Component project activity design document form for
small-scale CDM component project activities

(Version 04.0)

Complete this form in accordance with the Attachment "Instructions for filling out the component project activity design document form for CDM small-scale component project activities" at the end of this form.

COMPONENT PROJECT DESIGN DOCUMENT (CPA-DD)
Title of the CPA: Project Gaia Cook Stove Programme of Activities - CPA0003 Ethiopia
Version number of the CPA-DD: Version 01
Completion date of the CPA-DD: 13/11/2015
Title of the PoA to which the CPA is included: Project Gaia Cook Stove Programme of Activities (PoA)
Host Party: Ethiopia
Estimated amount of annual average GHG emission reductions: 72,420 tCO_2e

SECTION A. General description of CPA

A.1. Title of the proposed or registered PoA

Project Gaia Cook stove Programme of Activities (PoA)

A.2. Title of the CPA

Title: Project Gaia Cook Stove Programme of Activities - CPA0003 Ethiopia
Version: 1.0
Date of Completion: 13/11/2015

A.3. Description of the CPA

The purpose of the CPA, under the **Project Gaia Cook stove Programme of Activities (PG PoA)** is to displace the use of non-renewable biomass and fossil fuel for cooking in refugee households through the dissemination of energy efficient cook stoves powered by ethanol, a renewable energy source. The CPA is of the small-scale type falling under sectoral scope: Energy industries renewable/non-renewable sources (1).

The CPA will be implemented in refugee camps located within the national boundary of Ethiopia as described in section A.7 of the CPA-DD. Cook stoves distributed under this CPA will not exceed a total installed/rated capacity of 45MWth while individual stoves will have a rated capacity not exceeding 150 kWth.

Project Gaia Inc will be the Coordinating/Managing Entity (CME) of the programme while the CPA implementer will be Gaia Association.

As the CPA implementer, Gaia Association will be responsible for the following:

- Ensure that the CPA is implemented.
- Operate and maintain the CPA for the duration of the project;
- Keep records of parameters as per the monitoring plan and provide hard and electronic records to the CME on a regular basis and provide the CME and DOE with required documents and access to stove users.
- Make available staff for validation and verification where applicable.

Upon implementation, the CPA will achieve total emission reductions of 506,942 tCO_2e during the first crediting period and an annual average of 72,420 tCO_2e.

Besides reducing the greenhouse gases (GHG), the project will result in the following sustainable development benefits in line with the PG PoA.

Environmental Benefits

1. The project will reduce deforestation and forest degradation in areas where non-renewable biomass is used as a source of fuel. This will contribute to the overall stability of forest ecosystems, which support biodiversity and maintain cultural and aesthetic value of forestlands.

Social-economic Benefits

1. The project will reduce indoor air pollution through reduced combustion of non-renewable biomass and fossil fuels in households. According to the WHO report on indoor air

pollutions (2007)[1], toxic smoke from the combustion of firewood and fossil fuels is responsible for a range of deadly chronic and acute health effects such as child pneumonia, lung cancer, chronic obstructive pulmonary disease, and heart disease, particularly for women and children who spend a large portion of their time near the fireplaces.

2. The project will reduce the amount of money spent to purchase fossil fuels and fuel wood
3. The project will also help to free time spent in search of wood fuel in places where non-renewable biomass is the fuel of choice. This will ensure that household members, particularly women have enough time to care for their children and attend to other responsibilities such as pursuing income-generating activities, education, leisure and rest. According to the Global Alliance for Cook Stoves[2] lack of access to cooking fuel forces women and children to spend many hours gathering firewood (up to 5 hours per day) or spend significant household income on fuel purchase.
4. The project will reduce the risks and danger faced by women and girls when collecting firewood for cooking. Women and girls are the primary collectors of firewood. The search for firewood exposes them to attack, rape and gender violence as they venture into unsafe territories.
5. The project will contribute to the national hydrocarbon balance by reducing the amount of kerosene imports for cooking purposes at the household level.

A.4. Entity/individual responsible for the operation of CPA

The entity responsible for the proposed CPA is Gaia Association an NGO based in Ethiopia and will also be the distribution organisation (DO) for the dissemination of the stoves in Ethiopia's refugee households.

Project Gaia Inc will be the Coordinating/Managing Entity.

A.5. Technical description of the CPA

Facilities, systems and equipment in operation in the baseline scenario

The WHO report on indoor air pollution indicates that Ethiopia's energy sector is highly dependent on biomass energy sources, such as fuel wood and charcoal, which account for more than 90% of total domestic energy demand[3]. This pattern is a major cause of land degradation, biodiversity loss and deforestation in the country. According to the Central Statistical Agency Ethiopia, biomass stock from forests (above-ground biomass) decreased from 484 million tonnes in 1990 to only 367 million tonnes in 2010[4]. The same report indicates that wood fuel removals have increased from 100,376,000m^3 in 2000 to 108,548,000m^3 in 2005.

According to the Ethiopian Central Statistical Authority, at the national level, about 85% of the households use fuel wood for cooking purposes and only 1.2% of the households use kerosene for cooking[5]. The vast majority of cooking among households is done in open fires (three stone) and traditional inefficient stoves. Figure 1 and Figure 2 below show typical cooking habits in Ethiopia.

[1] World Health Organization, Indoor Air Pollution: National burden of Disease Estimates., Geneva: WHO (2007)

[2] http://cleanCook stoves.org/impact-areas/women/; Accessed on 1 April 2015.

[3] Ethiopian Environmental Protection Agency (EPA). (2004), The third national report on the implementation of the UNCCD/NAP in Ethiopia

[4] FAO Global Forest Resource Assessment (2010) *Country Report- Ethiopia:* http://www.fao.org/docrep/013/al501E/al501e.pdf

[5] Central Statistical Agency (2011). *Ethiopian Monitoring Survey*-Summary report

Figure 1: Traditional cooking stove

Figure 2: Open fire cooking

In developing countries, kerosene use for cooking and lighting remains widespread despite the global reduced use arising from electrification.[6] Kerosene use has remained prevalent due to its classification as a cleaner alternative to solid fuels including biomass and coal for cooking. In Ethiopia, a household survey commissioned by Central Statistical Agency in 2011[7] reported a monthly consumption of 27 litres of kerosene per household[8] using the kerosene wick stove, which are common with low-income households. Figure 3 shows a typical diagram of the kerosene wick stove alongside a charcoal stove.

Figure 3: Kerosene wick stove alongside a charcoal stove

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

Facilities, systems and equipment in the project scenario

The CPA will introduce measures that will reduce the emission of carbon dioxide through the displacement of fossil fuel and the use of non-renewable biomass. The CPA will involve the distribution of energy efficient cook stoves powered by ethanol to refugee households for cooking

[6] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3664014/; Accessed on 28 May 2015

[7] Central Statistical Agency (2011). *Ethiopian Monitoring Survey*-Summary report

[8] Business Plan for Ethanol Cooking Fuel and Dometic CleanCook Stove Market Development in Ethiopia Household Energy Survey (2007)

purposes. The CME will work with the CPA implementers in the distribution of the stoves to the end-users.

The stoves to be distributed will have a higher efficiency compared to the baseline technology, which is composed of inefficient wood fuel cook stoves, and/or kerosene powered stoves.

The stoves will be of the following specifications

1. **Single Burner Stainless Steel Stove**
   - The stove is made out of stainless steel burner parts, body of stainless steel; galvanized steel and high quality enamel finish with one burner. The stove has an approximate lifetime of 10 years.
   - Has a power rated capacity of 1.5 kWth per burner
   - The stove burns using only ethanol
   - Can burn 1 litre of ethanol in 4.5 hours under high power and 9 hours under low power
   - Has only one burner for cooking
   - Efficiency of the stove is greater than 60%

2. **Double Burner Stainless Steel Stove**
   - The stove is made out of stainless steel burner parts, body of stainless steel, galvanized steel, and high quality enamel finish with double burner. The stove has an approximate lifetime of 10 years.
   - Has a power rated capacity of 1.5 kWth per burner making a total of 3.0 kWth its capacity
   - Can burn 1 litre of ethanol in 4.5 hours under high power and 9 hours under low power
   - Has only double burner for cooking
   - Efficiency of the stove is greater than 60%

3. **Single Burner Aluminium stove**
   - All stainless steel burner parts, body of aluminium, galvanized steel, aluminium single burner with a rated lifetime of 6 years
   - Has a power rated capacity of 1.5 kWth per burner
   - Can burn 1 litre of ethanol in 4.5 hours under high power and 9 hours under low power
   - Efficiency of the stove is greater than 60%

4. **Double Burner Aluminium Stove**
   - All stainless steel burner parts, body of aluminium, galvanized steel, aluminium double burner with a rated lifetime of 6 years
   - Has a power rated capacity of 1.5 kWth per burner making a total of 3.0 kWth its capacity
   - Can burn 1 litre of ethanol in 4.5 hours under high power and 9 hours under low power
   - Efficiency of the stove is greater than 60%

Figure 4 and Figure **5** below show typical stove types to be distributed under the CPA while Figure 6 shows the fuel canister.

Figure 4: Double Burner Stove

Figure 5: Single Burner Stove

Figure 6:Fuel canister

Transfer of technical know how

Transfer of technical know-how will be achieved by the distribution of state-of-the-art Dometic Cook stoves from Sweden. The CPA Implementing entities will provide trainings to the users at the time of purchase of the stoves by the users. The trainings will ensue that the users are well aware of the safe operation procedures of the stoves with minimal risks of accidents.

A.6. Party(ies)

Name of Party involved (host) indicates host Party	Private and/or public entity(ies) CPA implementer(s) (as applicable)	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
Ethiopia (host)	Gaia Association	No

A.7. Geographic reference or other means of identification

The CPA will be implemented in refugee camps located within the boundary of the host country (Ethiopia) as defined by the figure below and the coordinates.

Figure 7: Ethiopia

Point	Latitude	Longitude
Point 1	14.237364°	36.609131°
Point 2	12.467558°	42.392283°
Point 3	10.957506°	42.97985°
Point 4	8.013983°	48.028539°
Point 5	3.991681°	41.936503°
Point 6	4.665675°	36.014278°
Point 7	9.510436°	34.132022°

A.8. Duration of the CPA

A.8.1. Start date of the CPA

13/04/2015

A.8.2. Expected operational lifetime of the CPA

10 years (based on maximum operational lifetime of the stove)

A.9. Choice of the crediting period and related information

Renewable crediting period

A.9.1. Start date of the crediting period

01/01/2016

A.9.2. Length of the crediting period

First crediting period 7 years renewable twice for a total of 21 years.

A.10. Estimated amount of GHG emission reductions

Emission reductions during the crediting period	
Years	Annual GHG emission reductions (in tonnes of CO_2e) for each year
2016	38,942
2017	72,405
2018	87,132
2019	85,371
2020	82,487
2021	80,726
2022	59,879
Total number of crediting years	7
Annual average GHG emission reductions over the crediting period	506,942
Total estimated reductions (tonnes of CO_2e)	72,420

A.11. Public funding of the CPA

The CPA does not make use of any ODA and unless otherwise a statement will be provided showing non-diversion of ODA by the CPA.

A.12. Debundling of small-scale component project activities

In accordance with the methodological tool: Assessment of debundling for small-scale project activities version 04.0, project activities that consist of independent subsystems that are distributed in multiple locations and are not greater than 1% of the small-scale thresholds defined by SSC methodologies, are exempted from performing a de-bundling check i.e. considered as being not a de-bundled component of a large scale activity.

The CPA has already demonstrated in section D.5 that it involves the distribution of ethanol stoves to refugee households. Further to this the CPA through the manufacture's specification has demonstrated that the units are not more than 1% of the small-scale threshold and is therefore exempted from debundling check.

A.13. Confirmation for CPA

The CPA is neither registered as an individual CDM project activity nor is it part of another registered PoA. All Cook stoves distributed under this CPA will be uniquely identifiable by a serial number as further documented in CPA eligibility criteria in section D.5 of the CPA-DD.

A.14. Contact information of responsible persons/ entities for completing the CDM-SSC-CPA-DD-FORM

Entity: Carbon Africa Ltd
Name: Elijah Isabu
Date: 13/11/2015

SECTION B. Environmental analysis

B.1. Analysis of the environmental impacts

The project will not require an Environmental Impact Analysis (EIA) based on DIRECTIVE NO.2/ 2008 issued by the Environmental Council in accordance with Article 9(3) of the Environmental Protection Organs Establishment Proclamation No. 295/2002.

