or charcoal	CH_4	No	Excluded for simplification
Baseline	Combustion of non renewable firewood or charcoal	N_2O	No	Excluded for simplification
Project Activity	Combustion of renewable biomass	CO_2	No	No emission source due to the fact that 100% of the firewood or charcoal is displaced by renewable biomass.
Project Activity	Combustion of renewable biomass	CH_4	No	Excluded for simplification
Project Activity	Combustion of renewable biomass	N_2O	No	Excluded for simplification
Project Emissions	Project emissions from cultivation of biomass	CO_2	Yes	N/A
Project Emissions	Project emissions from cultivation of biomass	CH_4	No	N/A
Project Emissions	Project emissions from cultivation of biomass	N_2O	No	N/A
Leakage Emissions	Leakage due to shift of pre-project activity	CO_2	Yes	N/A
Leakage Emissions	Leakage due to shift of pre-project activity	CH_4	No	N/A
Leakage Emissions	Leakage due to shift of pre-project activity	N_2O	No	N/A
Leakage Emissions	Leakage due to diversion of biomass	CO_2	Yes	Source of leakage emissions

	residue from other applications	CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification

B.3. Establishment and description of baseline scenario

According to paragraph 4 of AMS-II.G (version 03), 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, and this baseline is applied in all SSC-CPAs.

Similarly in accordance with paragraph 10 of AMS-I.E (version 06.0), 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, and this baseline is applied in all SSC-CPAs.

However, the baseline scenario for either the AMS-II.G methodology or the combination of the methodologies will be calculated as per the guidelines for the consideration of interactive effects for the application of multiple CDM methodologies for a Programme of Activities, EB68 Annex 3, paragraph 14(a).

B.4. Estimation of emission reductions

B.4.1. Explanation of methodological choices

This CPA may apply the small-scale baseline and monitoring methodology either AMS-II.G (version 03) or AMS-I.E (version 06.0) or a combination of both the methodologies.

Methodological choices for AMS II.G (version 03):

This CPA includes the introduction of ICS. The stoves are small appliances for efficiency improvements in the thermal application of non-renewable biomass. It is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.

Methodological choices for AMS I.E (version 06.0):

This CPA includes the introduction of renewable energy technologies (improved cooking stoves or "ICS") and renewable biomass to switch fuel from non-renewable biomass to renewable biomass. 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.

The CME will use the separate values for the two baseline parameters B_{old} and B_y. In the light of EB68 Annex 3 "Guidelines for the consideration of interactive effects for the application of multiple CDM methodologies for a Programme of Activities", paragraph 14(a), the approach to combine the two methodologies is as follows:

B_{old} is the baseline parameter of AMS-II.G, whereas B_y is calculated using the formula: $B_y = N_{AMS-I.E} * (B_{old} - B_{y, savings})$ which follows paragraph 14(a)(ii) where adjusted values are required as follows: The estimate of AMS-I.E's B_y for one stove as a reference unit used for 365 days is made from data from ILF's CPA 1 verification and issuance of ICS using AMS-II.G, dated October 2015. The value is 4.101 tonnes/stove/year for B_{old}, and 3.081 tonnes/stove/year for $B_{y, savings}$. Thus the estimate for B_y is 0.964 tonnes/stove/year.

AMS-I.E's parameter $N_{AMS-I.E}$ is the number of operational ICS using AMS-I.E, calculated as:

$N_{AMS-I.E} = U_{(i,j)\ AMS-I.E} * t_{fraction(I,j),\ AMS-I.E}$

Thus, depending upon the choice of applied methodology by this CPA, the emission reductions from the use of ICS would be calculated as follows:

1. Equations for calculations of ERs as per AMS-II.G (version 03):

a. Baseline Emissions:

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

Where:

ER_y Emission reductions during the year y in tCO2e

$B_{y,savings}$ Quantity of woody biomass that is saved in tonnes

$f_{NRB,y}$ Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass

$NCV_{biomass}$ Net calorific value of the non-renewable woody biomass that is substituted. The IPCC default for wood fuel, 0.015 TJ/tonne is applied

$EF_{projected-fossilfuel}$ Emission factor for the substitution of non-renewable woody biomass by similar consumers. As per methodology, a value of 81.6 tCO_2/TJ is employed.

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

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

Where:

i   Model of ICS which is a specified size of an ICS type or a group of sizes of an ICS type

j   Cohort for each model of ICS. A cohort is defined as the ICS model sold or gone through maintenance in the same year *y*

$B_{y,savings,(i,j)}$ Quantity of woody biomass that is saved in tonnes per model and cohort of ICS

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

The Option 2 of B.6.1 of part II of PoA-DD is chosen to calculate the $B_{y,savings,(i,j)}$ of the ICS:

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

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

Where:

$B_{,old,(i,j)}$ Quantity of woody biomass used in the absence of the project activity in tonnes per model and cohort of ICS

$\eta_{old,i}$ Efficiency of the baseline system/s being replaced, measured using representative sampling methods or based on referenced literature values (fraction), use weighted average values if more than one type of system is being replaced. A default value of 0.10 may be optionally used if the replaced system is three stone fire, or conventional system with no improved combustion air supply or flue gas ventilation system i.e., without a grate as well as a chimney; for other types of system a default value of 0.2 may be optionally used

$\eta_{new,(i,j)}$ Efficiency of the system being deployed as part do the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average values if more than one type of system is being introduced by the project activity.

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

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

Where:

$N_{(i,j)}$ Number of systems per cohort and model

$C_{y,fueltype,region,old}$ Estimate of average annual consumption of woody biomass per appliance (tonnes/year) derived from a survey of local usage

$L_{(i,j)}$ Leakage, the fraction by which emission reductions are multiplied to obtain an assessment adjusted for leakage risks

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

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

Where:

$U_{(i,j)}$ Usage, the fraction to adjust for drop off of ICS per cohort and model

$t_{fraction,y,(i,j)}$ Fraction of the days in use in year y of a single ICS deployed per cohort and model

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

b. Leakage:

According to paragraph 13 & 23 of AMS-II.G (version 03) the following sources of leakage have to be assessed:

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

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

c) *Increase in the use of non-renewable biomass outside the project boundary to create non-renewable biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non-renewable biomass outside the project boundary then B_{old} is adjusted to account for the quantifiable leakage.*

All the CPAs under this SSC-PoA will use the net to gross adjustment factor of 0.95 to address leakages.

Furthermore, as per paragraph 14 of AMS II.G (version 03), if the equipment currently being utilised is transferred from outside the boundary to the project boundary, leakage is to be

considered. The ICS to be disseminated in the PoA do not include any equipment in operation outside the project boundary but exclusively project-specific ICS, therefore no currently utilised equipment will be transferred from outside the boundary to the project activity and this source of leakage can be neglected.

2. Equations for calculations of ERs as per AMS-I.E (version 06.0):

a. Baseline Emissions:

$$ER_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\_fuel} - PE_{BC,y}$$

Equation (1) of AMS-I.E.

Where:

ER_y	=	Emission reductions during the year y in t CO_2e
B_y	=	Quantity of woody biomass that is substituted or displaced in tonnes
$f_{NRB,y}$	=	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass using survey methods or government data or approved default country specific fraction of non-renewable woody biomass (fNRB) values available on the CDM website[20]
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossil\,fuel}$	=	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 t CO_2/TJ[21]
$PE_{BC,y}$	=	Project emissions due to cultivation of biomass

B_y is determined by the following options:

(a) Calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year); This can be derived from historical data or estimated using survey methods; or

This CPA uses option (a) above in accordance with paragraph 12 (a) of AMS.I.E (version 06.0).

Specific renewable energy based water treatment technologies are not included under this CPA.

This CPA does not involve sourcing of biomass from dedicated plantations.

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[20] Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/DNA/fNRB/index.html>.

[21] This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50 per cent weight is assigned to coal as the alternative solid fossil fuel (96 t CO_2/TJ) and a 25 per cent weight is assigned to both liquid and gaseous fuels (71.5 t CO_2/TJ for kerosene and 63.0 t CO_2/TJ for liquefied petroleum gas (LPG).

Differentiation between non-renewable and renewable woody biomass (as per AMS-II.G. and AMS-I.E)

The shares of renewable and non-renewable woody biomass in B_y (the quantity of woody biomass used in the absence of the project activity) the total biomass consumption using nationally approved methods (e.g. surveys or government data if available) and then the parameter $f_{NRB,y}$ shall be determined as described below. The following principles shall be taken into account:

Demonstrably renewable woody biomass[22] (DRB):

Woody[23] biomass is "renewable" if one of the following two conditions is satisfied:
   (a) The woody biomass is originating from land areas that are forests[24] where:
        (i)   The land area remains a forest;
        (ii) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks [25] on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
        (iii) Any national or regional forestry and nature conservation regulations are complied with;

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

Non-renewable biomass

NRB is the quantity of woody biomass used in the absence of the project activity (B_y) minus the *DRB* component, as long as at least two of the following supporting indicators are shown to exist:

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

Thus, the fraction of woody biomass saved by the project activity in year *y* that can be established as non-renewable, is:

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

Equation (6) of AMS-II.G and (4) of AMS-I.E.

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[22] This definition uses elements of EB 23, annex 18.
[23] In cases of charcoal produced from woody biomass, the demonstration of renewability shall be done for the areas where the woody biomass is sourced.
[24] The forest definitions as established by the country in accordance with the decisions 11/CP.7 and 19/CP.9 should apply.
[25] Carbon stocks may be estimated following the procedures described in the methodological tool "Project and leakage emissions from biomass".

Evidence shall be provided that the trends identified are not occurring due to the enforcement of local/national regulations.

b. Leakage Emissions:

For stoves using renewable biomass (under AMS-I.E) in this CPA, leakage emissions due to diversion of biomass residues is applicable and the same will be determined in accordance with provisions of methodological tool "**Project and leakage emissions from biomass (version 02.0)**", as follows:

1. Leakage due to diversion of biomass residues from other applications:

This section is applicable for project activities, which utilize biomass residues. It quantifies leakage due to diversion of biomass residues to the project to be used as either fuel or feedstock. These biomass residues could have been used outside the project boundary in competing applications, and due to the implementation of the project activity these competing application might be forced to use inputs, which are not carbon neutral.

1.1. Determination of the alternative scenario of the biomass residues in absence of the project activity:

In accordance with the Methodological Tool: Project and leakage emissions from biomass, version 02.0, this CPA will demonstrate either option B1, B2, or B3, or any combination of these, at the time of verification of the CPA after the findings of a biomass usage survey, with an ex-post leakage value for the ER calculation.

For biomass residues categories for which scenarios B1, B2 or B3 are deemed a plausible alternative scenario, it shall be demonstrated that this is a realistic and credible alternative scenario. Towards this end one of the following procedures will be applied for the combined amount of biomass identified:
   (i)   Demonstrate that there is an abundant surplus of the biomass residue in the project region, which is not utilized. For this purpose, demonstrate that the total quantity of that type of biomass residues annually available in the project region is at least 25 per cent larger than the quantity of biomass residues which is utilized annually in the project region (e.g. for energy generation or as feedstock), including the project facility;
   (ii) Demonstrate for the sites from where biomass residues are sourced that the biomass residues have not been collected or utilized (e.g. as fuel, fertilizer or feedstock) but have been dumped and left to decay, land-filled, left in the field to decay after harvest, or burnt[26] without energy generation (e.g. field burning). This approach is only applicable to biomass residues categories for which project participants can clearly identify the site from where the biomass residues are sourced;
   (iii) In case abundance of biomass in the project region cannot be demonstrated, the alternative use of the biomass shall be considered unknown (B4) and result in leakage emissions.

During the crediting period, biomass residues of the type B1, B2 or B3 may be used in the project activity and the alternative scenario for these types of biomass residues shall be assessed using the procedures outlined in this tool for each new category of biomass residues.

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[26] Assumed nil for this example, but a real case would be based on a SO's defined group of renewable biomass users

1.2. Calculation of Leakage due to diversion of biomass residues:

The main potential source of leakage due to biomass residues is an increase in emissions from fossil fuel combustion or other sources due to diversion of biomass residues from other uses to the project plant as a result of the project activity. The alternative scenario for biomass residues for which this potential leakage is relevant is B4.

Therefore, for the categories of biomass residues whose alternative scenario has been identified as B4, project participants shall calculate leakage emissions as follows:

$$LE_{BR,y} = EF_{CO2,LE} \times \sum_{n} BR_{PJ,n,y} \times NCV_{n,y}$$

Equation (9)

Where:

$LE_{BR,y}$ = Leakage emissions in year y (t CO$_2$e)

$EF_{CO2,LE}$ = CO$_2$ emission factor of the most carbon intensive fossil fuel used in the country (t CO$_2$/GJ)

$BR_{PJ,n,y}$ = Quantity of biomass residues used in the project site and included in the project boundary in year y (tonnes on dry-basis)

$NCV_{n,y}$ = Net calorific value of the biomass residues of category n in year y (GJ/tonne of dry matter)

n = Categories of biomass residues for which B4 has been identified as the alternative scenario

The determination of $BR_{PJ,n,y}$ shall be based on the monitored amounts of biomass residues used in facilities included in the project boundary.

B.4.2. Data and parameters fixed ex ante

Data / Parameter:	NCV$_{biomass}$
Data unit:	TJ/tonne
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data:	IPCC default for wood fuel
Value(s) applied:	0.015
Choice of data or Measurement methods and procedures:	Default value that is provided in in accordance with paragraph 5 of AMS II.G (version 03) and paragraph 11 of AMS-I.E (version 06.0)
Purpose of data	Calculation of baseline emissions
Additional comment:	As per AMS-II.G and AMS-I.E.

Data / Parameter:	EF$_{projected-fossilfuel}$
Data unit:	tCO$_2$/TJ
Description:	Emission factor for the substitution of non-renewable woody biomass by similar consumers.
Source of data:	IPCC
Value(s) applied:	81.6
Choice of data or Measurement methods and procedures:	Default value in accordance with paragraph 5 of AMS II.G (version 03) and paragraph 11 of AMS-I.E (version 06.0)

Purpose of data	Calculation of baseline emissions
Additional comment:	As per AMS-II.G and AMS-I.E.

Data / Parameter:	$C_{y,fueltype,region,old}$
Data unit:	tonnes/year
Description:	Quantity of woody biomass used in the absence of the project activity in tonnes per type of ICS within a region.
Source of data:	Center for Integrated Research and Community Development Uganda (CIRCODU), Final Report on Baseline Fuel Consumption in Households in Uganda, April 2010 (revised October 2010). CDM ASB0016 Standardized Baseline Institutional Cook Stoves in Uganda v01.
Value(s) applied:	Domestic stoves: 4.58 tonnes of woody biomass per household per year for charcoal-burning stoves (calculated from 2.09 kg/stove/day with a conversion factor of 6); 3.50 tonnes of woody biomass per household per year for wood-burning stoves (calculated from 9.6 kg/stove/day). Institutional stoves: 0.38 tonnes of woody biomass per person per year for boarding schools; 0.19 tonnes of woody biomass per person per year for day schools; and 0.59 tonnes of woody biomass per person per year for prisons, plantation estates, and hospitals.
Choice of data or Measurement methods and procedures:	Estimate of average annual consumption of woody biomass per appliance (tonnes/year) derived from a survey of local usage or historical data. If data were obtained by survey, then the survey follows the representative sampling methods as described in paragraph 22 of AMS II.G. (version 03) and paragraph 26 of AMS-I.E (version 06.0).
Purpose of data	Calculation of baseline emissions
Additional comment:	Only applicable for calculations of ER as per AMS-II.G (version 03).

Data / Parameter:	$L_{(i,j)}$
Data unit:	Fraction
Description:	Net to Gross adjustment factor to account for leakage
Source of data:	Default value in accordance with paragraph 13 (a) of AMS II.G (version 03) and paragraph 19 (a) of AMS-I.E (version 06.0)
Value(s) applied:	0.95
Choice of data or Measurement methods and procedures:	N/A
Purpose of data	Calculation of leakage emissions
Additional comment:	In case this leakage adjustment factor is applied, it is not required to survey the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources.

Data / Parameter:	$Capacity_{ICS}$
Data unit:	kW_{th}
Description:	Installed/rated capacity of stove in kilowatt equivalent for thermal energy
Source of data:	WBT data sheet for the Aid Africa 6-Brick Wood Stove Test Certificate
Value(s) applied:	3.657 kW_{th}
Choice of data or Measurement methods and procedures:	Either data from stove manufacturer or calculated in a transparent manner. The calculation will vary depending on the most appropriate data source and therefore will be detailed on CPA level and described by stove type.

Purpose of data	Calculation of baseline emissions
Additional comment:	To ensure that the total rated capacity of all the stoves in the CPA do not exceed the relevant limit, $45MW_{th}$ per CPA.

Data / Parameter:	$\eta_{old,i}$
Data unit:	Fraction
Description:	Efficiency of the baseline appliance being replaced
Source of data:	Representative sampling testing based on Water Boiling Tests or any other test approved by the UNFCCC, referenced literature or default values according to the methodology AMS II.G (version 03) and AMS-I.E (version 06.0).
Value(s) applied:	Default value (0.1 for domestic) according to the methodology, and (0.121 for institutional stoves) according to the Uganda standardized baseline for IICS
Choice of data or Measurement methods and procedures:	Default value according to the methodology may apply, or results from testing in a laboratory may apply.
Purpose of data	Calculation of baseline emissions
Additional comment:	This parameter may or not may be reported according to the option selected at CPA level for the estimation of emission reductions. Data to be reported if option 2 of AMS-II.G (version 03) is chosen is chosen.

Data / Parameter:	$\eta_{new,(i,j)}$
Data unit:	Fraction
Description:	Specific efficiency of the ICS being deployed as part of the project activity.
Source of data:	Representative sampling testing based on Water Boiling Tests or any other test approved by the UNFCCC, or referenced literature
Value(s) applied	32.3%
Measurement methods and procedures:	ICS are tested by a laboratory according to the WBT ex ante and ex post as part of the monitoring. The specified efficiency of ICS may also change over the lifetime of the stove, normally decreasing over the time. Therefore the specified efficiency of a ICS is a range of values where its lower limit is an efficiency of 20% in comparison with $\eta_{old,i}$ and its higher limit is a 10% higher than the ex- ante value presented in the CPA-DD. The ICS to be tested according to the monitoring plan will be randomly selected from the usage sample survey. Tests during monitoring will be performed by an authorised organisation at least every two years.
Monitoring frequency:	Annual or Biennial
QA/QC procedures:	Tests during monitoring will be performed by the CME and/or by an authorised organisation designated by the CME. Cross checks on the CME or authorised organisations will be made annually by comparisons of control stoves.
Purpose of data	Calculation of baseline emissions
Additional comment:	This parameter may or may not be monitored according to the option selected at CPA level for the calculation of emission reductions.