According to this directive the project is not among those that require an EIA.

SECTION C. Local stakeholder consultation

C.1. Solicitation of comments from local stakeholders

Based on the definition of "stakeholder" from Glossary of CDM terms version (08.0) the following groups of people were identified as stakeholders:

- Refugees
- Members from the wider project area and members of the general public.
- Academia
- Government departments and agencies (local, district and national)
- NGOs, community representatives and donor representatives

Refugees: Refugees are considered stakeholders because the ethanol powered cook stoves will also be distributed to refugee households and thus they will also form part of the end-users for CPAs.

General Public: The general public is a stakeholder because they will be interacting with refugees and share energy resources for cooking.

Academia: Higher learning institutions are considered stakeholders because of relevant data and information they might possess regarding the region that the developer may not be aware of.

Government representatives and Designated National Authority: Government representatives and the Designated National Authority are considered stakeholders because the implementation of the project is expected to impact on the achievement of a number government policies and sustainable development goals in relation to poverty reduction and energy provision.

NGOs, community representatives and donor representatives: NGOs, community representatives and donors are considered stakeholders because of their unique position as direct contact with the community members. One such NGO is Gaia Association, which will host the project.

Similar Technology Providers: These were considered to be important part of the stakeholders since they are considered to have much experience on what it takes for similar projects to flourish under the current environment. Also they are in a good position to know how possible and easy it is to tap in to possible synergies for the project.

How stakeholder comments were solicited

Comments from the various groups of stakeholders were solicited by the use of emails, newspaper adverts, and consultation meetings, as further described below:

Email invitations: A good number of the stakeholders identified had access to email services and therefore they were invited by the use of emails. The emails were sent approximately 4 weeks prior to the date of the consultation meeting in order to give the stakeholders sufficient time to plan for attending the meeting. Stakeholders who confirmed that they could not attend the meeting due to other commitments were asked to send representatives if possible. As a last measure, in the event that it was impossible for the stakeholders and any of their representatives to be present, their input was solicited via email.

Phone call invitations: Some stakeholders were invited by the use of phone calls. All responses were recorded in the stakeholder tracking spreadsheet.

Invitation Letters: Invitation letters were sent out to pre-identified concerned stakeholders such as Local Government Administration Bureau, Implementing Partners, UNHCR, ARRA, and Refugee Central Committee members.

Newspaper adverts: The general public was invited through advertisements in the local newspaper. The announcements were published on 24th May 2015 on the Ethiopian Reporter Newspaper

Websites advertisement: The general public was invited through online advertisements on two websites. The announcements were published on 25th May 2015 on Project Gaia website and Carbon Africa's website.

Posters: Refugees and other organisations working in refugee camps were invited through the use of posters that were placed in strategic locations and notice boards at the Shedder Refugee camp. Invitation announcements were posted four weeks before the scheduled meeting date at food and fuel distribution centers' notice boards in addition to the camp administration bureau. Both the refugees and UNHCR implementing partners' staff were capable of accessing the notification in these strategic locations.

C.2. Summary of comments received

The following is a summary of the comments received by stakeholders:

Project Implementation

1. The idea of using charcoal as an alternative in Addis Ababa has been considered as an affordable option. How does the affordability of ethanol compare with that of charcoal?
2. How is the community is guaranteed to get the stoves?
3. Who is going to carry out the monitoring of the project?
4. Is it possible to increase the amount of ethanol fuel that is distributed to beneficiary families?
5. Do you have a plan to provide more training to ensure safe use of the fuel?

Climate change and carbon credits

1. What was the baseline for the reduction of the Carbon Monoxide and Particulate Matter? Does it consider the type of the wood as the denser the wood the lesser the pollution and the condition of the wood since the more drier the wood the lesser the pollution?
2. How will the stoves be traced and account for the emission reductions in reference to a particular stove?

3. If a household has more than one cookstove will you count all of them in the calculation of emission reductions?
4. How will the end users benefit from the carbon credits achieved through the use of stoves?
5. Which methodologies are you going to account the amount of carbon dioxide displaced by the project? Will they be able to distinguish households that used kerosene and one that used firewood?
6. What is the price of carbon credit in CDM and Gold Standard?
7. Can someone claim credits both under the CDM and under GS?

C.3. Report on consideration of comments received

Project Implementation

1. The stoves will be supplied by Dometic who is the manufacturer and through Gaia Association the stoves will be distributed at different households in the refugee camps.
2. A third party will be contracted to carry out monitoring in the event that Gaia Association is not able to do the monitoring. Otherwise for verification purposes a registered verifier will be contracted to carry out the verification prior to issuance.
3. For refugee camps where ethanol is distributed free of charge, Gaia Association explained that the fuel distribution norm is established on the basis of a study conducted to determine the baseline fuel wood consumption of households and calculation of the energy demand to cook the amount food provided for each household. Based on the study conducted and discussions made with UNHCR and ARRA; the distribution norm was established. However, additional energy need assessment will be conducted to decide the need for fuel distribution norm revision.
4. Safety is always a priority to Gaia Association and it is a must for each household to be trained before receiving the new technology. In addition, Gaia Association has already put in place a continuous training and follow-up program to ensure safe use of the fuel.

Climate change and carbon credits

1. The analysis of the amount of carbon monoxide and particulate matter reduced by the project was carried out as required by the WHO standards and certified by Colorado University.
2. The stoves will have serial numbers that will be used to identify them with the end user of the stove and this will avoid any form of double counting that may occur
3. During monitoring only one stove will be accounted for per household and not more than one stove per household will be used for calculate the ex-post emission reductions
4. The project will apply a combination of two approved methodologies by the CDM that calculate the achieved emission reduction based on the baseline used i.e either kerosene or firewood
5. Currently the prices of carbon credits are very low with the CDM being as little as 0.5 USD per credit while Gold Standard can fetch 5 USD per credit.
6. A Project can be registered under both CDM and Gold Standard just like Project Gaia will be looking forward to achieve. However the credits will only be issued under one standard and not on both to avoid double counting.

SECTION D. Eligibility of CPA and estimation of emissions reductions

D.1. Reference of methodology(ies) and standardized baseline(s)

CPAs included under this CPA will apply a combination of approved small scale methodologies *AMS-I.E* '*Switch from non-renewable biomass for thermal application by the user' version 06.0* and approved baseline and monitoring methodology *AMS-I.I 'Biogas/biomass thermal applications for households/small users' version 04.0*

Tools applicable

Methodology AMS-I.E version 06.0 makes use of the latest version of the following tool:

a) *Tool for Project emissions from cultivation of biomass v01.0*

Methodology AMS-I.I version 04.0 does not make use of any tool

CPAs under this PoA will not utilize a standardized baseline.

D.2. Applicability of methodology(ies) and standardized baseline(s)

The CPA meets the applicability of approved methodologies *AMS-I.E 'Switch from non-renewable biomass for thermal application by the user' version 06.0* and *AMS-I.I 'Biogas/biomass thermal applications for households/small users' version 04.0* as justified in the Table 2 and Table 3 below.

The combination of these methodologies is applicable based on the *Standard demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities version 03.0 paragraph 30* which states that 'Combinations of technologies/measures and/or methodologies for a PoA are eligible where it is demonstrated that there are no cross effects between the technologies/measures applied.

A cross effect analysis has been carried out in line with the *CDM Guideline for the Consideration of Interactive Effects for the Application of Multiple CDM Methodologies for a Programme of Activities (Version 01.0 - EB 68, Annex 3)*. The analysis has proven that there are no cross-effects whatsoever in the combination of the two methodologies as outlined in paragraph 13 of the *Guideline for the Consideration of Interactive Effects for the Application of Multiple CDM Methodologies for a Programme of Activities (Version 01.0 - EB 68, Annex 3)*. The analysis is shown in Table 1 below:

Table 1: Cross Effects Analysis

Type of interactive effect	Justification of non-interactive effect by the CPA
a) Type I: interactive effects could occur when there is **an exchange of energy** (thermal, mechanical or electrical) or mass transfer between different measures of the CPA, the transfer occurring from a primary, independent measure to a dependent measure;	a) There is no exchange of energy between an ethanol cook stove that displaces kerosene stove and an ethanol cook stove that displaces a wood/charcoal stove.
b) Type II: interactive effects could also occur when several measures rely on the **same information** when estimating emission reductions. For example, several measures refer to historical fuel/electricity/heat consumption. They may also occur when combining methodologies relying solely on default factors for setting the baseline.	b) Emission reduction calculations are a function of consumption of baseline fuel and stove efficiency. The CPA relies on different information for the estimation of baseline fuel consumption and baseline stove efficiency. Information about project stove efficiency is the same but this is not relevant in terms of cross effects.

Applicability criteria for AMS-I.I *'Biogas/biomass thermal applications for households/small users' version 04.0.*

Table 2: Applicability of AMS-I.I version 04.0

Methodology Applicability	Justification
This category comprises activities for generation of renewable thermal energy using renewable biomass or biogas for use in residential, commercial, institutional applications (e.g. for supply to households, small farms or for use in built environment of institutions such as schools). 1 Examples of these technologies that displace or avoid fossil fuel use include but are not limited to biogas cook stoves, biomass briquette cook stoves, small scale baking and drying systems, water heating, or space heating systems.	The CPA will distribute stoves that generate renewable thermal energy using ethanol, which is a renewable biomass.
The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal	The estimated, cumulative rated thermal energy generation capacity installed under the CPA will not exceed 45 MW thermal
Each unit (e.g. cook stove, heater) shall have a rated capacity equal to or less than 150 kW thermal. Projects that include units with rated capacity greater than 150 kW thermal may explore AMS-I.C Thermal energy production with or without electricity	The stoves distributed under the CPA have a maximum rated capacity of 3.0kW, which is less than 150kW
For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: It is produced using solely renewable biomass (more than one type of biomass may be used). Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded; The General guidance on leakage in biomass project activities (attachment C to appendix B of 4/CMP.1 Annex II) shall be followed; The project participant can monitor the mass, moisture content and NCV of the resulting biomass fuel, through sampling that meets the confidence/precision level of 90/10; Where the project participant is not the producer of the renewable fuel, the project participant and the producer are bound by a contract that shall enable the project participant to monitor the source of renewable biomass to account for any emissions associated with biomass production (as per 4(b) above). Such a contract shall also ensure that there is no double counting of emission reductions.	Not applicable as the CPA does not use biomass residues processed as fuel. Instead, the CPA derives its fuel from molasses, which is a by-product of sugar processing (industrial waste).
The methodology is applicable to a programme of activities; no additional leakage estimations are necessary other than that indicated under leakage section above.	The CPA is part of the Project Gaia Cook Stove Programme of Activities. The CPA will comply with the necessary leakage estimations indicated above

Applicability criteria for AMS-I.E '*Switch from non-renewable biomass for thermal application by the user' version 06.0*