B.4.3. Ex ante calculation of emission reductions

Emission reductions are calculated as follows:

$$ER_y = ER_{AMS-II.G,y} + ER_{AMS-I.E,y}$$	Equation 10

Where:

ER_y = Emission reductions during year y in t CO_2e

$ER_{AMS-II.G,y}$ = Emission reductions during year y in t CO_2e from AMS-II.G.

$ER_{AMS-I.E.y}$ = Emission reductions during year y in t CO_2e from AMS-I.E.

The calculation of emission reductions is based on the individual stoves/stove cohort. The example calculation below is therefore shown for one stove. The sum of the emission reductions of all stoves results in the total emission reduction achieved within a specific monitoring period.

For the example calculation it is assumed that the stove was operated for a period of 365 days fuelled with renewable biomass not sourced from the cultivation of biomass in a dedicated plantation. The calculation is done for 365 days following AMS-I.E and AMS-II.G as follows:

ID	Description	Unit	Source / calculated as	Value	Example
			Calculation as per AMS-II.G.		
A	Crediting days	D	Monitored	CPA specific	365
B	Days in full year	D	Monitored	365, 366	365
C	$t_{fraction(i,j)}$	Fraction	A/B	CPA specific	1.000
D	$U_{(i,j)}$	Fraction	Monitored	CPA specific	0.945
E	$N_{(i,j)}$	Fraction	C*D	CPA specific	0.945
F	Leakage	Fraction	AMS-II.G. (Default value)	0.95	0.95
G	$C_{y,fueltype,region,old}$	tonnes/stove/y	Baseline study (CIRCODU)	CPA specific	3.504
H	B_{old} (AMS-II.G.)	tonnes/y	E*F*G	CPA specific	3.146
I	Efficiency new	Fraction	Monitored	CPA specific	0.323
J	Efficiency old	Fraction	AMS-II.G. (Default value)	0.1	0.1
K	Fuel savings	Fraction	1-J/I	CPA specific	0.69
L	$B_{y,savings}$	tonnes/y	H*K	CPA specific	2.172
M	fNRB (national)	Fraction	Baseline study (FAO, National Forestry Authority approved)	Country specific	0.92
N	NCV	TJ/tonne	AMS-II.G. (Default value)	0.015	0.015
O	EF	tCO$_2$e/TJ	AMS-II.G. (Default value)	81.6	81.6

P	ER per stove w/o adjustment	tCO_2e/stove	L*M*N*O	CPA specific	2.446
Q	Adjustment for continued use of BL stoves	Fraction	Monitored	CPA specific	0.999
R	ER per stove with adjustment (under AMS-II.G)	tCO_2e/stove	P*Q	CPA specific	2.443
Calculation as per AMS-I.E.					
A_2	Crediting days using RB	D	Monitored	CPA specific	365
B	Days in full year	D	Monitored	365, 366	365
C_2	$t_{fraction(i,j), AMS-I.E}$	Fraction	A_2/B	CPA specific	1.000
D	$U_{(i,j), AMS-I.E}$	Fraction	Monitored	CPA specific	0.945
E_2	$N_{AMS-I.E}$	Fraction	C_2*D	CPA specific	0.945
F_2	$B_{old,} - B_{y,savings,}$	tonnes/stove/y	$B_{old,} - B_{y,savings,}$	CPA specific	0.974
G_2	B_y	tonnes/y	E_2*F_2 (AMS-I.E. baseline emissions for B_y calculation, EB68 Annex 3 para 14.	CPA specific	0.920
L_2	fNRB (national)	fraction	Baseline study (FAO & National Forestry Authority approved)	Country specific	0.92
M	NCV	TJ/tonne	AMS-I.E. (Default value)	0.015	0.015
N	EF	tCO_2e/TJ	AMS-I.E. (Default value)	81.6	81.6
O_2	Leakage	Fraction	AMS-I.E v.6. clause 19 (a)	0.95	0.95
P_2	Project Emissions[27]	tCO_2e/stove	Calculated as per tool for Project emissions resulting from utilization of biomass residues	CPA specific	0
Q_2	Total ER per stove	tCO_2e/stove	$(G_2*L_2*M*N*O_2)$ - P_2	CPA specific	0.985
Total emission reductions as per AMS-II.G and AMS-I.E.					
S	Total ER per stove	tCO_2e/stove	R+Q_2	CPA specific	3.428

The number of crediting days under AMS-II.G and AMS-I.E. shall not exceed the number of days in the crediting period.

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[27] Assumed nil for this example, but a real case would be based on a SO's defined group of renewable biomass users

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

AMS-II.G stoves using NRB

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1: 01/02/2018-31/01/2019	45,859	0	2,184	43,675
Year 2: 01/02/2019-31/01/2020	45,859	0	2,184	43,675
Year 3: 01/02/2020-31/01/2021	45,859	0	2,184	43,675
Year 4: 01/02/2021-31/01/2022	45,859	0	2,184	43,675
Year 5: 01/02/2022-31/01/2023	45,859	0	2,184	43,675
Year 6: 01/02/2023-31/01/2024	45,859	0	2,184	43,675
Year 7: 01/02/2024-31/01/2025	45,859	0	2,184	43,675
Total	321,013	0	15,286	305,727
Total number of crediting years	7 Years			
Annual average over the crediting period	45,859	0	2,184	43,675

AMS-II.G + AMS-I.E combination stoves using RB

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1: 01/02/2018-31/01/2019	44,288	0	2,109	42,179
Year 2: 01/02/2019-31/01/2020	44,288	0	2,109	42,179
Year 3: 01/02/2020-31/01/2021	44,288	0	2,109	42,179

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 4: 01/02/2021-31/01/2022	44,288	0	2,109	42,179
Year 5: 01/02/2022-31/01/2023	44,288	0	2,109	42,179
Year 6: 01/02/2023-31/01/2024	44,288	0	2,109	42,179
Year 7: 01/02/2024-31/01/2025	44,288	0	2,109	42,179
Total	310,016	0	14,763	295,253
Total number of crediting years	7 Years			
Annual average over the crediting period	44,288	0	2,109	42,179

Combined total of AMS-II.G only stoves using NRB plus AMS-II.G + AMS-I.E combination stoves using RB

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1: 01/02/2018-31/01/2019	90,147	0	4,293	85,854
Year 2: 01/02/2019-31/01/2020	90,147	0	4,293	85,854
Year 3: 01/02/2020-31/01/2021	90,147	0	4,293	85,854
Year 4: 01/02/2021-31/01/2022	90,147	0	4,293	85,854
Year 5: 01/02/2022-31/01/2023	90,147	0	4,293	85,854
Year 6: 01/02/2023-31/01/2024	90,147	0	4,293	85,854
Year 7: 01/02/2024-31/01/2025	90,147	0	4,293	85,854
Total	631,028	0	30,049	600,979

Total number of crediting years	7 Years			
Annual average over the crediting period	90,373	0	4,293	85,854

B.5. Monitoring plan

B.5.1. Data and parameters to be monitored

Data / Parameter:	N_y
Data unit:	Unit
Description:	Number of ICS units distributed
Source of data:	CPA database
Value(s) applied	[XXX]
Measurement methods and procedures:	Monthly submissions of Sales Agreements/Logbooks and data entries by CPA
Monitoring frequency:	Annual
QA/QC procedures:	This factor will be monitored according to the monitoring plan, and updated when necessary. Cross check comparisons will be made against spot check visits and monitoring of a randomly selected sample of households to administer the usage survey questionnaire, and any significant differences will be counted as "Drop-Offs".
Purpose of data	Calculation of baseline emissions
Additional comment:	As per AMS-II.G and AMS-I.E.

Data / Parameter:	$U_{(i,j)\ AMS\text{-}I.E}$
Data unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an adjustment for drop off of ICS in use per cohort year that are using renewable biomass. A cohort is defined as the ICS model sold or gone through maintenance in the same year.
Source of data:	Survey of ICS users per cohort that use renewable biomass as the main source of fuel, using sampling methods.
Value(s) applied	[XXX]
Measurement methods and procedures:	The SO keeps a paper and electronic record and a survey is done at least biennially in order to assess the operational ICS use of renewable biomass. This factor addresses the leakage to be considered as per AMS-I.E/Version 06.
Monitoring frequency:	Annual or biennial
QA/QC procedures:	Usage monitoring will be performed by the CME and/or by an authorised organisation designated by the CME following the sampling plan. In all cases cross-checking procedures appropriate to the monitoring choice will be undertaken.
Purpose of data	Calculation of leakage emissions
Additional comment:	

Data / Parameter:	$t_{fraction,(i,j),\ AMS\text{-}I.E}$
Data unit:	Fraction of 365
Description:	Fraction of the days in use in year y of a single ICS deployed that uses renewable biomass
Source of data:	Derived from sales records and SOs standard operating procedures
Value(s) applied	[XXX]
Measurement methods and procedures:	The SO keeps a paper and electronic record of the sales date, and the stove is considered to be in use from the commissioning date, which is the date on which the stove is put into use for the first time. The number of operational stoves each year will be summarised in a table and checked to ensure that the installed capacity of each CPA does not exceed the small-scale limit of 45 MW$_{th}$ output per year. This factor will be calculated daily through the electronic database. The SO also provides a standard operating procedure, certifying the date that household made a shift from the use of non-renewable biomass to renewable biomass as their primary source of fuel.
Monitoring frequency:	Continuously, (reported annually)

QA/QC procedures:	Sales records will be scrutinised by the SO to avoid double-counting and the CME will also conduct spot-checks to verify the legitimacy of such records.
	On a monthly basis, SOs will verify the stoves put into use based on the ICS sales during the month through telephone surveys or physical inspection/verification or third party monitoring events. These monitoring events may include a record of one or a combination of the following activities or events: (a) Customer inspections resulting from loan or hire purchase agreements (b) Double verified records of community-based stove monitoring staff (c) Independent monitoring verification exercises organised by the CME.
	This will provide the date on which the stove is put into use for the first time and will be used as the start date for the computation of certified emission reductions. On a monthly basis, CPAs will send duplicate copies of sales agreements to ICSEA for verification of the data entered into the sales database.
	This will also provide the date on which the operational stove started using renewable biomass for the first time and will be used as the start date for the computation of certified emission reductions. On a monthly basis, CPAs will send duplicate copies of sales agreements to ICSEA for verification of the data entered into the sales database.
	Telephone checks and spot checks will be used by the CME to review and authenticate the data in the sales database. An ICS not found to be in use during the course of the monitoring period, will be suspended from the sales database until it is verified to be in use. If it is not found to be in use before the annual verification, it will not be included in the sales database and will not earn carbon credits for that monitoring period. This data will also be used to determine the number of ICS installed in the CPA.
	An operational ICS not found to be using renewable biomass after having being identified by the SO under its standard operating procedures as one that has shifted its fuel use from non-renewable to renewable biomass, shall only be included in the sales database as ICS applying AMS-II.G.
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 the year y that can be established as non-renewable biomass
Source of data:	National forestry agencies, default values and environmental authorities literature or statics (e.g. FAO)
Value(s) applied	[XXX]

Measurement methods and procedures:	The $f_{NRB,y}$ will be determined for each CPA based on the most recent national approved studies or African studies; where available, a regional approach will be used to determine $f_{NRB,y}$. At least once a year the parameter will be monitored. By updating the value at least once a year, leakage b) is taken into consideration
Monitoring frequency:	Annual
QA/QC procedures:	This factor will be monitored according to the monitoring plan, and updated when necessary. Cross check comparisons will be made against UNFCCC published default values, and any significant differences will be justified.
Purpose of data	Calculation of baseline emissions
Additional comment:	As per AMS-II.G and AMS-I.E.

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

Data / Parameter:	$t_{fraction,(i,j)}$
Data unit:	Fraction of 365
Description:	Fraction of the days in use in year y of a single ICS deployed
Source of data:	Derived from sales records
Value(s) applied	[XXX]
Measurement methods and procedures:	The SO keeps a paper and electronic record of the sales date, and the stove is considered to be in use from the commissioning date, which is the date on which the stove is put into use for the first time. The number of operational stoves each year will be summarised in a table and justified by comparing the efficiency savings of each CPA to the small-scale limit of savings of 180 GWh_{th} per year. This factor will be calculated daily through the electronic database.
Monitoring frequency:	Continuously, (reported annually)

QA/QC procedures:	Sales records will be scrutinised by the SO to avoid double-counting and the CME will also conduct spot-checks to verify the legitimacy of such records.
	On a monthly basis, SOs will verify the stoves put into use based on the ICS sales during the month through telephone surveys or physical inspection/verification or third party monitoring events. These monitoring events may include a record of one or a combination of the following activities or events:
	(a) Customer inspections resulting from loan or hire purchase agreements
	(b) Double verified records of community-based stove monitoring staff
	(c) Independent monitoring verification exercises organised by the CME.
	This will provide the commissioning date, which is the date on which the stove is put into use for the first time and will be used as the start date for the computation of certified emission reductions. On a monthly basis, CPAs will send duplicate copies of sales agreements to ICSEA for verification of the data entered into the sales database.
	Telephone checks and spot checks will be used by the CME to review and authenticate the data in the sales database. An ICS not found to be in use will be suspended from the sales database until it is verified to be in use. If it is not found to be in use before the annual verification, it will not be included in the sales database and may be deleted and replaced with a new ICS. This data will also be used to determine the number of ICS installed in the CPA.
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$U_{(i,j)}$
Data unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an adjustment for drop off of ICS in use per cohort year. A cohort is defined as the ICS model sold or gone through maintenance in the same year.
Source of data:	Survey of ICS users per cohort using sampling methods.
Value(s) applied	[XXX]
Measurement methods and procedures:	The SO keeps a paper and electronic record and a survey is done at least biennially in order to assess the ICS in operation.
	This factor addresses the leakage to be considered as per AMS II.G./Version 03 clause 14 if equipment currently being utilised is transferred from outside the boundary to the project activity.
Monitoring frequency:	Annual or biennial
QA/QC procedures:	Usage monitoring will be performed by the CME and/or by an authorised organisation designated by the CME following the sampling plan. In all cases cross-checking procedures appropriate to the monitoring choice will be undertaken.
Purpose of data	Calculation of leakage emissions
Additional comment:	

Data / Parameter:	$Q_{Renewable\ Biomass,y}$
Data unit:	Tonnes/Stove/year
Description:	Quantity of renewable biomass used in project ICS
Source of data:	Survey of ICS users per cohort using sampling methods.
Value(s) applied	[XXX]
Measurement methods and procedures:	Survey. The SO keeps a paper and electronic record.
Monitoring frequency:	Annual
QA/QC procedures:	Survey follows sampling guidelines
Purpose of data	Calculation of baseline emissions
Additional comment:	The survey will identify the share of days or cooking events where RB was used for cooking in the monitoring period.

B.5.2. Sampling plan

<u>SAMPLING PLAN[28]: For Drop Off Check</u>

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

Approach 1: Census

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

Approach 2: Sampling

Sampling design

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

OPTION 1: Annual inspection per CPA[29]

<u>Objectives and reliability requirements</u>

The objective is to estimate the proportion of project improved cook stoves (ICS) that are still in

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[28] According to appendix 3 of the Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities (Version 02.0), EB 65 Report, Annex 2; equations were obtained from "Best Practices Examples Focusing on Sample Size and Reliability Calculations", EB 67 Annex 6
[29] This implies either conducting a census or selecting a random sample for each CPA independently according to the sampling plan

operation/use at the end of each year. AMS II.G./Version 03 will be applied. The overall objective is to estimate the annual emission reductions during the year y in tCO_2e during the crediting period, and with 90/10 confidence/precision.

Target population

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

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

Sampling method

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

Sample size

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

The equation for estimating the sample size is:

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

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

n   Sample size
N   Population total
p   Our expected proportion
1.645   Represents the 90% confidence required
0.1   Represents the 10% relative precision

The minimum sample sizes for the different scenarios required to meet the confidence and precision requirements are calculated in a sample size computation spreadsheet.[30]

Summary results for different populations are found in the following table for an assumed 50% of cook stoves still in use[31]:

Population size	Calculated minimum sample size	Adjusted sample size according to response rate of 80%
1,000	214	268
2,000	239	299
3,000	249	312
4,000	254	318
5,000	257	322
6,000	259	324
7,000	261	327
8,000	262	328

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[30] Sample size calculation spreadsheet provided to the DOE
[31] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

9,000	263	329
10,000	264	330
11,000	265	332
12,000	265	332
13,250	266	333
14,000	266	333

Sampling frame

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

OPTION 2: Annual inspection of a random sample of CPAs from each Supplier Organisation (SO)

Objectives and reliability requirements

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

Target population

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

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

Sampling method

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

Sample Size

The required sample size will be determined using multistage sampling.

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

$$C \geq \frac{\frac{SD_B^2}{P^2} X \frac{M}{M-1} + \frac{1}{\bar{u}} X \frac{SD_W^2}{P^2} X \frac{(\bar{N}-\bar{u})}{(\bar{N}-1)}}{\frac{0.1^2}{1.96^2} + \frac{1}{M-1} \frac{SD_B^2}{P^2}}$$

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

SD_B^2 Variance between clusters (CPA)
SD_W^2 Average within cluster (CPA) variation
p   Overall proportion of ICS in use
1.96   Represents the 95% confidence required
0.1   Represents the 10% relative precision
$\bar{p}$ Is the average proportion of ICS

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet [32].
Summary results for different possible numbers of CPAs are found in the following table for an assumed 80% of cook stoves in use: [33]

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

Sampling frame

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

OPTION 3: Biennial inspection per CPA

Objectives and reliability requirements

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

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

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

Sampling method

Simple random sampling will be used. A number of ICS will be sampled using simple random

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

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

Sample size

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

The equation for estimating the sample size is:

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

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

n   Sample size
N   Population total
p   Our expected proportion
1.96   Represents the 95% confidence required
0.05   Represents the 5% relative precision

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

Summary results for different populations are found in the following table for an assumed 50% of cook stoves still in use[35]:

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

Sampling frame

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

OPTION 4: Annual inspection of a random sample of CPAs from CPAs using the same ICS Model

Objectives and reliability requirements

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[34] Sample size calculation spreadsheet provided to the DOE
[35] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

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

Target population

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

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

Sampling method

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

Sample size

The required sample size will be determined using multistage sampling.

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

$$C \geq \frac{\dfrac{SD_B^2}{\overline{P^2}} X \dfrac{M}{M-1} + \dfrac{1}{\bar{u}} X \dfrac{SD_W^2}{\overline{P^2}} X \dfrac{(\overline{N}-\bar{u})}{(\overline{N}-1)}}{\dfrac{0.1^2}{1.96^2} + \dfrac{1}{M-1}\dfrac{SD_B^2}{\overline{P^2}}}$$

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

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

Summary results for different possible numbers of CPAs are found in the following table for an assumed 80% of cook stoves in use: [37]

Number of ICS to be sampled from each CPA	Number of CPAs to Sample	Total sample size
1	96	96
5	21	105

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

10	11	110
15	8	120
20	6	120
25	6	150
30	5	150
35	4	140
40	4	160

Sampling frame

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

Data

Field measurements

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

Quality assurance/quality control

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

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

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

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

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

Analysis

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

Implementation

Implementation Plan

The Monitoring Manager will be responsible for data collection and data analysis. The Monitoring Manager has experience in sampling and surveys.