Table 3: Applicability of AMS-I.E version 06.0

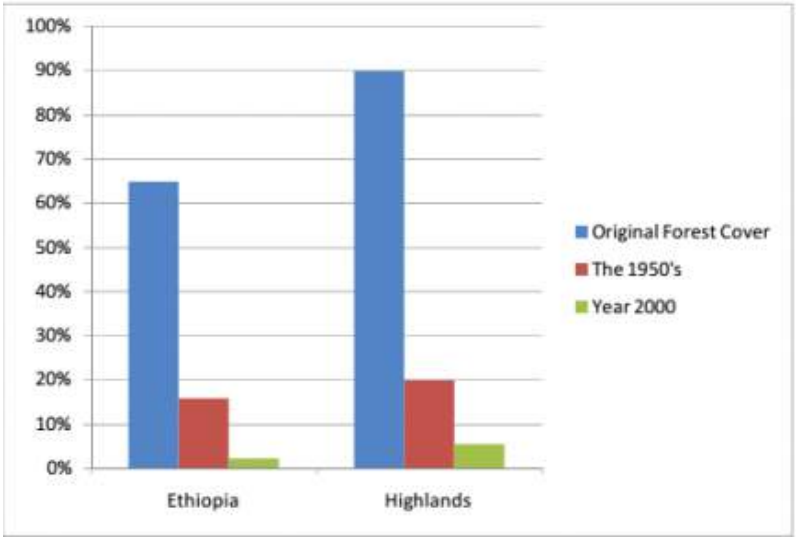
Applicability	Justification
This methodology comprises of activities to displace the use of non-renewable biomass by introducing renewable energy technologies. Examples of these technologies include, but are not limited to biogas stoves, solar cookers, passive solar homes, renewable energy based drinking water treatment technologies (e.g. sand filters followed by solar water disinfection; water boiling using renewable biomass).	The CPA, as part of the Project Gaia Cook Stove Programme of Activities, will distribute stoves that will displace the use of non-renewable wood fuel (firewood and charcoal) with stoves that use ethanol as fuel, which is a renewable biomass.
Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	The project participant has evidenced in Table 4 that non-renewable biomass has been in use since 31 December 1989.
The methodology is applicable for technologies displacing use of non-renewable biomass by renewable energy	The technologies implemented under this CPA will be energy efficient cook stoves that use ethanol which is a renewable biomass that will displace the use of wood fuel which is a non-renewable biomass used by the baseline stoves.
The use of this methodology in a project activity under a programme of activities (PoA) is legitimate if the following leakages are estimated and accounted for, if required, on a sample basis using a 90/30 precision for the selection of samples, and accounted for: (a) Use of non-renewable woody 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 woody biomass saved under the project activity that is then used as the baseline of other CDM project activities then By is adjusted to account for the quantified leakage; (b) Increase in the use of non-renewable woody biomass outside the project boundary to create non-renewable woody biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass outside the project boundary, then By is adjusted to account for the quantified leakage; (c) As an alternative to subparagraphs (a) and (b), *By* can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.	a) The CPA accounts for leakage that arises from non-renewable woody biomass saved under the CPA. b) Leakage arising from the increased use of non-renewable woody biomass is accounted for in the CPA. c) Applicable since the CPA applies the net to gross adjustment factor to account for leakages.
The following further conditions apply for the value of fraction of non-renewable (fNRB) applied in a component project activity (CPA) of a PoA. The choice between (a) conduct own studies to determine the local fNRB value and then apply those values in the CPAs; and (b)	The CPA applies (b) the use default national values approved by the Board.

use default national values approved by the Board; shall be made ex ante. A switch from national value i.e. choice (b) to sub-national values i.e. choice (a) is permitted, under the condition that the selected approach is consistently applied to all CPAs.	

Table 4: Demonstration of use of NRB

In Ethiopia non-renewable biomass has been in use before 1989. A study of the forest degradation rate in Ethiopia indicated that in the late 1950s, forests covered 16% of Ethiopia's land area. During 1973 to 1976, forests cover dropped to 6.08 %. During 1986–1990, (some 10 to 15 years later,) the forest cover had dropped further to around 4.75% of the country's land area. In 2000, the forest cover had reduced to only 2.36%[9].

Below is a graphical representation of the amount of lost forest cover with a comparison of the original forest cover, the cover in 1950s and the forest cover in 2000.



Ethiopia forest coverage comparison

As reported in the same study, the Ethiopian Forestry Action Programme estimated that 150,000-200,000 ha of forest is destroyed annually with an average annual deforestation rate of 0.8 percent, one of the highest in the world.

FAO estimates that at present more than 90% of the domestic supplies of industrial wood and firewood comes from the natural forests, which are the main sources of wood products. Fuel wood accounts for the bulk of the wood used, and is the predominantly preferred domestic fuel in both rural and urban areas. The projected demand for fuel wood and building poles based on assumed per capita requirement is on the increase and is expected to be over 100 million m^3 by 2020. On the other hand, the projected supply from all sources is expected to be only 9 million m^3, which is far below the demand.[10]

The above information provides a justification that there has been continuous use of that non-renewable biomass in Ethiopia.

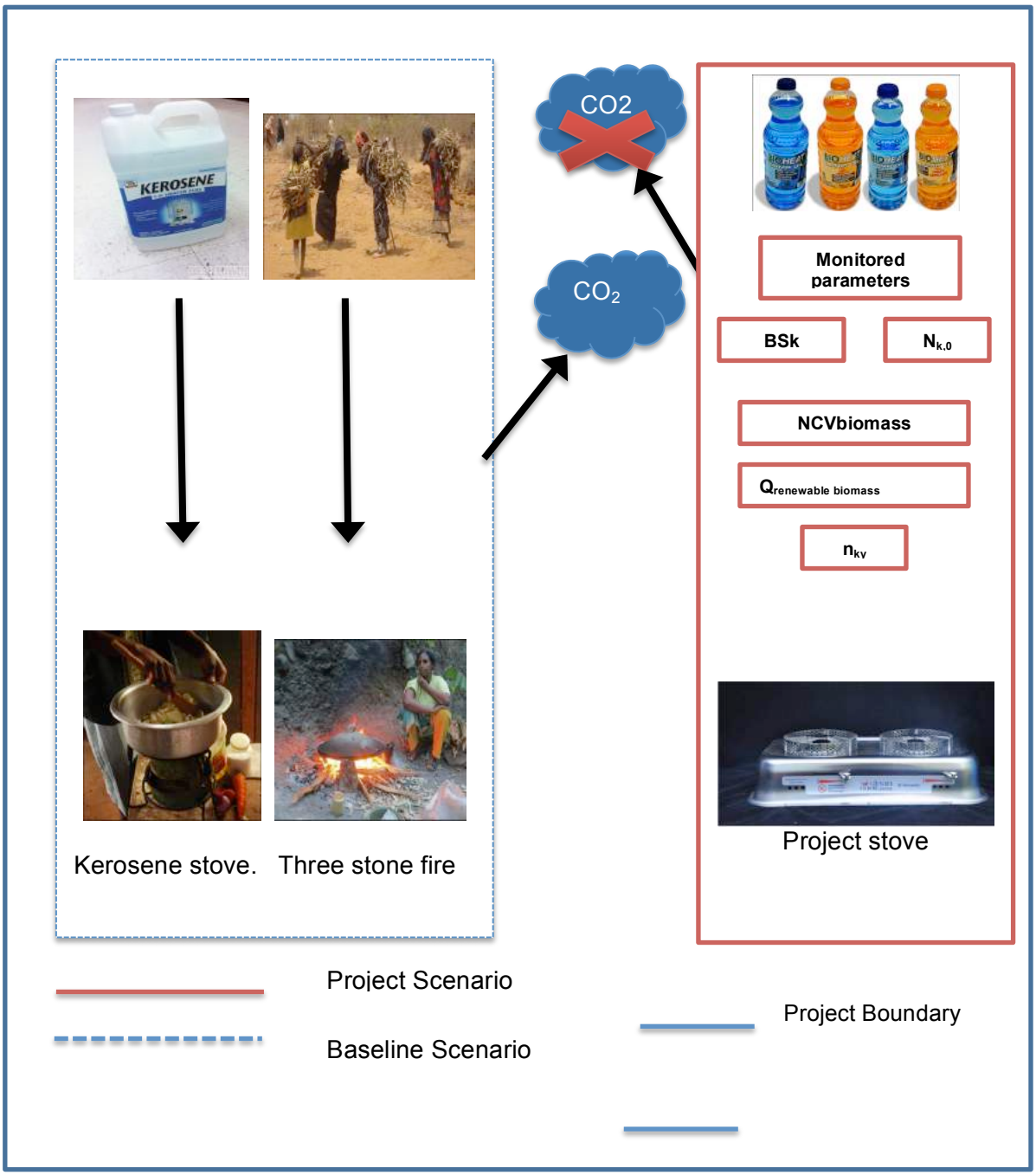
[9] Forest Degradation in Ethiopia: Extent and conservation Efforts http://www.palgojournals.org/PJA/Pdf/2015/May/Temesgen%20et%20al.pdf accessed on 30/09/2015

[10] http://www.fao.org/docrep/004/ab582e/AB582E04.htm accessed on 30/09/2015

D.3. Sources and GHGs

In accordance with the approved small-scale methodology AMS-I.I *'Biogas/biomass thermal applications for households/small users' version 04.0,* the project boundary is the physical, geographical sites of the equipment producing thermal energy during the crediting period. Likewise, according to AMS-I.E '*Switch from non-renewable biomass for thermal application by the user' version 06.0,* the project boundary is the physical, geographical site of the use of biomass or the renewable energy.

Cook stove units distributed under this CPA will be located in refugee camps households within the national boundaries of Ethiopia. The flow diagram below highlights the equipment, systems, emission sources and gases included in the boundary as well as the monitoring parameters in the CPA boundary.



The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the table below.

Source		Gas	Included	Justification
Baseline Emissions	**Combustion of non-renewable biomass for cooking**	CO_2	Yes	Main source of emission under AMS-I.E
		CH_4	No	Not considered as a source of emissions as per AMS-I.E
		N_2O	No	Not considered as a source of emissions as per AMS-I.E
	Combustion of fossil fuel for cooking	CO_2	Yes	Main source of emission under AMS-I.I
		CH_4	No	Minor source of emissions as per AMS-I.I
		N_2O	No	Not considered as a source of emissions as per AMS-I.I
Project Emissions	**Combustion of non-renewable biomass for cooking**	CO_2	No	Not relevant for the project as it does not involve cultivation of biomass
		CH_4	No	Not relevant under methodology AMS-I.E
		N_2O	No	Not relevant under methodology AMS-I.E
	Combustion of fossil fuel for cooking	CO_2	No	Not relevant under the option chosen in AMS-I.I
		CH_4	No	Not relevant under methodology AMS-I.I
		N_2O	No	Not relevant under methodology AMS-I.I

D.4. Description of the baseline scenario

In accordance with AMS-I.E version 6.0, it is assumed that in the absence of the project activity, the baseline scenario would be the use of non-renewable biomass for meeting similar thermal energy needs. Similarly, AMS-I.I version 4.0 states that the baseline is the fuel consumption of the thermal application used or that would have been used in the absence of the project activity times an emission factor for the fossil fuel displaced.

Therefore, in the baseline scenario of the CPA, CO_2 would have been produced from the combustion of non-renewable biomass and fossil fuels for cooking purposes.

According to world energy outlook, in developing countries and especially in rural areas, 2.5 billion people rely on biomass, such as firewood, charcoal, agricultural waste and animal dung, for their cooking needs. In these countries, this resources account for over 90% of the household energy consumption. In absence of better policies this demand is projected to increase from 2.6 billion

reliance in 2015 to 2.7 billion reliance in 2030. This will represent one third of the world population relying on biomass as their source of cooking energy.[11]

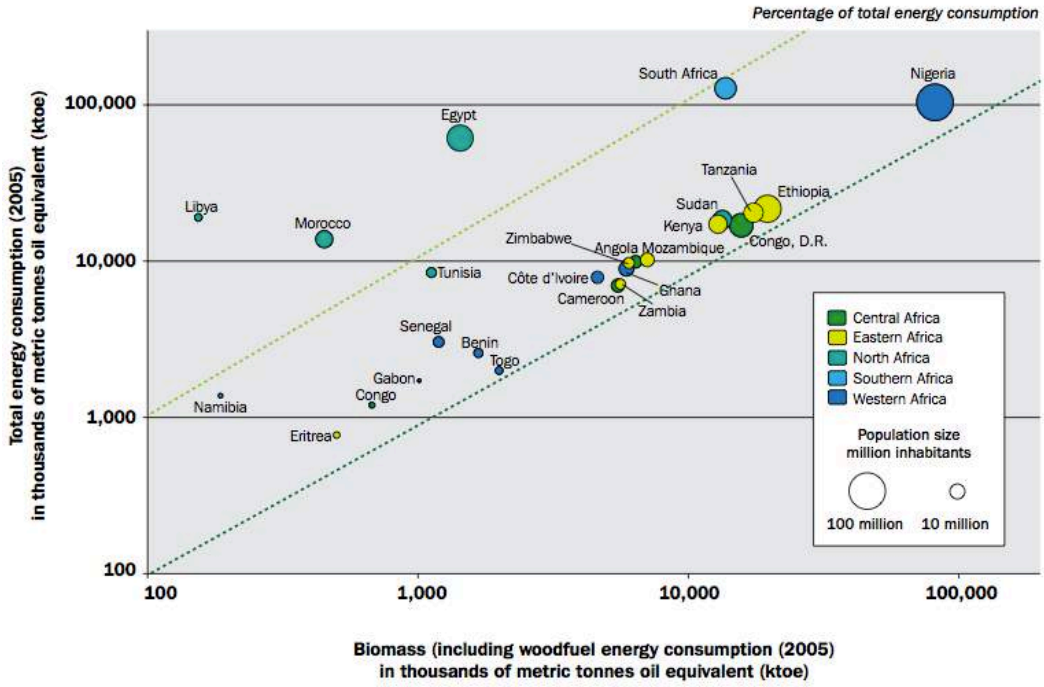
The use of biomass itself hasn't been indicated as being the main concern but rather its harvesting which has been cited as being done in an unsustainable manner. The use of inefficient technologies for energy conversion purpose has had adverse effects on the population in which its employed. These effects range from social, health, environmental and economical development effects.