The schedule for implementing the sampling will be set out by the Monitoring Manager.

SAMPLING PLAN:[38]: For Efficiency Check

Sampling design

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

OPTION 1: Annual inspection per CPA

Objectives and reliability requirements

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

Target population

The target population is the total number of ICS installed by the CPA at the end of the year that are in use. The primary means to uniquely identify the activities under the CPA is by means of buyer information collected through Sales Agreements and the unique numbering of each ICS. The sales data will be stored in the CPA's records in the PoA's electronic database. The total number of cook stoves that are in use will be identified through either one or a combination of the following activities that will be stored in the monitoring database: The database will be continually updated with the following events: (a) an annual maintenance/repair event (b) customer inspections

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

resulting from loan or hire purchase agreements (c) double verified records of community-based stove monitoring staff (d) independent monitoring verification exercises organised by the CME (e) annual usage survey.

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

Sampling method

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

Sample size

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

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

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

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

n   sample size
N   Total number of ICS in use
Mean Our expected standard deviation
1.645 Represents the 90% confidence required
0.1   Represents the 10% relative precision

The minimum sample sizes -for the different scenarios- required to meet the confidence and precision requirements are given in a computation spreadsheet.[39]

Summary results for different populations are found in the following table for an assumed 0.285 mean efficiency[40]:

Population size	Standard deviation	Calculated minimum sample size	Adjusted sample size according to response rate of 80%
1,000	0.175	93	117
2,000	0.175	98	123
3,000	0.175	99	124
4,000	0.175	100	125
5,000	0.175	101	127
6,000	0.175	101	127
7,000	0.175	101	127
8,000	0.175	101	127
9,000	0.175	101	127
10,000	0.175	102	128
11,000	0.175	102	128

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[39] Sample size calculation spreadsheet provided to the DOE
[40] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

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

Sampling frame

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

OPTION 2: Annual inspection of a random sample of CPAs from each Supplier Organization (SO)

Objectives and reliability requirements

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

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

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

Sampling method

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

Sample size

The required sample size will be determined using multistage sampling.

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

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

Where:

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

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

Summary results for different possible numbers of CPA are found in the following table for an assumed efficiency of 0.28[42]:

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

Sampling frame

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

OPTION 3: Biennial inspection per CPA

Objectives and reliability requirements

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

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[41] Sample size calculation spreadsheet provided to the DOE

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

Target population

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

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

Sampling method

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

Sample size

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

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

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

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

n   sample size
N   Total number of ICS in use
Mean   Our expected standard deviation
1.96   Represents the 95% confidence required
0.05   Represents the 5% relative precision

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

Summary results for different populations are found in the following table for an assumed 0.285 mean efficiency[44]:

Population size	Standard deviation	Calculated minimum sample size	Adjusted sample size according to response rate of 80%
1,000	0.175	368	460
2,000	0.175	450	563
3,000	0.175	486	608

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[43] Sample size calculation spreadsheet provided to the DOE
[44] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

4,000	0.175	507	634
5,000	0.175	520	650
6,000	0.175	529	662
7,000	0.175	536	670
8,000	0.175	541	677
9,000	0.175	545	682
10,000	0.175	548	685
11,000	0.175	551	689
12,000	0.175	553	692
13,250	0.175	556	695
14,000	0.175	557	697

Sampling frame

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

OPTION 4: Annual inspection of a random sample of CPAs from CPAs using the same ICS Model

Objectives and reliability requirements

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

Target population

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

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

Sampling method

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

Sample size

The required sample size will be determined using multistage sampling.

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

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

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

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

Summary results for different possible numbers of CPA are found in the following table for an assumed efficiency of 0.28[46]:

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

Sampling frame

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

Data

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[45] Sample size calculation spreadsheet provided to the DOE
[46] The percentage of cook stoves expected in use will be altered for each CPA depending on their performance

Field measurements

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

Quality assurance/quality control

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

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

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

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

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

Analysis

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

Implementation

Implementation Plan

The Monitoring Manager will be responsible for data collection and data analysis. The Monitoring Manager has experience in sampling and surveys.

The schedule for implementing the sampling will be set out by the Monitoring Manager.

SAMPLING PLAN: For Determination of Historical Annual Average Consumption of Woody Biomass per Appliance (tonnes/year).

The "Quantity of woody biomass that is substituted or displaced" can be either determined as the share of days or cooking events where renewable biomass was used as fuel or based on the parameter $HG_{p,y}$ "Quantity of thermal energy generated" as per the provisions of AMS-I.I.

In the following, it is assumed the "Quantity of woody biomass that is substituted or displaced" is determined by a survey to find out the share of days or cooking events where renewable biomass was used as fuel. Although, the parameter of interest is expressed in percentages, the parameter of interest is of the type "mean".

Sampling design

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

OPTION 1: ANNUAL INSPECTION PER CPA

Objectives and reliability requirements

The objective is to estimate the share of days or cooking events where renewable biomass was used as fuel of the project improved cook stoves (ICS) with 90/10 confidence/precision (in the following the "*share of RB use*").

Target population

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

The data to be collected on each sampling unit (ICS) is its share of RB use.

Sampling method

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

Sample size

The required sample size will be determined using simple random sampling in each cohort. The equation for estimating the sample size in each cohort is:

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

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

n   sample size

N   Total number of ICS in use

Mean   Our expected standard deviation

1.645   Represents the 90% confidence required

0.1   Represents the 10% relative precision

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

Summary results for different expected shares of RB use are found in the following table for an assumed population total (N) of 12,849 based on ILF projections:

Our expected share	Standard deviation	Sample size	Adjusted sample size according to response rate of 80%
0.9	0.02	1	2
0.8	0.04	1	2
0.7	0.06	2	3
0.6	0.08	5	7
0.5	0.1	11	14
0.4	0.12	25	31
0.3	0.14	59	74
0.2	0.16	171	214
0.1	0.18	821	1,027

Sampling frame

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

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[47] Sample size calculation spreadsheet provided to the DOE

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

Objectives and reliability requirements

The objective is to estimate the share of days or cooking events where renewable biomass was used as fuel of the project improved cook stoves (ICS) with 95/10 confidence/precision (in the following the "*share of RB use*").

Target population

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

The data to be collected on each sampling unit (ICS) is the share of RB use.

Sampling method

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

Sample size

The required sample size will be determined using multistage sampling.

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

$$C \geq \frac{\dfrac{SD_B^2}{clustermean^2} X \dfrac{M}{M-1} + \dfrac{1}{\bar{u}} X \dfrac{SD_W^2}{overallmean^2} X \dfrac{(\bar{N}-\bar{u})}{(\bar{N}-1)}}{\dfrac{0.1^2}{1.96^2} + \dfrac{1}{M-1}\dfrac{SD_B^2}{clustermean^2}}$$

Where:

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

$\bar{N}$ Average units (ICS/households) per cluster (CPA)
SD_B^2 Variance between clusters (CPA)
SD_W^2 Average within cluster (CPA) variation
1.96   Represents the 95% confidence required
0.1   Represents the 10% relative precision

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

Summary results for different possible numbers of CPAs are found in the following table for an assumed share of RB use from 0.4 to 0.6:

Number of ICS to be sampled from each CPA	Adjusted Number of ICS to be sampled from each CPA	Total sample size of CPAs
10	13	444
50	63	96
100	125	53
150	188	38
200	250	31
250	313	27
300	375	24
400	500	20
500	625	18

Sampling frame

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

OPTION 3: BIENNIAL INSPECTION PER CPA

Objectives and reliability requirements

The objective is to estimate the share of days or cooking events where renewable biomass was used as fuel of the project improved cook stoves (ICS) with 95/5 confidence/precision (in the following the "*share of RB use*").

Target population

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

The data to be collected on each sampling unit (ICS) is the share of RB use.

Sampling method

Simple random sampling will be used. A number of ICS in each cohort will be sampled using

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

Sample size

The required sample size will be determined using simple random sampling in each cohort.
The equation for estimating the sample size in each cohort is:

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

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

n   sample size

N   Total number of ICS in use

Mean   Our expected standard deviation

1.96   Represents the 95% confidence required

0.05   Represents the 5% relative precision

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

Summary results for different expected shares of RB use are found in the following table for an assumed population total (N) of 12,849 based on ILF projections:

Our expected share	Standard deviation	Sample size	Adjusted sample size according to response rate of 80%
0.9	0.02	1	2
0.8	0.04	4	5
0.7	0.06	12	15
0.6	0.08	28	35
0.5	0.1	62	77
0.4	0.12	137	172
0.3	0.14	327	408
0.2	0.16	914	1,142
0.1	0.18	3,589	4,486

Sampling frame

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

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

Objectives and reliability requirements

The objective is to estimate the share of days or cooking events where renewable biomass was used as fuel of the project improved cook stoves (ICS) with 95/10 confidence/precision (in the following the "*share of RB use*").

Target population

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

The data to be collected on each sampling unit (ICS) is the share of RB use.

Sampling method

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

Sample size

The required sample size will be determined using multistage sampling.

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

$$C \geq \frac{\dfrac{SD_B^2}{clustermean^2} X \dfrac{M}{M-1} + \dfrac{1}{\bar{u}} X \dfrac{SD_W^2}{overallmean^2} X \dfrac{(\bar{N}-\bar{u})}{(\bar{N}-1)}}{\dfrac{0.1^2}{1.96^2} + \dfrac{1}{M-1}\dfrac{SD_B^2}{clustermean^2}}$$

Where:

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

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

Summary results for different possible numbers of CPAs are found in the following table for an assumed share of RB use from 0.4 to 0.6:

Number of ICS to be sampled from each CPA	Adjusted Number of ICS to be sampled from each CPA	Total sample size of CPAs
10	13	444
50	63	96
100	125	53
150	188	38
200	250	31
250	313	27
300	375	24
400	500	20
500	625	18

Sampling frame

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

DATA

Field measurements

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

Quality assurance/quality control

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

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

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

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

Check programs will also be prepared to automatically reject defective data and automatically notify the testers that the data is defective for immediate verification and rectification or call back.

Analysis

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

IMPLEMENTATION

Implementation Plan

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

Sampling design

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

B.5.3. Other elements of monitoring plan

The monitoring plan describes how to collect, assess and archive all relevant data to be monitored according to the methodology. Data from the monitoring procedures will be recorded in the electronic project database and summarized in the Monitoring Report. The data collection that will follow the " Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities (Version 02.0)"[48], will comply with the requirements for the verification stated in section C of PoA-DD (Part I) of transparency and double-counting avoidance, and will check the required parameters in the methodology AMS II.G (version 03) and AMS-I.E (version 06.0) in an unbiased and reliable way. A clear procedure will be enforced by the CME on each SO to identify cohorts of stove users switching to the use of renewable biomass to ensure that the total amount of renewable biomass delivered/sold under the project activity will be consistent with the number of households belonging to the AMS-I.E component.

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[48] EB 65 Report, Annex 2

The procedure will involve an early prior notification (in accordance with the PoA's Management Rules) to the CME by each SO of the current practice or plans to supply renewable biomass fuels to specific groups of households, whereby the CME can be satisfied about the integrity of the plans. The date of the switch will be conservatively set when all the cohort of stove users have made the switch, as confirmed by the SO, and accepted by the CME. All SOs will have a contractual obligation to notify the CME of any reversals in the use of renewable biomass fuels to ensure and indicate, which type of baseline (AMS-I.E or AMS-II.G) each participant household belongs to at anytime during the crediting period.

The monitoring plan consists of:
- Monitoring concept
- Monitoring requirements and procedures for replacement of traditional stoves
- Monitoring requirements and procedures for efficiency of ICS
- Requirement for annual consumption of renewable biomass
- Requirements for checking of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating or are replaced by an equivalent service appliance.
- Requirements for displacement or substitution, of non-renewable woody biomass at each location.
- Requirements for amount of thermal energy generated by the new renewable energy technology in the project in year
- Data collection
- Data archiving
- Training
- Quality Assurance/Quality Control Procedures
- Monitoring Report
- Monitoring responsibilities

Monitoring concept

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

In order to account for drop-off in use (U)[49], the ICS deployed by the SO will be monitored through a census[50] and/or a usage survey. A census and/or a representative sample will be selected to count for drop-off or disposal of ICS. Sampling size will be chosen to achieve a 90/10 or 95/10 precision when annual sampling is chosen, dependant on the use of either option one, two or four from the sampling plan[51]. Sampling size will be chosen to achieve a 95/5 precision when option 3, biennial sampling, is chosen from the sampling plan. In cases where survey results indicate that the precision level is not achieved the lower bound of the confidence interval may be chosen instead of repeating the survey effort. In order to avoid this situation, oversampling will be

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[49] Paragraph 16 of AMS II.G (version 03)
[50] See Annex 4
[51] See Annex 4

encouraged. In cases where a SO chooses the option of a census for monitoring purposes, monitoring may include a record of one or a combination of the following activities or events:

    (a) An annual maintenance/repair event

    (b) Customer inspections resulting from loan or hire purchase agreements

    (c) Double verified records of community-based stove monitoring staff

    (d) Independent monitoring verification exercises organised by the CME.

In general, a cohort is defined as the year that an ICS model is sold in or gone through maintenance in the same year.

Cohorts of ICS that are older than the expected normal lifetime of the ICS may or may not be included in the monitoring, and accordingly regarded in the calculation of emission reductions. A decision to cut off older cohorts will depend on the guarantee and maintenance policy adopted by the SO and will be decided by the CME.

Concerning the sampling of ICS for the efficiency[52] check[53], ICS will be grouped according to exclusive and exhaustive characteristics that significantly affect the ICS's lifetime, such as final user size (domestic/institutional) and type (fixed built-in/transportable) and cohort/age. The sample to be selected from each stratum will follow the required precision or the lower bound of the confidence interval and the necessary sampling requirements[54]. In cases where different SOs are distributing the same model of ICS manufactured by the same organisation, and it can be safely assumed a similar lifetime according to similar guarantee and maintenance policies, the CME may or may not decide to cluster the ICS of different SOs into the same cohort, safeguarding the transparency of being able to attribute each ICS according to its CPA.

Requirements for replacement of traditional stoves

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

Monitoring procedures

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

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

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

    2. If the household size is larger than can be reasonably assumed to be satisfied by the ICS in question (e.g. a small ICS for a household of 4 is used in a household of 8 together with a traditional stove) then it can be assumed that the ICS is being fully utilized and no adjustment should be applied.

    3. If the ICS ownership has been transferred (e.g. sales or gifts) and the ICS can be found to be still in use, no adjustment is needed.

    4. If none of the above cases is true, then adjustment for that household will be estimated on the basis of an interview to conservatively estimate the fraction of time in which the ICS is

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[52] See Annex 4
[53] Paragraph 15 of AMS II.G (version 03)
[54] EB 65 Report, Annex 2

in use. The total adjustment for that CPA will hence be based on the sampling and statistics described in the monitoring concept and its annexes.

Requirements for efficiency of ICS

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

Monitoring procedures

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

Requirement for annual consumption of renewable biomass

The precise procedure for monitoring of the quantity of renewable biomass used will be determined on CPA-level, as different methods of supply will be adopted in different CPAs. Examples of monitoring approaches dependent on supply methods are (a) Supply contracts, (b) receipts and delivery notes confirming supply of specified volumes to users, (c) retailer records of sales of renewable biomass to registered stove users (d) survey of users as further described in the sampling plan.

Checking of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating or are replaced by an equivalent service appliance:

A sampling survey of all users as contained in the database will be carried out to determine the fraction of operational project stoves (the parameter n_y as described in the sampling plan below).

Displacement or substitution, of non-renewable woody biomass at each location:

Monitoring shall confirm the displacement or substitution of NRB. The f_{NRB} as per equation 4 of AMS-I.E (version 06.0) shall be determined for each CPA and monitored ex-post for each monitoring period.

Data collection[55]

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

Data archiving

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[55] The project participant may decide not to claim emission reductions from the use of renewable biomass for a specific monitoring period. Accordingly, monitoring of the parameters only required for the AMS-I.E. component may be omitted for such a monitoring period

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

Training

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

Quality Assurance/Quality Control Procedures

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

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

Monitoring Report

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

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

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

Monitoring Responsibilities

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

Monitoring Organization Chart
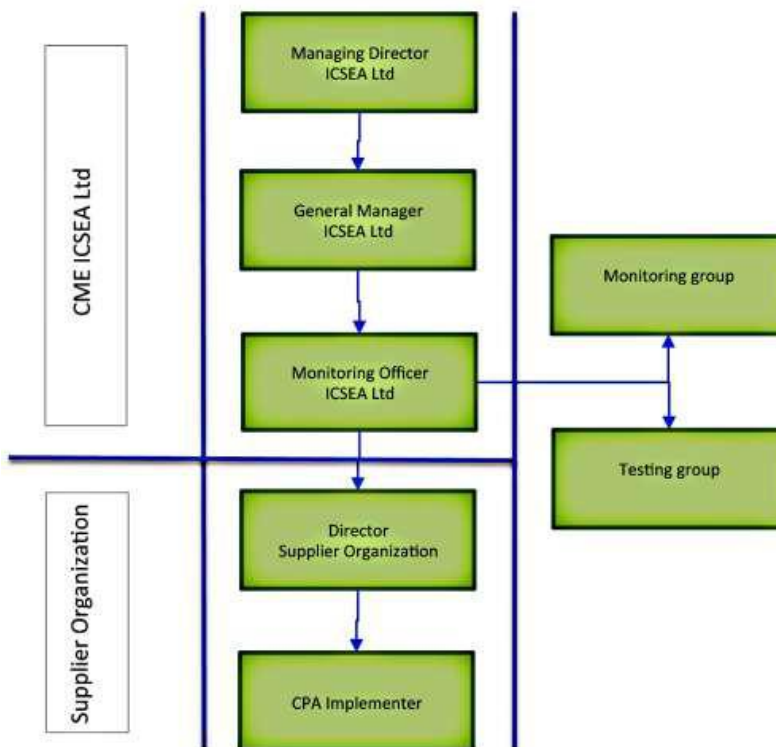
SECTION C.   Start date, crediting period type and duration

C.1.   Start date of CPA

The start date of this CDM Component Project Activity (CPA) is 10/02/2017, it is the date on which first stove under the CPA was sold to the end user.

The starting date of this CPA is after the commencement of validation of the Programme of Activities, i.e. 11/11/2010 the date on which the CDM-POA-DD was published for global stakeholder consultation.

C.2.   Expected operational lifetime of CPA

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

The start date of the crediting period of this CPA is 01/02/2018 or the date of inclusion of the CPA, whichever is later.