About 1.3 million people in developing countries mostly women and children die prematurely every year because of exposure to indoor air pollution from biomass. Valuable time and effort is devoted to fuel collection instead of education or income generation.

Two complementary approaches have been singled out as a remedy to the situation; promoting more efficient and sustainable use of traditional biomass and encouraging people to switch to modern cooking fuels and technologies.

The quantity of household energy demand in developing countries in 2004 was about 1090 Mtoe with household biomass in developing countries accounting for almost 70% of the world primary energy demand, the use being primarily on household cooking followed by heating space and water heating. [12]

In Sub-Saharan Africa about 76% of the population depends on biomass for cooking.[13] Closer look at regions in Africa below show the high consumption of biomass by African countries[14]



As of 2015, UNHCR estimates the total population of refugees accommodated across Ethiopia camps at 659,529. The government of Ethiopia has allocated land for about 23 camps in the country together with police to provide security.[15]

[11] World Energy Outlook

[13] World Energy Outlook 2006

[14] Wood-Based Biomass Energy Development for Sub-Saharan Africa

[15] http://www.unhcr.org/pages/49e483986.html

According to a survey jointly commissioned by the Shell Foundation, UNHCR and Gaia Association[16], fuel wood is the predominant source of fuel in refugee camps. About 85% of households in refugee camps were reported to purchase and use fuel wood for cooking while the remaining 15% purchased and used kerosene.[17] The households are well adapted to the cooking systems associated with fuel wood and their stoves, pans, cooking pots and food preparation techniques are designed around the fuel. Meeting the energy daily household requirements is therefore an important consideration for refugees, driving them to sell part of their daily ration to buy fuel wood. In the event that the households can't afford to purchase fuel wood, they are forced to walk long distances in search of firewood exposing them to numerous dangers and conflicts with the local residents.

In a typical refugee household, women and children are the first victims because they do most of the firewood collection. Often they have to walk barefoot for about 5 to10 km or more in the scorching sun in search of firewood. It is becoming increasingly common to see women and children fall under the heavy loads of firewood due to fatigue resulting in self-inflicted injuries. In addition to these accidental injuries, they are exposed to harm from strangers and attacks by wild animals such as snakes. It has been observed that more and more children will be needed to help in gathering fuel, thereby taking them away from education or social development activities.[18] . This survey further reports an increasing number of new inhabitants in the refugee camps with some camps recording approximately 300 to 400 new individuals per month, stretching the camps beyond their designed capacities. Reasons behind the practice vary but the desire to join family members in the camps and escape from discrimination stand out. With the price of fuel wood and charcoal on the rise, it is therefore anticipated that the problem could be further escalated.

Data gathered from the fifty households surveyed in Shimelba camp showed that, prior to the introduction of the clean cook stove as part of assessing the projects viability, 40 of the homes with a total of 82 fuel wood gatherers collected an average of 16,090 kg/month. A total of 196 people live in these 40 households therefore, the amount of wood consumed as an average over the served population was 82 kg/month or 2.7 kg per person per day. The value falls within the ranges of previous household energy surveys conducted by the UNHCR that showed a daily average of about 2.1 kg per person, or a monthly average of about 63 kg/person.[19] Considering the surveyed population of 196 persons living in 40 homes and the total number of households surveyed, the average household size is estimated at 4.9 persons/household.

Refugees are not permitted to work in Ethiopia by law and therefore rely on donations from UNHCR together with other concerned stakeholders. Prior to the project implementation, UNHCR together with its implementing partners distributed kerosene to refugee camps where kerosene use is economical for cooking. The kerosene distribution is rationed depending on the size of the refugee households. However, according to the refugees interviewed at Aw Bare camp, 15 liters of kerosene lasted for 10 days serving a family of 8 while 25 liters lasted 12 to 15 days serving a family of 10. Assuming the average refugee household size of about 5 to 8 as determined above in Shimelba camp, the average monthly consumption of a typical household is estimated at 45 liters per month.[20]

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[17] An Ethanol-fueled Household Energy Initiative in the Shimelba Refugee Camp, Tigray, Ethiopia: A Joint Study by the UNHCR and the Gaia Association, Page 13

[18] An Ethanol-fueled Household Energy Initiative in the Shimelba Refugee Camp, Tigray, Ethiopia: A Joint Study by the UNHCR and the Gaia Association, Page 5

[19] An Ethanol-fueled Household Energy Initiative in the Shimelba Refugee Camp, Tigray, Ethiopia: A Joint Study by the UNHCR and the Gaia Association, Page 15

[20] http://www.genderconsult.org/uploads/publications/doc/SAFE_Ethiopia_Appraisal_Report_Final_Draft_2.pdf; Page 11 and page 14.

Similar to the normal households, kerosene consumption in refugee households serves the dual purpose of lighting and cooking. A World Food Programme commissioned study[21] reports that out of a refugee ration of 15 liters per month, most refugees reported that 5 liters was used for lighting while the remaining 10 liters used for cooking. The proportion of kerosene used for cooking is thus 2/3 of the total. Applying this proportion to estimate the monthly amount of kerosene consumption for cooking, it is established that approximately 30 liters of kerosene is used for cooking per refugee household this is calculated as 10 liters of kerosene used in 10 days for cooking thus in a month (30 days) 30 liters of kerosene is used for cooking. This value is within the range of average kerosene consumption for normal households in Ethiopia, estimated at 27 liters per month.

D.5. Demonstration of eligibility for a CPA

In accordance with paragraph 208 of the *CDM Project Standard version 09.0*, the CME is required to consider any specific guidance in applied methodologies regarding the preparation of separate generic CPA-DDs for each different technology/measure, taking into account differences in the means of demonstration of additionality, emission reduction calculations, and monitoring methods. Based on this guidance, the programme will have two CPA types based on the host country of implementation although additional CPA types might be added in future:

- CPA Type I: Project Gaia Cook Stove Programme Of Activities - CPA000 [Insert identification number] Ethiopia
- CPA Type II: Project Gaia Cook Stove Programme Of Activities - CPA000 [[Insert identification number] Djibouti

This CPA will fall under CPA Type I. The eligibility to be used for the inclusion of the CPA into the PoA has been developed in accordance to the *CDM project standard (version 09.0)* and *Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for Programme of Activities version 03.0 and following General Guidelines for SSC CDM methodologies version 21 while taking into consideration the applied methodologies* AMS-I.E version 06.0 and AMS-I.I version 04.0

[21] http://www.genderconsult.org/uploads/publications/doc/SAFE_Ethiopia_Appraisal_Report_Final_Draft_2.pdf; Page 14

CPA Type I: Project Gaia Cook Stove Programme Of Activities - CPA0003 (Ethiopia)

No	Requirement in PoA Standard[22]	Eligibility Criteria Description	Documentary Evidence used by CPA to demonstrate compliance (Tick where appropriate)
16 a.	**The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA**	All distributed stoves in each CPA are located in the geographic boundary of Ethiopia.	☒ GPS Coordinates ☒ Area map or Address
16 b	**Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)**	Double counting could occur in cases where an individual stove is included in more than one CPA under the same programme or included more than once in the same CPA. Furthermore, double counting can occur if the cook stove is included in a registered single CDM Project Activity or included in a registered PoA	For CPA0003, all the following are fulfilled: ☒ Contractual agreements between CME or CPA implementer and end-user on CER transferring. ☒ Agreement between CME and CPA implementer confirming that the CPA has not been registered as single CDM Project Activity or included in a registered CDM PoA. And, individual programme system/unit is identifiable by: ☒ Unique serial numbers that uniquely identify individual units to the programme. ☒ End user details (i.e. name, address)
16 c.	**The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications;**	The CPA involves the distribution of energy efficient cook stoves powered by a renewable source.	As evidenced by the technical description/manufacturer specifications of the units: ☒ The stoves distributed under this CPA are powered by (ethanol), a renewable source. ☒ Each unit (ethanol stove) shall have a rated capacity equal to or less than 150

[22] Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for Programme of Activities

			kW thermal. ☒ The total or cumulative installed/rated thermal energy generation capacity of the systems/units is equal to or less than 45 MW thermal. ☒ Confirmation by CPA implementer that each unit (ethanol stove) meets the industry standards of quality.
16 d.	**Conditions to check the start date of the CPA through documentary evidence;**	CPA Start date shall not be before the start date of the PoA [23] {i.e. 12 February 2015}	The start of the CPA is {13/04/2015}, the date when real action occurred: ☐ It is the date for which the first order for the first project unit was placed. ☒ It is the date for which the first project unit was distributed to the end user.
16 e.	**Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs**	The CPA has confirmed its compliance among other requirements, with the applicability of AMS-I.E version 6.0 and AMS-I.I version 4.0 in section D.2 of the CDM-SSC-CPA-DD-FORM. A cross effect analysis of the applicability of the methodological combination has been carried out in section D2 of specific CPA-DD	☒ Compliance with applicability of AMS-I.E met in section D2 of specific CPA-DD ☒Compliance with applicability of AMS-I.I met in section D2 of specific CPA-DD ☒ A cross effect analysis has been carried out in section D2 of specific CPA-DD
16 f.	**The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality as specified in Section A above;**	In line with paragraph 11 of the Methodological tool: *Demonstration of additionality of small-scale project activities Version 10.0,* documentation of barrier is not required for the positive list of technologies and project activity types that are defined as automatically additional for project sizes up to and including the small-scale CDM	As documented in section A.5 of the specific CPA-DD, the CPA is implemented in: ☒ Households ☐ Communities ☐ SMEs As evidenced by the technical specification of the cook stoves, and the cumulative number of units distributed under the CPA as explained on the threshold calculation in the

[23] Stat date of PoA is defined as the date when notification on Prior Consideration was sent to the UNFCCC Secretariat.

		thresholds (e.g. installed capacity up to 15 MW). Distribution of cook stoves to households/ communities/SMEs form part of the positive list in accordance with paragraph. 11(c) which states that: *"Project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale CDM thresholds"*	emission reduction spread sheet, the cookstove units: ☒ Have a cumulative capacity not exceeding 45 MWth ☒ Have a capacity of less than 5% of the small-scale thresh hold.
16 g.	**The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;**	The PoA shall undergo Local Stakeholder Consultations and Environmental Impact Assessment where required:	As evidenced by the CDM PoA-DD, CDM CPA-DD and the LSC report, a Local stakeholder consultation is undertaken at: ☐ PoA level ☒ CPA level The Host Country requires the EIA? ☐ Yes ☒ No If Yes, has the CPA carried out an EIA? ☐ Yes ☐ No
16 h.	**Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance;**	If the CPA has not received any public funding from an Annex I country, it shall confirm so by providing a written confirmation letter. If a CPA has received any public funding from an Annex I country, it shall seek a confirmation letter from the Annex I country or any related agencies that the funding will not lead to a diversion of Official Development Assistance.	The CPA shall prove compliance through one of the two conditions: Through a signed confirmation letter, the CPA has proven that it has not received any public funding from an Annex I country. ☐ Yes ☐ No The CPA has received public funding from an Annex I country. Through a letter from the Annex I

			country or any related agencies, the CPA has confirmed that the funding will not result in diversion of Official Development Assistance. ☒ Yes ☐ No
16 i.	**Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation);**	In section A.7 of the CPA-DD, the CPA has already demonstrated that the CPA is implemented within the geographical boundaries of Ethiopia. The CPA will further demonstrate the target group in section A.5. of the CPA-DD.	As documented in section A.5 of the CPA-DD, the CPA is implemented in: ☒ Households ☐ Communities ☐ SMEs
16 j	**Where applicable, the conditions related to sampling requirements for the PoA in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities";**	Sampling will be carried out in line with the *"Standard for sampling and surveys for CDM project activities and programme of activities version 04.1* and latest *Guidelines for sampling and surveys for CDM project activities and programmes of activities*	As evidenced in section D.7.2 of the CPA-DD, the CPA has established sampling procedures that are in line with the CDM requirements ☒ Yes ☐ No
16 k.	**Where applicable, the conditions that ensure that every CPA in aggregate meets the small-scale or microscale threshold criteria and remains within those thresholds throughout the crediting period of the CPA;**	The cumulative number of units distributed under each CPA will not exceed 45 MWth.	As evidenced by the technical specification of each cookstove and the maximum number of cook stoves that can be distributed in the CPA as provided in emission reduction spread sheet, the cook stove units will: ☒ Have a cumulative capacity not exceeding 45 MWth
16 l.	**Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories.**	In accordance with the methodological tool: *Assessment of debundling for small-scale project activities version 04.0*, project activities that consist of independent subsystems that are distributed in multiple locations and are not greater than 1% of the small-scale thresholds defined by SSC methodologies, these project activities are exempted from performing a de-bundling check i.e. considered as being not a	As evidenced by the technical description/manufacturer specification of the cook stoves, each independent units (cookstove): ☒ Has a rated capacity not exceeding 450 kWth

		de-bundled component of a large scale activity. The CPA has already demonstrated in eligibility criteria 16i that it comprises of distribution of energy efficient cook stoves powered by a renewable source to multiple locations (households/communities/ SMEs). The CPA will therefore have to meet the following additional eligibility criteria in order to be exempted from performing a de-bundling check.	