C.3.3. Duration of crediting period

21 years.

The first crediting period is 7 years. The number of renewal periods is 2. The duration of the crediting period is limited to the end date of the PoA regardless of when the CPA is added.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

Manufacturing Operation
This project has been exempted[56] from conducting an Environmental Impact Assessment (EIA) from the National Environment Management Authority (NEMA) of Uganda. Hence, no EIA has been conducted.

Supply Chain/Operations
The supply chain and operation-related environmental impacts are expected to be minimal.

Disposal
Once users have stopped using the stoves, the SO will evaluate if the stoves can be refurbished or if they need to be scrapped.

Environmental benefits:
- Human health: Children and mothers will be exposed to fewer air pollutants through reduced emission of not only CO_2, but also carbon monoxide and particulate matter. Air pollution from cooking with solid fuel is a key risk factor for childhood pneumonia as well as many other respiratory, cardiovascular and ocular diseases.
- Biodiversity: will be improved as the programme reduces pressure on remaining forest reserves in Uganda, increasing not only the amount of biomass stocks, but preserving the otherwise deforested woody ecosystems. This will have positive effects on both the fauna and flora biodiversity of the wood collection areas.

D.2. Environmental impact assessment

An environmental impact assessment is not required for ICS distribution activities.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation[57]

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[56] NEMA letter of exemption from conducting an EIA has been provided to the DOE during validation

[57] A copy of the LSC report containing the advert and invitation letter, photographs, and duly signed attendance register were submitted to the DOE

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

The local stakeholder consultation was held on Thursday 8 December 2016 at St. Monica Girls Tailoring Centre on Lagony Road in Gulu, Uganda. The participants' list was as follows:

Position of Participant in the Community	Male/ Female	Organisation (if relevant)
REPRESENTATIVE	MALE	GULU DISTRICT
REPRESENTATIVE	MALE	CORNER PA MOLA COMMUNITY
REPRESENTATIVE	MALE	ONGAKO COMMUNITY
REPRESENTATIVE	MALE	PABWO COMMUNITY
REPRESENTATIVE	MALE	PATULE COMMUNITY
REPRESENTATIVE	MALE	CUDA COMMUNITY
REPRESENTATIVE	MALE	ALERO COMMUNITY
REPRESENTATIVE	MALE	OWO COMMUNITY
REPRESENTATIVE	MALE	OCUKA COMMUNITY
REPRESENTATIVE	FEMALE	OCUKA COMMUNITY
REPRESENTATIVE	FEMALE	OCUKA COMMUNITY
REPRESENTATIVE	MALE	OCUKA COMMUNITY
REPRESENTATIVE	MALE	OCUKA COMMUNITY
REPRESENTATIVE	MALE	RWOT OBILO COMMUNITY
REPRESENTATIVE	MALE	GULU DISTRICT
REPRESENTATIVE	FEMALE	GULU DISTRICT
REPRESENTATIVE	FEMALE	KULUKENE COMMUNITY
REPRESENTATIVE	FEMALE	LAROO COMMUNITY
REPRESENTATIVE	FEMALE	BOBI COMMUNITY
REPRESENTATIVE	MALE	BOBI COMMUNITY
REPRESENTATIVE	FEMALE	LACOO COMMUNITY
REPRESENTATIVE	MALE	LII COMMUNITY
ACCOUNTANT	MALE	AID AFRICA
REPRESENTATIVE	FEMALE	AAWARANGA COMMUNITY
ASSISTANT MANAGER	FEMALE	AID AFRICA
PROJECT MANAGER	FEMALE	AID AFRICA
VOLUNTEER	MALE	AID AFRICA
REPRESENTATIVE	MALE	BOBI
REPRESENTATIVE	FEMALE	GULU DISTRICT
CHAIRPERSON, LOCAL COUNCIL III	MALE	LAKWANA SUB-COUNTY LOCAL GOVERNMENT
LOCAL COUNCIL V	MALE	LAROO DIVISION LOCAL GOVERNMENT
VICE CHAIRPERSON	FEMALE	BORDEGE DIVISION LOCAL GOVERNMENT
WATER OFFICER	MALE	GULU DISTRICT LOCAL GOVERNMENT
CHAIRPERSON, LOCAL COUNCIL III	MALE	UNYAMA SUB-COUNTY LOCAL GOVERNMENT
ENVIRONMENT OFFICER	FEMALE	GULU DISTRICT LOCAL GOVERNMENT
CHAIRPERSON, LOCAL COUNCIL III	MALE	BOBI SUB-COUNTY LOCAL GOVERNMENT
PROGRAM ASSOCIATE	MALE	GULU DISTRICT NGO FORUM
DIRECTOR	MALE	HIGHLAND HIGH SCHOOL

E.2.   Summary of comments received

A summary of comments received and Aid Africa's response was as follows:

Comments received	Aid Africa's responses
Which stove is better?	Aid Africa can distribute any stove portable/fixed, domestic/institutional, using non-renewable/renewable biomass fuel. The stove selection must: 1) suit the community's cooking needs (typically firewood stoves for rural communities and charcoal stoves for peri-urban communities); and 2) pass the thermal efficiency threshold of 20% and safety test in accordance with the ICSEA Rating Test Protocol.
Concern that this project appears to be exclusively for Aid Africa members.	Aid Africa will start distributing these stoves for carbon credit earnings as a benefit to its members and those interested in earning carbon credits on their stoves can register with Aid Africa. It is a lot easier to track and monitor stoves that are with members because Aid Africa has each member listed in its database.
Concern about the cost of the stove	Aid Africa will distribute the stoves for free.
Will members get a copy of the report of the meeting?	Copies of the Local Stakeholder Consultation Report, the Project Design Document and the Gold Standard Passport will be made available to all participants during the Stakeholder Feedback Round. All participants will be invited to make comments on the documents. Hard copies of the documents will also be available at the Aid Africa office in Gulu.

Details of comments received during the stakeholder consultation process are contained in the Local Stakeholder Consultation Report.

E.3.   Consideration of comments received

All comments received during the Local Stakeholder Consultation Report were reviewed and wherever possible were incorporated into the design of the CPA.

SECTION F.   Eligibility for inclusion

This CPA follows the stated goal of the PoA and eligibility criteria for inclusion in the PoA as determined in chapter B.2 of the PoA-DD (part I):

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.	Location	The CPA will be involved in the manufacturing, distribution and/or sales of ICS within the geographical	The following document shall be provided: • Contractual agreement between	The CPA will start its distribution with the Aid Africa 6-Brick Wood Stove. Various ICS models may be distributed within the

		region of the PoA	ICSEA Ltd and SO	geographical boundary of Uganda after passing the initial rating test using the ICSEA Rating Test Protocol. Uganda is one of the host countries that form the geographical region of the PoA. This is confirmed in the contractual agreement between ICSEA Ltd and SO.
2.	Double-counting	The CPA does not double-count any of its appliances for the ERs estimation	The following document shall be provided: • Contractual agreement between ICSEA Ltd and SO	The CPA does not double-count any of its appliances for the ERs estimation. This is confirmed in the contractual agreement between ICSEA Ltd and SO.
3.	Technology	The ICS disseminated are high efficiency biomass fired cook stoves with a specified efficiency of at least 20%	The following document shall be provided: • Initial rating based on one of the tests for efficiency as determined in AMS-II.G./Version 03 clause 6	This CPA will start its distribution with the Aid Africa 6-Brick Wood Stove, which has a thermal efficiency of 32.3% well over the required 20%. The Center for Research in Energy and Energy Conservation (CREEC) has certified the thermal efficiency of this ICS using the ICSEA Water Boiling Test protocol[58].
4.	Start Date	The start date of the CPA shall not be before the commencement of validation of the PoA i.e. the 11 November 2010 on which the PoA-DD was published for global stakeholder consultation.	The following document shall be provided: • Specific Sales Agreements	The start date of this CDM Component Project Activity (CPA) is 10/02/2017, it is the date on which first stove under the CPA was sold to the end user. The starting date of this CPA is after the commencement of validation of the Programme of Activities, i.e. 11/11/2010 the date

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[58] The efficiency of the project systems as certified by a laboratory accredited by the CME.

				on which the CDM-POA-DD was published for global stakeholder consultation. The same has been confirmed by the CME through a review of the specific stove sales agreement.
5.	Methodology	The CPA complies with the baselines and monitoring requirements of the applied methodologies i.e., AMS-II.G (version 3) or AMS-I.E (version 06.0)	The following document shall be provided: • Completed due diligence questionnaire	The CPA fulfils the applicability and monitoring requirements of both the applied methodologies i.e., AMS-II.G (version 3) and AMS-I.E (version 06.0). The same was confirmed by the CME through its review of the completed due diligence questionnaire.
6.	Additionality	Additionality for all CPAs is demonstrated according to "Standard for Demonstration of Additionality, Development of Eligibility Criteria and application of multiple methodologies for Programme of Activities", and "Guidelines for the demonstration of additionality of small scale project activities". CPAs having the following characteristics are thus automatically additional: 1. The improved cook stoves disseminated under each CPA would be isolated	• Manufacturers' specifications of ICS • Emission Reduction Calculation Sheet • Copy of Sales Agreements/ Logbooks	The CPA fulfils the additionality requirements as: 1. The CPA will be involved in the distribution of various ICS models that have all been certified and have passed the initial rating test according to the ICSEA Rating Test Protocol. These ICS are isolated units as confirmed by the accredited testing laboratories of the ICS. 2. The users of the ICS are households or institutions. The same was confirmed through copy of Sales Agreements/Logbooks. 3. Size of each ICS unit is not larger than 5% of the small-scale CDM thresholds –