D.6. Estimation of emission reductions

D.6.1. Explanation of methodological choices

The CPA will utilize a combination of two methodologies to estimate the emission reductions achieved by ethanol stoves distributed under the CPA.

a) AMS-I.E '*Switch from non-renewable biomass for thermal application by the user' version 06.0* and approved baseline and monitoring methodology
b) AMS-I.I *'Biogas/biomass thermal applications for households/small users' version 04.0*

The combination of these methodologies is applicable based on the *Standard demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities* version 03.0 paragraph 30 which states that 'Combinations of technologies/measures and/or methodologies for a PoA are eligible where it is demonstrated that there are no cross effects between the technologies/measures applied.

A cross effect analysis has been carried out and it has been proven that there are no cross-effects as indicated in section D.2 of the CPA-DD.

Further to the cross effect analysis, the combination of the two methodologies is permissible based on paragraph 31.C of the *Standard demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities* version 03.0, based on the following argument:

- A principle technology/measure is applied consistently in each CPA using multiple combinations of methodologies. For example, wastewater treatment projects with different ways of utilizing recovered methane (AMS-I.C for heat, AMS-I.D and AMS-I.F for electricity, or both), biomass/biogas projects with different fuel displacement (AMS-I.C and AMS -I.I for fossil fuel, AMS-I.E for non - renewable biomass, or both). The CPAs included under this PoA will apply only one technology/measure that is distribution of efficient cook stoves that utilize renewable biomass to replace either the non-renewable biomass powered cook stoves (firewood and charcoal) or fossil fuel powered cook stoves.

Calculation of emission reductions from the displacement of non-renewable biomass and displacement of fossil fuel

The CPA will utilize the two methodologies to calculate the amount of emission reductions achieved by the project. The methodological application will take into account the baseline fuel being displaced by the project appliance as either non-renewable biomass or fossil fuel.

Calculation of emission reduction from the displacement of non-renewable biomass applying methodology AMS-I.E version 06.0

The methodology assumes that in the absence of the project activity the baseline would be the use of non-renewable biomass for meeting similar thermal needs.

The following steps will be used to calculate emission reduction as per the methodology:

Baseline emissions

Equation 1 of the methodology will be used to estimate the emissions reductions

$$ER_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\_fuel} - PE_{BC,y} \quad \text{Equation (1)}$$

Where:

ER_y	=	Emission reductions during the year y in tCO2e
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
$NCV_{biomass}$	=	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 CO2/TJ
$PE_{BC,y}$	=	Project emissions due to cultivation of biomass

Determination of By

In accordance with paragraph 12 of AMS-I.E version 06.0, the CPA will determine B_y using option (a) which is explained below:

(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;

B_y will be determined using the following equation:

$$By = Q_{biomass} * N_{k,0} * n_{k,y} * P_{non-renewable}$$

Where:

B_y	Quantity of woody biomass that is substituted or displaced per appliance/household in tonnes per year
$Q_{biomass}$	Average annual consumption of woody biomass per appliance/household.
$N_{k,0}$	Number of cook stoves distributed by the CPA in year 1
$P_{non-renewable}$	Proportion of distributed cook stoves that are displacing non-renewable biomass
$n_{k,y}$	Proportion of distributed cook stoves that remain operational in year 1 of operation

Determination of $f_{NRB,y}$

The CPA will apply option (a) of the methodology AMS-I.E to determine the fraction of non-renewable biomass $f_{NRB,y}$

Project emissions

No project emission will be accounted for, since the project does not involve cultivation of biomass.

Leakage

Leakage related to the non-renewable woody biomass saved by the project activity shall be assessed based on ex post surveys of users and the areas from which this woody biomass is sourced (using 90/30 precision for a selection of samples). The following potential source of leakage shall be considered:

(a) The use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non- renewable woody biomass used by the non-project households/users that is attributable to the project activity then B_y is adjusted to account for the quantified leakage. Alternatively, B_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

The CPA will apply the gross adjustment factor as mentioned above, to account for leakage. Therefore, ex post surveys will not be required.

In accordance with paragraph 20 of the methodology, the general guidance on leakage in biomass project activities shall be followed to quantify leakages pertaining to the use of biomass residues. This document has since been reclassified as the methodological tool: Leakage in biomass small-scale project activities version 04 (EB 83 Annex 15). In line with paragraph 23 of the methodological tool, the CPA will evaluate ex ante if there is a surplus of the biomass in the region of the project activity, which is not utilised. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

In Ethiopia, most ethanol is derived from molasses, a by-product of sugar processing[24]. According to the definition of renewable biomass from EB 23 Annex 18, ethanol derived from molasses can best fit under “non-fossil fraction of an industrial or municipal waste” and not “biomass residue". This would in turn classify molasses as industrial waste and not biomass residue. Therefore, no leakage arising from the competing use of biomass will be accounted for.

Thus:

Net Emission Reductions = Emission Reductions per cook stove* Number of appliances– Leakage from biomass residues-$PE_{BC,y}$

Calculation of emission reduction from the displacement of non-renewable biomass applying methodology AMS-I.I version 04.0

[24] Asheden Awards Case Study pg 5

Baseline emissions

The methodology describes the baseline as; in the absence of the project the alternative would be the use of fossil fuel for provision of thermal needs to the end-user.

Emissions reductions are calculated following the steps below:

Emission reductions are determined using option (2) of the methodology, based on the thermal energy generated and applying equation 4 as follows:

$$ER_y = \sum_k N_{k,0} * n_{k,y} * BS_{k,y} * EF * \eta_{PJ/BL} * NCV_{biomass} - LE_y$$

Where:

$N_{k,0}$	Number of thermal applications k commissioned
$\eta_{k,y}$	Proportion of Nk,0 that remain operating at year y (fraction)
$BS_{k,y}$	The net quantity of renewable biomass or biogas consumed by the thermal application k in year y (mass or volume units, dry basis)
EF	CO_2 emission factor (tCO_2/GJ)

$$EF = \sum_j x_j * EF_{FF,j}$$

Where:
x j is a fraction representing fuel type j used by the baseline thermal applications displaced by biomass/biogas

$\eta_{PJ/BL}$	Ratio of efficiencies of project equipment and baseline equipment (e.g. cook stove using coal) measured once prior to validation applying the same test procedure (e.g. lab test), as per a national or an international standard. Official data or scientific literature can be used for cross-check purposes
$NCV_{biomass}$	Net calorific value of the biomass (GJ/unit mass or volume, dry basis).

Project emissions

No project emissions are accounted under the selected option for calculating emission reductions.

Leakage emissions

The project equipment will not be transferred out of the project boundary and so no leakage emissions are to be accounted based on paragraph 15 of the methodology, which states that 'If the energy generating equipment introduced by the project activity is transferred from outside the boundary to the project activity, leakage is to be considered.'

In accordance with paragraph 4(b) of the methodology, the general guidance on leakage in biomass project activities shall be followed to quantify leakages pertaining to the use of biomass residues. This document has since been reclassified as the methodological tool: Leakage in biomass small-scale project activities version 04 (EB 83 Annex 15). In line with paragraph 23 of the methodological tool, the CPA will evaluate ex ante if there is a surplus of the biomass in the region of the project activity, which is not utilized. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

In Ethiopia, ethanol is derived from molasses, a by-product of sugar processing[25]. According to the definition of renewable biomass from EB 23 Annex 18, ethanol derived from molasses can best fit

[25] Ashden Awards Case Study pg 5

under “non-fossil fraction of an industrial or municipal waste” and not “biomass residue". This would in turn classify molasses as industrial waste and not biomass residue. Therefore, no leakage arising from the competing use of biomass will be accounted for.

D.6.2. Data and parameters fixed ex-ante

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/tonne
Description:	Net calorific value of the non-renewable biomass that is substituted
Source of data:	IPCC Default
Value(s) applied:	0.015
Choice of data or Measurement methods and procedures:	The selection of the data is based on the recommendation by the methodology on paragraph 11 that allows the application of IPCC defaults
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable to AMS-I.E

Data / Parameter:	f_{NRB}
Data unit:	%
Description:	Fraction of non-renewable biomass
Source of data:	Country specific (Ethiopia) fraction of non-renewable woody biomass (fNRB) CDM website and approved by the country’s DNA
Value(s) applied:	88%
Choice of data or Measurement methods and procedures:	As recommended by the methodology the project can establish fNRB using survey methods or government data or approved default country specific fraction of non-renewable woody biomass (fNRB) values available on the CDM website.
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable to AMS-I.E

Data / Parameter:	$Q_{biomass}$
Data unit:	Tonnes/yr
Description:	Average annual consumption of woody biomass per appliance
Source of data:	Calculated based on data from A Joint Study by the UNHCR and the Gaia Association (2006), Page 5
Value(s) applied:	4.83

Choice of data or Measurement methods and procedures:	According to a survey jointly commissioned by the Shell Foundation, UNHCR and Gaia Association, data gathered from the fifty households surveyed in Shimelba camp showed that, prior to the introduction of the clean cook stove as part of assessing the projects viability, 40 of the homes with a total of 82 fuel wood gatherers collected an average of 16,090 kg/month. A total of 196 people live in these 40 households therefore, the amount of wood consumed as an average over the served population was 82 kg/month or 2.7 kg per person per day. Assuming the total population of refugees to be 659,529 according to UNHCR, and an average household size of 4.9 persons/household, this results in 4.83 tonnes of fuel wood per household per year. Further information on the calculation is provided in the emission reductions spreadsheet.
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable to AMS-I.E

Data / Parameter:	$\mathbf{x}_j$
Data unit:	Fraction
Description:	A fraction representing fuel type *j* used by the baseline thermal applications displaced by biomass/biogas
Source of data:	Business Plan for Ethanol Cooking Fuel and Dometic CleanCook Stove Market Development in Ethiopia Household Energy Survey (2007)
Value(s) applied:	1
Choice of data or Measurement methods and procedures:	In accordance with the baseline description, kerosene is the only fossil fuel type that will be replaced by the project cook stoves. The stoves solely use ethanol as fuel and thus will replace the kerosene entirely
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable to AMS-I.I

Data / Parameter:	$EF_{FF,J}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fuel type *j* used by the baseline thermal applications displaced by biomass
Source of data:	IPCC default value
Value(s) applied:	0.0741
Choice of data or Measurement methods and procedures:	As conservative approach the IPCC emission factor default value for kerosene has been selected for calculation of ex-ante emission reductions. Kerosene is considered as the only fuel that will be replaced through the use of the project.
Purpose of data	Calculation of baseline emissions
Additional comment:	IPCC default emission factor for kerosene. The parameter is applicable to AMS-I.I

Data / Parameter:	η_{PJ}
Data unit:	Dimensionless
Description:	Efficiency of the project stove
Source of data:	Manufactures specification
Value(s) applied:	60%

Choice of data or Measurement methods and procedures:	The efficiency of the project stove has been based on manufacturer specifications since these are the expected performance level as designed by the equipment manufacturer.
Purpose of data	Calculation of baseline emission
Additional comment:	Applicable to AMS-I.I

Data / Parameter:	η_{BL}
Data unit:	Dimensionless
Description:	Efficiency of baseline stove
Source of data:	Holistic Feasibility Study of a National Scale-up Programme for Ethanol Cook stoves and Ethanol Micro Distilleries (EMDs) in Ethiopia
Value(s) applied:	42%
Choice of data or Measurement methods and procedures:	The data has been sourced from credible literature
Purpose of data	Calculation of baseline emissions and emission reductions
Additional comment:	Applicable to AMS-I.I

D.6.3. Ex-ante calculation of emission reductions

The ex-ante emission reductions estimates will be based on the combined application of methodologies AMS-I.E '*Switch from non-renewable biomass for thermal application by the user' version 06.0* and AMS-I.I *'Biogas/biomass thermal applications for households/small users' version 04.0*

The emissions reduction will be calculated separately following the methodology and aggregated for the CPA-DD as follows:

Emission Reductions from the use of non-renewable biomass – Application of AMS-I.E

Emission reductions from the use of non-renewable biomass is estimated using AMS-I.E version 06.

Emissions Reductions

Equation 1 of the methodology will be used to estimate the emissions reductions

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

Where

Parameter	Description	Value	Unit	Source
ER_y	Emission reduction per device during the year y	4.94	t CO_2 eq	Calculated
By	Quantity of woody biomass that is substituted or displaced per appliance/ household in tonnes	4.83	t/hh/yr	Calculated
$f_{NRB,y}$	Fraction of non-renewable 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	88%	fraction	CDM Website

	the CDM website			
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted	0.015	TJ/tonne	IPCC default
$EF_{projected\_fossil\_fuel,y}$	Emission factor for the substitution of non-renewable woody biomass by similar.	81.6	t CO_2/TJ	Methodology default
$PE_{BC,y}$	Project emission due to cultivation of biomass	0	t CO_2 e	N/A
Leakage	Net Gross Factor accounting for leakage	0.95	-	Methodology default

Determination of B_y

$$By = Q_{biomass} * N_{k,0} * n_{k,y} * P_{non-renewable}$$

Where

Parameter	Description	Value	SI Unit	Source
B_y	Quantity of woody biomass that is substituted or displaced per appliance/household in tonnes per year.	4.83	t/hh/yr	Calculated (see emission reduction spread sheet)
$Q_{biomass}$	Average annual consumption of woody biomass per appliance	4.83	Tonne/year	Calculated based on Literature data as shown in the emission reduction spread sheet
$N_{k,0}$	Number of cook stoves distributed by the CPA in year 1 (2015)	5,100	Number	Project developer
$P_{non-renewable}$	Proportion of distributed cook stoves that are displacing non-renewable biomass	85%	Percentage	Calculated (see emission reduction spread sheet)
n_{ky}	Proportion of distributed cook stoves that remain operational in year 1 of operation	100%	Percentage	Assumed based on the manufactures specification on the cook stove lifetime

Therefore, the total emission reductions per appliance in year 1 of operation under the CPA is calculated as:

Total Emission Reductions per appliance =4.83*0.95*88%*0.015*81.6-0 = **4.94** t CO_2e

Project emissions ($PE_{BC,y}$)

No project emissions will be accounted for, as the project does not involve the cultivation of biomass

Thus:

$PE_{BC,y}$=0

Leakage

Leakage shall be accounted for by multiplying B_y with a net gross factor of 0.95 for the use/diversion of non-renewable woody biomass saved under the project activity by non-project household/users that previously used renewable energy sources.

The methodological tool: *Leakage in biomass small-scale project activities version 04 (EB 83 Annex 15* used to quantify leakages pertaining to the use of biomass residues will not be applied as has been justified in section D.6.1above.

The calculation is as shown in the equation below:

Net Emission Reductions = Emission Reductions per cook stove* Number of appliances– Leakage from biomass residues- 0

Assuming that the number of cook stoves commissioned in year 1 of operation (2015) amounts to a total of 5,100 stoves, net emission reductions for all the appliance is calculated as:

Net Emission Reductions = Emission Reductions per appliance * Number of appliance* Proportion of distributed appliances displacing non-renewable biomass = 4.94 * 5100*85%
= 21,414 t CO_2e

Emission reduction from the use of fossil fuel – Application of AMS-I.I

Emission reductions from the displacement of fossil fuels are calculated based on AMS-I.I *version 04.0.* The calculation is based on the thermal energy generated using the measured quantity of biomass using equation 4 of the methodology as follows:

$$ER_y = \sum_k N_{k,0} * \eta_{k,y} * BS_{k,y} * EF * \eta_{PJ/BL} * NCV_{biomass} - LE_y$$

Where:

Parameter	Description	Value	SI Unit	Source
$N_{k,0}$	Number of thermal applications k commissioned by the CPA in year 1 (2015)	5100	Number	Gaia Distribution plan
$\eta_{k,y}$	Proportion of $N_{k,0}$ that remain operating at year y (fraction)	100%	Fraction	Assumed based on the manufactures specification on the cookstove lifetime. It's expected that in year 1 of operation, all stoves will still be operational.
$BS_{k,y}$	The net quantity of renewable biomass or biogas consumed by the thermal application k in year y (mass or volume units, dry basis)	0.47	Tonne/year	Calculated as shown in the emission reduction spread sheet
EF	CO2 emission factor (tCO2/GJ) $EF = \sum_j x_j * EF_{FF,j}$ Where: x j is a fraction representing fuel type j used by the baseline thermal applications displaced by biomass/biogas	=0.0741*1	tCO_2/GJ	Calculated. Kerosene is the only fossil fuel displaced by the project Cook stoves. Therefore, the fraction is assumed as 1
$\eta_{PJ/BL}$	Ratio of efficiencies of project equipment and baseline equipment (e.g. cook stove using coal) measured once prior to validation applying the same test procedure (e.g. lab test), as per a national or an international standard. Official data or scientific literature can be used for cross-check purposes	1.43	Fraction	Calculated as shown in the emission reduction spread sheet
$NCV_{biomass}$	Net calorific value of the biomass (GJ/unit mass or volume, dry basis)	27	GJ/tonne	Default IPCC value
P_{FF}	Proportion of Cook stoves displacing kerosene in Ethiopia	15%	Percentage	Calculated as shown in the emission reduction spread sheet

The achieved emission reduction is therefore as follows:

ER_y = 5100*100%*0.43*15% *0.0741*1.43*27= 941 t CO_2e

Leakage emissions (LE)

The project equipment will not be transferred out of the project boundary and so no leakage emissions are to be accounted based on paragraph 15 of the methodology, which states that 'If the energy generating equipment introduced by the project activity is transferred from outside the boundary to the project activity, leakage is to be considered.

Leakage from competing use of biomass is not accounted for since molasses is considered as an industrial waste and not biomass residue.

Net Emission Reductions= (Emission Reductions per appliance* Number of appliances) – Leakage emissions

941 tCO_2e-0 tCO_2e = 941 tCO_2e

Total emission reductions = Emission Reductions from AMS-I.E + Emissions Reductions from AMS-I.I for the year 1 of operation

= 21,414 t CO_2e + 941 t CO_2e

= 22,355 t CO_2e

D.6.4. Summary of the ex-ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2016	38,942	0	0	38,942
2017	72,402	0	0	72,402
2018	87,132	0	0	87,132
2019 …	85,371	0	0	85,371
2020	82,487	0	0	82,487
2021	80,726	0	0	80,726
2022	59,879	0	0	59,879
Total	506,942	0	0	506,942
Total number of crediting years	7			
Annual average over the crediting period	72,420	0	0	72,420

D.7. Application of the monitoring methodology and description of the monitoring plan

The application of the monitoring methodology and description of the monitoring plan are provided in section D.7.1 and D.7.2 below.

D.7.1. Data and parameters to be monitored

Data / Parameter:	$Q_{renewable\ biomass}$ and $BS_{k,y}$
Data unit:	Tonnes/year
Description:	The net quantity of renewable biomass consumed by the thermal application *k* in year *y* (mass or volume units, dry basis)
Source of data:	Survey results
Value(s) applied	0.47
Measurement methods and procedures:	This will be measured through surveys carried out during monitoring. Interviews will be carried out on the selected households to be surveyed through sampling. The surveys will satisfy 90/10 confidence precision level when done annually and 95/10 when carried out biennially. For estimation of the sample size ex-ante 0.47 tonne will be used The CME or third party contracted to carry out the survey will visit the households that possess the selected stoves. Through interviewing the end-user of the stove the surveying entity will capture the amount of ethanol that the end-user consumes per day or per week. This value shall be reciprocated for the whole year for the sampled end-users and a mean derived out of it to be used for ex-post emission reductions. The interviews will only be carried out on households that the project stove is found to be in operation
Monitoring frequency:	Annually or Biennial
QA/QC procedures:	The data collected shall be transferred from the surveying entity to the CME in cases where its not the CME carrying out the survey. The data shall be checked for any inconsistency that might lead to biased results and rectified. Depending on the frequency of monitoring the sample results will be required to attain a set precision. In case the required precision is not attained then the surveying entity will apply the reliability procedures described under the monitoring plan. When biennial inspection is chosen, a 95% confidence interval and 10% margin of error requirement shall be achieved for the sampling parameter on other hand, when the project proponent chooses to inspect annually, a 90% confidence interval and 10% margin of error requirement shall be achieved for the sampling parameter. In the case where the confidence precision level is not reached oversampling will be carried out to achieve this from a buffer sample that will have been calculated during sample drawing otherwise the lower bound of a 90 per cent or 95 per cent confidence interval of the parameter value may be chosen as alternative.
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable to AMS-I.E and AMS.I.I

Data / Parameter:	$NCV_{biomass}$
Data unit:	GJ/tonne
Description:	Net calorific value biomass type (ethanol)
Source of data:	Laboratories tests carried out by the CME according to relevant international standards. For ex-ante estimation IPCC value of 27 has been used
Value(s) applied	27

Measurement methods and procedures:	The parameter shall be monitored through sampling where a sample size shall be calculated as described in of monitoring plan section under sample size calculation. The sample size will satisfy a 90/10 confidence precision level. The CME or contracted third party will visit the selected households for surveys A sample of ethanol from households where the project appliance has been found to be in operation shall be collected and a lab analysis carried out. The lab analysis shall meet international standards. Based on the results, an average shall be calculated and shall be used for ex-post emission reductions. Where necessary, the amount of ethanol that will be taken to be tested will be replaced with the same amount of ethanol from the CME to avoid cases of non-response as a result of the end-users getting a loss.
Monitoring frequency:	Annually
QA/QC procedures:	The tests done on the renewable biomass used by the stoves shall be confirmed to meet national/international standards. This shall be confirmed by the CME or the third party entity contracted to perform the tests. The sample results will meet the required precision level and in case they do not then the reliability test shall be conducted. The consistency of the measurements shall be checked by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable for the methodology AMS-I.I version 04.0

Data / Parameter:	$N_{k,0}$
Data unit:	Dimensionless
Description:	Number of thermal applications k commissioned
Source of data:	Records of installation date of each system.
Value(s) applied	Please refer to ER spreadsheet for the distribution plan
Measurement methods and procedures:	At the time of installation all project activity systems shall be inspected and undergo acceptance testing (commissioning) for proper operation by qualified personnel in compliance with specifications. Proper operation of the Cook stoves shall be confirmed and evidenced through a signed delivery note between the end-user and the CPA Implementing Entity. The records will be archived in a project data base which will capture the following: - The customer address - Sales date of the stove - Phone number if applicable - Stoves serial number - The baseline stoves
Monitoring frequency:	Continuous
QA/QC procedures:	All project activity systems shall be inspected and undergo acceptance testing (commissioning) for proper operation in compliance with specifications. The serial numbers of the stoves captured in the distribution will be counter checked with the serial number of the stoves from the batch to make sure that the serial number is well captured,
Purpose of data	Calculation of baseline emissions

Additional comment:	Applicable for the methodology AMS-I.I version 04.0 and AMS I.E version 06.0. For the methodology AMS I.E this parameter is used to calculate the parameter By (the quantity of woody biomass that is substituted or displaced in tonnes).