	units 2. The users of the cook stoves would be households, or communities or SMEs 3. The size of the each unit will be no larger than 5% of the small-scale CDM thresholds – therefore, each ICS shall have an installed capacity of less than 2.25 MWth and energy saving of less than or equal to 9 GWhth per year.		therefore, each ICS has an installed capacity of 0.003657 MWth which is less than the CDM AMS-I.E threshold of 2.25 MWth and energy saving of 0.0100692 GWhth which is less than the CDM AMS-II.G threshold of 9 GWhth per year. The same is confirmed through a review of the Additionality sheet of the Aid Africa CPA CER calculation_ver 01_Aid Africa 6-Brick Wood Stove[59].
7.	Local Stakeholder Consultation & Environmental Clearance	The CPA organised a local stakeholder consultation and got environmental clearance of the project related activities	The following documents shall be provided: • Local Stakeholder Report including comments of stakeholders and how the comments were taken into account by the CPA implementer • Environmental clearance letter and/or EIA if requested by national regulations	The CPA involves the distribution of various ICS models that have passed the certification of the initial rating test according to the ICSEA initial rating test protocol. Projects that manufacture stoves may be required to submit a project brief in respect of the sourcing of clay as per the National Environmental Management Authority (NEMA) regulation.[60] Aid Africa has obtained a copy of the NEMA approval for the extraction of clay. A local stakeholder consultation was conducted for this CPA. The same was confirmed with CME through review of LSC

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[59] 'Additionality' sheet of the Aid Africa CPA CER calculation_ver 01_Aid Africa 6-Brick Wood Stove

[60] NEMA Environmental Impact Assessment Regulations, 1998 only require a project brief for projects listed in the Third Schedule of the National Environment Act, which only applies to SOs that manufacture ICS.

				report.
8.	Public Funding	No public Official Development Assistance funding has been used for the implementation or operation of the CPA, which requires the purchase of CERs from this CPA	The following document shall be provided: • Confirmation Letter of No Diversion of ODA from CPA implementer	The implementation and operation of the CPA does not involve any ODA funding. The same was confirmed by CME through review of confirmation Letter of No Diversion of ODA from the CPA implementer.
9.	Target Group	The target group and distribution mechanism is defined.	Any of the following documents shall be provided: • Sales forecast • Marketing plan • Description of technology (e.g. domestic or institutional stove)	The target group for the sale of ICS under this CPA is households or communities. The same was confirmed through a review of the Sales Agreements/ Logbooks. The stove distribution mechanism was confirmed through a review by the CME of marketing plan and sales forecast.
10.	Sampling Requirements	The SO agrees to support the sampling and survey activities of ICSEA Ltd.	The following document shall be provided: • Contractual agreement between ICSEA Ltd and SO	Fulfilment of this eligibility criterion was confirmed through review of Contractual agreement between ICSEA Ltd and SO.
11.	Small Scale Thresholds	The CPA shall meet the limits for sales or installations for a specific CPA as provided by ICSEA Ltd to ensure that the small scale threshold criteria of 45 MWth for AMS-I.E (Type I) and of 180 GWhth for AMS-II.G (Type II) are met.	The following document shall be provided: • Contractual agreement between ICSEA Ltd and SO • Sales forecast	The CPA will remain within the small-scale threshold criteria of 45 MWth for AMS-I.E (Type I) and of 180 GWhth for AMS-II.G (Type II). The same was verified through a review of ER sheet and sales forecast.
12.	De-bundling	The CPA is not a de-bundled component of another CPA or CDM project activity and follows the de-bundling criteria as described in section C of PoA-DD and section A.12 of	The following evidence shall be provided: • Relevant information as described in section A.8 of CPA-DD and section C of PoA-DD, following the relevant de-bundling guidelines	This eligibility criterion has been met by the CPA and the same was confirmed through review of relevant information as described in section A.8 of CPA-DD.

		CPA-DD.		
13.	Inclusion in PoA	The CPA is validated in order to be included in ICSEA.	The following document shall be provided: • Inclusion Report	CPA has met this eligibility criterion and the same was confirmed through a review of inclusion report.
14.	Voluntary Action	The proposed CPA is a voluntary action by the SO	Any of the following documents shall be provided: • Contractual agreement • Published statement, vision or mission of the SO	CPA fulfils this eligibility criterion and the same was confirmed through review of contractual agreement and published statement, vision or mission of SO.
Additional criteria only for a combination of AMS-II.G and AMS-I.E				
15.	Fraction of Non-Renewable Biomass	Fraction of Non-Renewable Biomass ($f_{NRB,y}$) shall be based on national values or datasets.	The following document shall be provided: • Letter from national forestry authorities and any publically available documents or literature for e.g. FAO reports.	$f_{NRB,y}$ (Fraction of Non-Renewable Biomass) calculation for this CPA is based on national values or datasets. The same was verified through the review of the Uganda National Forestry Authority letter.
16.	Methodology	All stoves under AMS-I.E shall use renewable biomass as defined in Annex 18, EB 23	The CME has developed a Standard Operating Procedure (SOP) to ensure that future CPAs under the PoA that use renewable biomass will adhere to the cited CDM definition of renewable biomass, and are capable of demonstrating to the CME and the DOE that the biomass used by the CPAs can be considered as renewable.	All the stoves under AMS-I.E in this CPA will use renewable biomass as defined in Annex 18, EB 23. The same was confirmed by the CME in its Standard Operating Procedure (SOP).
17.	Methodology	CPAs applying combination of AMS-I.E. and AMS-II.G shall comply with recommendations provided under F-CDM-SSCwg SSC_624	The following document shall be provided: • The PoA Management Rules have been amended to ensure all Supplier Organisations are aware of the recommendations.	This CPA applies combination of AMS-I.E. and AMS-II.G and complies with the requirements provided under SSC working group recommendations (F-CDM-SSCwg SSC_624).

| | | | • Contractual agreement between ICSEA Ltd and SOs confirming that clearly defined groups of stove users are using renewable biomass fuel, to ensure that conservative monitoring and ER calculation takes place. Any shifting of groups of households between the baselines shall require each CPA to furnish full details of how 100% compliance with the new methodology can be assured and that 90/10 or 95/5 monitoring precision can be assured.
• The revised monitoring plan will assure compliance with recommendations provided under F-CDM-SSCwg SSC_624.
• A signed statement by SOs that specific groups of ICS users will be using only renewable biomass as their regular source of fuel. | The same was confirmed through review of:

1. PoA Rules

2. Contractual agreement between ICSEA Ltd and SOs.

3. A signed statement by SOs confirming that specific groups of ICS users will be using only renewable biomass as their regular source of fuel. |
| 18. | Methodology | CPAs applying the combination of AMS-I.E. and AMS-II.G shall comply with the requirements stated in the guidelines for the consideration of interactive effects in EB68, Annex 3. | The ER Calculation will assure compliance with guidelines provided under paragraph 14 of EB68, Annex 3. | This CPA applies combination of AMS-I.E. and AMS-II.G and complies with the requirements stated in the guidelines for the consideration of interactive effects in EB68, Annex 3.

The same was confirmed through review of ER sheet. |

Appendix 1.   Contact information of CPA implementers

Organization name	Aid Africa
Country	Uganda
Address	Plot 85 Lower Churchill Drive, P.O. Box 574, Senior Quarters Gulu, Northern Uganda
Telephone	+256 775 591 704 / +256 755 084 135
Fax	
E-mail	peter@aidafrica.net
Website	www.aidafrica.net
Contact person	Peter Keller

Appendix 2.   Affirmation regarding public funding

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

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

This section is left blank intentionally.

Appendix 4.   Further background information on monitoring plan

Sampling plan to determine drop off check, efficiency check, and for the determination of historical annual average consumption of woody biomass per appliance has been provided in section B.5.2.

Appendix 5.   Summary report of comments received from local stakeholders

Summary of comments received from the local stakeholders has been provided in section E.2.. The List of Participants (Annex 1) and Evaluation Forms (Annex 2) have been provided as Annexes to the Local Stakeholder Report.

Appendix 6.   Summary of post-registration changes

According to the CDM project standard the CME shall provide a summary of the post registration changes, including the reasons for the changes and any additional information relating to the changes to the PoA-DD. The following post registration changes are included:

(a) **1st post registration change (submitted 2012):**

Expanding geographical coverage and including additional host Parties as follows:
    i.   South Africa
    ii. Lesotho

This PRC request was approved on 11/06/2013.

(b) 2nd post registration change (submitted 2015):

In accordance with §290 item e) (i) of Project Standard (Version 09.0), the PRC involves addition of AMS-I.E (version 06.0), which allow the use of renewable biomass as fuel in the ICS to replace the use of non-renewable biomass for thermal energy generation by the user. So, this change is in essence a change that allows a shift to a more efficient, less GHG-intensive measure. Furthermore, as a result of addition of AMS I.E (version 06.0) the following changes have been done in the PoA-DD:

i. Change in the project description in the PoA-DD to include description of measure involved in AMS I.E (version 06.0)
ii. Change in eligibility criteria of the PoA due to addition of AMS I.E (version 06.0) and in order to comply with the requirements of SSC WG clarification 624.
iii. Change in the monitoring plan including the monitoring parameters and data and parameter available at the time of validation due to addition of AMS I.E (version 06.0)
iv. Change in the methodological equations and assumptions for the calculation of emission reductions from the project.

At the same time the PoA-DD has been updated to comply with version 04.0 of the PoA-DD template (following transition from VVM to VVS).

This PRC request was approved on 27/06/2016.

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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