Data / Parameter:	$n_{k,y}$
Data unit:	Fraction
Description:	Proportion of $N_{k,0}$ that remain operating at year y
Source of data:	Stove inspections to determine if they are still operational through sampling annually or biennially
Value(s) applied	Please refer to the ER spread sheet
Measurement methods and procedures:	The parameter shall be measured by way of sampling where a sample size shall be calculated based on 95/10 or 90/10 confidence precision level The CME or third party contracted to carry out the survey will visit the households in which the selected stoves are located and through visual inspections of the stoves. The proportion of stoves that are still operating shall be determined by relating the stoves operating to the stoves surveyed The CME or third party contracted to carry out the survey will capture the type of stove that was used by the end-user prior to acquiring the project stove. This will be used to determine which type of fuel the stove replaced i.e. either fossil fuel of non-renewable biomass. Based on the proportion of stoves replaced the population shall be classified based on the fuel replaced. When sampling is done on annual basis the survey will meet 90/10 confidence precision level and 95/10 confidence precision level shall be chosen, when surveys are done biennially.
Monitoring frequency:	At least once every two years (biennial) during the crediting period or annually
QA/QC procedures:	The data collected shall be transferred from the surveying entity to the CME in cases where its not the CME carrying out the survey. The data shall be checked for any inconsistency that might lead to biased results and rectified Depending on the frequency of monitoring, the sample results will be required to attain a set precision. In case the required precision is not attained then the surveying entity will apply the reliability procedures described under the monitoring plan. When biennial inspection is chosen, a 95% confidence interval and 10% margin of error requirement shall be achieved for the sampling parameter. On the other hand, when the project proponent chooses to inspect annually, a 90% confidence interval and 10% margin of error requirement shall be achieved for the sampling parameter. In the case where the confidence precision level is not reached oversampling will be carried out to achieve this from a buffer sample that will have been calculated during sample drawing
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable for the methodology AMS-I.I version 04.0 and AMS I.E version 06.0. For the methodology AMS I.E this parameter is used to calculate the parameter By (the quantity of woody biomass that is substituted or displaced in tonnes).

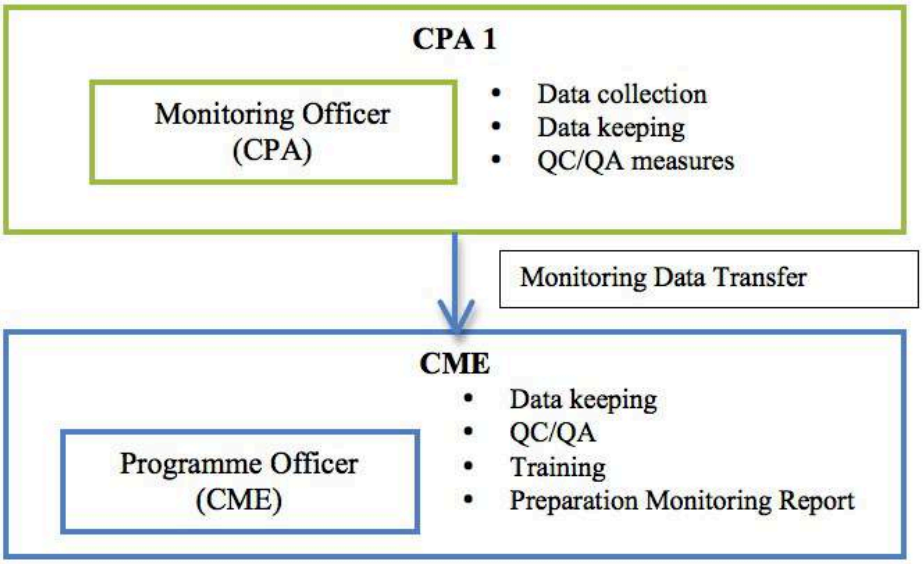
D.7.2. Description of the monitoring plan

Operational and management structure

The overall responsibility for monitoring of the Project Gaia Cook Stove Programme of Activities will rest with Project Gaia Inc. as the CME.The CME will ensure that each CPA is implemented and monitored as described in the PoA-DD and CPA-DD. In order to achieve this, the CME will enter

into a contractual agreement with each CPA implementing entity prior to the CPA inclusion into the PoA. The contract will outline the roles and responsibilities of the CME and CPA Implementing Entity in order to ensure a smooth implementation and monitoring of the CPA. Third Party entities will also be outsourced to facilitate the monitoring of the CPA if need be and they will also get into a contract with the CME.

An overview of the organization of the monitoring process is as follows:



Responsibilities of the CME

Once a DOE has approved the inclusion of a CPA and the project activity has begun operations, the CME will take charge of the following:

- Receiving and compiling monitoring records from the CPA implementing entity
- Archiving and keeping monitored data for two years after the end of the crediting period or the last issuance of CERs, whichever occurs later.
- Coordinating monitoring activities and data management during the lifetime of the PoA.
- Contracting a DOE for validation and verification purposes.
- Preparing and submitting monitoring reports and facilitating the verification of the same.
- Acting as the focal point with the CDM Executive Board for matters related to the PoA.
- During the lifetime of the PoA, maintaining all monitoring reports of all CPAs.
- Provide training as required to the CPA implementer's staff that will work on the monitoring of parameters relevant to the emission reduction assessment of the CPA.

The CME will further be responsible for ensuring that the CPA Implementer understands the requirements of the monitoring plan. The CME Programme Manager/Officer in charge will maintain regular communication with the CPA Implementer's staff.

CPA monitoring training

Before the implementation of the CPA or the start of the CPA crediting period, the CME will provide training and guidance regarding the implementation of the CPA monitoring plan to the CPA Implementer's staff. The training will include the following components:

- CDM Project Cycle and the significance of monitoring
- Management structure and work scope
- Components of the monitoring plan
- QA/QC procedures
- Monitoring report template
- Preparation for verification

- Questions and answers

The CME will ensure that the training materials provided to the CPA Implementer for monitoring will be regularly updated in line with changes to the CDM or PoA requirements. The relevant CME Programme Manager/Officer will responsible for updating the training materials.

The CME will maintain an electronic database that will incorporate the monitored parameters and values required in emission reduction calculations for each CPA, as well as other relevant information. The database will ensure that monitored data is kept and archived for two years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

Responsibilities of the CPA implementer

CPA Implementers will be responsible for the implementation of individual CPAs under the PoA and will also be in charge of:

- Operations and maintenance of the CPA for the duration of the project.
- Record keeping of parameters as per the monitoring plan and provide hard and electronic records to the CME on a regular basis.
- Make available staff for any training conducted by the CME on monitoring approaches and systems.
- Make staff available for validation and verification where applicable.
- Provide the DOE with required documents and access to sites as needed.

More specifically, the CPA implementer will be responsible for the technical aspects related to monitoring activities such as:

- Employment and training of personnel responsible for gathering and recording monitoring data
- Continuous record keeping of the number of cook stoves and the dates when they were distributed to end-users.
- Ensure that the stoves are in good working condition before the transfer of ownership is made to the end-users.
- Ensure that the end-users are well trained on the proper operation of the cook stoves before the transfer of ownership is made. This might be in the form of user manuals, one-on-one training sessions or any other appropriate methods.
- Ensure that the end users are well aware of the emergency procedures and the contact persons in case of such emergencies. This might be in the form of user manuals, warranty cards or any other appropriate methods.
- Continuous record keeping of the number and date when cook stoves have been replaced or serviced.
- If the CPA implementing entity will also distribute fuel to be used to the end-users, ensure continuous recording of the amounts of ethanol distributed.
- Incase the CPA implementing entity does not distribute ethanol to end-users, the CPA in liaison with the CME will estimate the amounts of ethanol distributed to end-users through an appropriate sampling method as further described in the sampling plan.
- Contracting a survey company where needed
- Electronic archiving of all monitored data and parameters.
- Submission of monitoring data to the CME on a regular basis.

As such, the CPA will appoint a monitoring officer who will be in charge of the CPA's monitoring responsibilities as described above. The records will be crosschecked for consistency by another employee of the CPA who is not directly in charge of data recording and finally approved by the director of the CPA. The CPA will thereafter submit on a regular basis, the monitored records to the CME accompanied by the respective copies of records/invoices for sold units as evidence.

Data and parameters to be monitored

The following data and parameters will be monitored as required by the two methodologies AMS-I.E and AMS-I.I

Parameter	Description	Monitoring / recording frequency
$Q_{renewable\ biomass}$	The net quantity of renewable biomass consumed by the thermal application k in year y	At least once every two years (biennial) during the crediting period)
$N_{k,0}$	Number of thermal applications k commissioned	At the time of installation all project activity systems shall be inspected and undergo acceptance testing (commissioning) for proper operation in compliance with specifications. The installation date of each system shall be recorded as soon as it is sold
$n_{k,y}$	Proportion of $N_{k,0}$ that remain operating at year y (fraction)	At least once every two years (biennial) during the crediting period
$BS_{k,y}$	The net quantity of renewable biomass or biogas consumed by the thermal application k in year y	At least once every two years (biennial) during the crediting period
$NCV_{biomass}$	Net calorific value of biomass type (ethanol)	Annually

Sampling Plan

In accordance to the applied methodologies, AMS.I.E ver 6.0 and AMS-I.I ver 4.0, a statistically valid sample of the locations where the systems are deployed, with consideration, in the sampling design, of occupancy and demographics differences can be used to determine parameter values used to determine emission reductions, as per the relevant requirements for sampling in the "Standard for sampling and surveys for CDM project activities and programme of activities". When biennial inspection is chosen a 95 per cent confidence interval and a 10 per cent margin of error requirement shall be achieved for the sampling parameter. On the other hand when the project proponent chooses to inspect annually or the methodology dictates so, a 90 per cent confidence interval and a 10 per cent margin of error requirement shall be achieved for the sampled parameters.

In cases where survey results indicate that 90/10 precision or 95/10 precision is not achieved, the lower bound of a 90 per cent or 95 per cent confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/10 precision or rather discounting the emission reductions by not less than 3 times the percentage of missed precision during the first two years of the crediting period of the CPA as outlined and recommended by the "*Standard for Sampling and surveys for CDM project activities and programme of activities" ver 04.1 paragraph 16*.

Methodology AMS-I.E ver 6.0 specifically requires that:

- Monitoring shall consist of 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 in service appliance.
- Monitoring should confirm the displacement or substitution of the non-renewable woody biomass at each location. In the case of appliances switching to renewable biomass the quantity of renewable biomass used shall be monitored. For this, project proponents may apply the "Standard for sampling and surveys for CDM project activities and programme of activities".

Parameters to be sampled under methodology AMS-I.E are provided in the table below:

Parameter	Description
$n_{k,y}$	Proportion of distributed units that remain operational at least once in two years.
$Q_{renewable\ biomass}$	The net quantity of renewable biomass consumed by the thermal application k in year y

Likewise, AMS-I.I ver.4.0 specifically requires that:

- At the time of installation all project activity systems shall be inspected and undergo acceptance testing (commissioning) for proper operation in compliance with specifications. The installation date of each system shall be recorded.
- According to the methodology, emission reductions can only be applied to systems that are demonstrated to be operational and in compliance with manufacturer required maintenance procedures, at least once every two years (biennial) during the crediting period. In order to determine this, a statistically valid sample of the residences where the systems are installed, can be used to determine the percentage of systems operating. The only exception to carrying out an actual site visit is where there are on-going rental/lease payments or a recurring maintenance fee by users.

Parameters to be sampled under AMS-I.I are provided in the table below:

Parameter	Description
$n_{k,y}$	Proportion of $N_{k,0}$ that remain operating at year y (fraction)
$BS_{k,y}$	The net quantity of renewable biomass consumed by the thermal application k in year y
$NCV_{biomass}$	Net calorific value of biomass (ethanol)

In order to ensure that parameter values obtained through sampling are non biased and that data collection minimizes non-sampling (non-random, systematic) errors, the CPA will observe sound practices in designing samples and administering surveys and field measurements as outlined in the "Guidelines for sampling and surveys for CDM project activities and programme of activities" and estimation of sample size will be guided by the type of parameter being sampled i.e. proportion parameter or mean parameter.

Sampling design

Sampling design shall be based on the methodologies and the nature of the sampled parameter.

Sampling design to be employed for sampling parameters under methodology AMS-I.E

(i) Objectives and Reliability Requirements

The objective of the sampling effort will be to assess the number of distributed units that are still in operation and the amount of renewable biomass used by the appliances. The sample size results will meet either a 90% confidence and a 10% precision level when monitoring is carried out annually and a 95% confidence and 10% precision level when monitoring is done once in two years as described under methodology AMS-I.E version 06.0

The parameters to be sampled are as shown below together with the confidence precision level target

Parameter	Descriptions	Confidence/precision
$n_{k,y}$	Proportion of distributed units that remain operational at least once in two years.	Annually: 90/10 Biennial: 95/10
$Q_{renewable\ biomass}$	The net quantity of renewable biomass consumed by the thermal application k in year y	Annually: 90/10 Biennial:

ii) Target Population

The target population will be households in which the cook stoves have been distributed as identified by the CME sales records.

(iii) Sampling method

The PoA will employ simple random sampling method, as the population targeted is homogeneous in nature based on the following

- Technology implemented: The CPA will involve the distribution of cook stoves of the same technology and specification in terms of fuel used and efficiency of the stoves as specified by the manufacturer
- End-users: The end-users to whom the stoves will be distributed will be similar in nature that is they will be will be households
- Boundary covered by the stoves: Stoves distributed will be within the confinement of the CPA boundary as defined in the project boundary.

Sampling will be done on single CPA basis and can be carried out across CPAs as long as homogeneity of the CPAs is established based on the above criteria.

A sample will be selected from population contained in a specific CPA based on calculation procedures indicated in the guidelines of sampling and surveys and through application of a random number generator. The selected stoves location will be visited by the CME or a third party hired to carry out the survey. Each stove will be uniquely identified through its serial number.
The survey of the monitored parameters will involve the following

Parameter	Process of carrying out the survey
$n_{k,y}$	The CME or third party contracted to carry out the survey will visit the households in which the appliances have been distributed and through visual inspections of the stoves the proportion of stoves that are still operating shall be determined by relating the stoves operating to the stoves surveyed. The CME or third party contracted to carry out the survey will capture the type of stove that was used by the end-user prior to acquiring the project stove. This will be used to determine which type of stove and fuel the project stove replaced i.e. either fossil fuel powered stove or fuel wood stove. Based on the proportion of stoves replaced the population shall be classified based on the baseline fuel replaced by the project appliance.
$Q_{\text{renewable biomass}}$	The CME or third party contracted to carry out the survey will visit the households that have the selected stoves from the sample size calculation. Through interviewing the end-user of the project stove the surveying entity will capture the amount of ethanol that the end-user consumes per day or per week. This value shall be extrapolated for the whole year for the sampled end-users and a mean derived out of it to be used for ex-post emission reductions. The interviews for this parameter will only be carried out on households that the project stove is found to be in operation.

In order to make sure that reliability is met, oversampling of 30% will be carried out on the initial calculated sample size to cater for non-response. A buffer list will also be created which will include the stoves to be chosen incase the reliability is not met on the first survey exercise. The buffer will be at least 30% of the calculated sample size of the parameter.
The use of buffer in meeting the reliability of the sample will be carried out in stages. Where 10% will first be drawn as additional stoves to be monitored followed by another 10% then if need be the whole 30%. The CME will draw samples from each CPA.

iv) Sample size calculation

The formula to be used for calculation of the sample size will depend on the type of parameter being sampled i.e. whether the parameter is a proportion/percentage parameter or if the parameter of interest is a mean.

Sample size calculation for $n_{k,y}$

Calculation for $n_{k,y}$ will be calculated following equation (1) paragraph 15 of appendix 2 of the Guidelines: sampling and surveys for CDM Project Activities and Programme of Activities version 03.0

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

$n_{k,y}$	Proportion of appliances that remain operational

Where:	
n	Sample size
N	Total population
p	Expected proportion of cook stoves that are still in operation
1.96	Represents 95% confidence required when biennial survey is chosen. When annual survey is selected 1.645 will be value used for sample size calculation as shown on sample size calculation spreadsheet.
0.1	Represents 10% precision level on both sides of p

Required data for calculation of the sample size

Parameter	**Source**
N	Sales records of stoves that have been sold determined per CPA distribution
p	Based on developers own experience or from similar CDM projects

For ex-ante estimation the following data shall be used for calculation of expected sample size for $n_{k,y}$

Data	Value	Source
N	13100	Based on the number of stoves expected to be distributed until the end of first crediting.
p	65%	Based from similar CDM cook stoves projects
n	204	Calculated- See Sample size calculation sheet
Oversampled size of 30%	266	Calculated- See Sample size calculation sheet

If the calculation of the sample size returns a value of less that 30 then the surveyor will apply a sample size of 30 as recommended by the Standard Sampling and surveys for CDM project activities and programme of activities version 04.1

Sample size calculation for $Q_{renewable\ biomass}$

$Q_{renewable\ biomass}$ being a mean parameter, the sample size calculation will be based on equation (4) paragraph 27 of appendix 2 of the *Guidelines: sampling and surveys for CDM Project Activities and Programme of Activities version 03.0*

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

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

Where:

n	Sample size
N	Total number of population
V	Variance
SD	Expected standard deviation
0.1	Precision
1.96	Represents the 95% confidence required when biennial survey is chosen. When annual survey is selected 1.645 will be value used for sample size calculation as shown on sample size calculation spreadsheet.
Mean	Expected mean

Required data for calculation of the sample size:

Parameter	Source
N	CME sales records
SD	Estimated
Mean	Based on project proponent experience

For ex-ante estimation the following data shall be used for calculation of expected sample size for $Q_{renewable\ biomass}$

Parameter	Value	Source
N	13100	Based on the number of stoves expected to be distributed until the date of first monitoring
SD	0.12	Estimated - See Sample size calculation sheet
Mean	0.47 tonne/yr litres	Estimated based on project proponent experience - See Sample size calculation sheet
Sample size n	48 (24per stove type)	Calculated
Student t-value	54 (27per stove type)	Calculated

If the calculation of the sample size returns a value of less that 30 then the surveyor will apply student t-distribution since the parameter of interest is a mean as recommended by the Standard Sampling and surveys for CDM project activities and programme of activities version 04.1. The sample size of this parameter shall be calculated based on the type of stove i.e single burner or double burner

Reliability for sampling results

Depending on the monitoring frequency the sample size will be expected to reach either 90/10 confidence precision level for annual monitoring or 95/10 for the case of biennial monitoring.
In case the sample will not attain the required precision the following options shall be used depending on which is appropriate as recommended by Standard Sampling and surveys for CDM project activities and programme of activities version 04.1

- Perform additional data collection that is a supplemental or new sample to reach the required precision level; or
- Apply a correction to the estimates using the options below:
  (i) Discounting the emission reduction estimates by either,

    a. Taking the lower or the upper bound, whatever is conservative, of the 90 or 95 per cent confidence interval, depending on the type of methodologies applied; or

b. Discounting by no less than three times (x3) the percentage precision points missed (e.g. if the attained precision is 90/11 then the emission reduction estimates are discounted by 3 per cent)

Sampling design to be employed for sampling parameters under methodology AMS-I.I

(i) Objectives and Reliability Requirements

The objective of the sampling effort will be to assess the number of distributed units that are still in operation, the amount of renewable biomass used by the appliances and the net calorific value of the renewable biomass used by the stoves. The sample size results will meet either a 90% confidence and a 10% precision level when monitoring is carried out annually or a 95% confidence and 10% precision level when monitoring is done once in two years as described under methodology AMS-I.I version 04.0

The parameters to be sampled are as shown below together with the confidence precision level target.

Parameter	Descriptions	Confidence/precision
$n_{k,y}$	Proportion of $N_{k,0}$ that remain operating at year y (fraction)	Annually: 90/10 Biennial: 95/10
$BS_{k,y}$	The net quantity of renewable biomass consumed by the thermal application k in year y	Annually: 90/10 Biennial: 95/10
$NCV_{biomass}$	Net calorific value of biomass type (ethanol) and satisfies a 90/10 confidence precision level	Annually: 90/10

ii) Target Population
The target population will be households in which the cook stoves have been distributed as identified by the CME sales records.

(iii) Sampling method
The PoA will employ simple random sampling method, as the population targeted is homogeneous in nature based on the following:

- Technology implemented: The CPA will involve the distribution of Cook stoves of the same technology and specification in terms of fuel used and efficiency.
- End-users: The end-users to whom the stoves will be distributed will be similar in nature that is they will be will be households
- Boundary covered by the stoves: Stoves distributed will be within the confinement of the CPA boundary as defined in the project boundary.

Sampling will be done on single CPA basis and can be carried out across-CPAs as long as homogeneity of the CPAs is established based on the above criteria.

A sample will be selected from population contained in a specific CPA based on calculation procedures indicated in the guidelines of sampling and surveys and through application of random generator the stoves will be selected and the stoves selected visited by the CME or a third party hired to carry out the survey. Each stove will be uniquely identified through its serial number

The survey of the monitored parameters will involve the following

Parameter	Process of carrying our the survey

$n_{k,y}$	The CME or third party contracted to carry out the survey will visit the households in which the selected stoves are located and through visual inspections of the stoves the proportion of the stoves that are still operating shall be determined by relating the stoves operating to the stoves surveyed. The CME or third party contracted to carry out the survey will capture the type of stove that was used by the end-user prior to acquiring the project stove. This will be used to determine which type of stove and fuel the stove replaced i.e. either fossil fuel powered stove or fuel wood stove. Based on the proportion of stoves replaced the population shall be classified based on the baseline fuel replaced by the project appliance.
$BS_{k,y}$	The CME or third party contracted to carry out the survey will visit the households that have the selected stoves from the sample size calculation. Through interviewing the end-user of the stove the surveying entity will capture the amount of ethanol that the end-user consumes per day or per week. This value shall be extrapolated for the whole year for the sampled end-users and a mean derived out of it to be used for ex-post emission reductions. The interviews will only be carried out on households that the project stove is found to be in operation.
$NCV_{biomass}$	The parameter shall be monitored through sampling where a sample size shall be calculated that satisfies a 90/10 confidence precision level. The CME or contracted third part will visit the selected households for surveys. A sample of the fuel will be taken from households where the project appliance has been found to be in operation and lab analysis carried out. Based on the results, an average shall be calculated and shall be used for ex-post emission reductions. Where necessary, the amount of ethanol that will be taken to be tested will be replaced with the same amount of ethanol from the CME to avoid cases of non response as a result of the end-users getting a loss.

In order to make sure that reliability is met, oversampling of 30% will be carried out on the initial calculated sample size to cater for non-response. A buffer will also be created which will include the stoves to be chosen incase the reliability is not met on the first survey exercise. The buffer will be at least 30% of the calculated sample size of the parameter.

The use of buffer in meeting the reliability of the sample will be carried out in stages. Where 10% will first be drawn as additional stoves to be monitored followed by another 10% then if need be the whole 30%. The CME will draw samples from each CPA.

v) Sample size calculation

The formula to be used for calculation of the sample size will depend on the type of parameter being sampled i.e. whether the parameter is a proportion/percentage parameter or if the parameter of interest is a mean.

Sample size calculation for $\mathbf{n_{k,y}}$

Calculation for $\mathbf{n_{k,y}}$ will be calculated following equation (1) paragraph 15 of the guidelines: sampling and surveys for CDM Project Activities and Programme of Activities version 03.0

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

$n_{k,y}$	Proportion of $N_{k,0}$ that remain operating at year *y* (fraction)

Where:	
n	Sample size
N	Total population
p	Expected proportion of cook stoves that are still in operation
1.96	Represents 95% confidence required when biennial survey is chosen. When annual survey is selected 1.645 will be value used for sample size calculation as shown on sample size calculation spreadsheet.
0.1	Represents 10% precision level on both sides of p

Required data for calculation of the sample size

Parameter	**Source**
N	Sales records of stoves that have been sold determined per CPA distribution
p	Based on developers own experience or from similar CDM projects

For ex-ante estimation the following data shall be used for calculation of expected sample size for $n_{k,y}$

Data	Value	Source
N	13100	Based on the number of stoves expected to be distributed in the first year of implementation of the project
p	65%	Based from similar CDM cook stoves projects
n	204	Calculated See Sample size calculation sheet
Oversample size of 30%	266	Calculated- See Sample size calculation sheet

If the calculation of the sample size returns a value of less that 30 then the surveyor will apply a sample size of 30 as recommended by the Standard Sampling and surveys for CDM project activities and programme of activities version 04.1

Sample size calculation for $BS_{k,y}$

$BS_{k,y}$ being a mean parameter the sample size calculation will be based on equation (4) para 27 of the guidelines: sampling and surveys for CDM Project Activities and Programme of Activities version 03.0

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

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

Where:

n	Sample size
N	Total number of population
V	Variance
SD	Expected standard deviation
0.1	Precision
1.96	Represents the 95% confidence required when biennial survey is chosen. When annual survey is selected 1.645 will be value used for sample size calculation as shown on sample size calculation spreadsheet.
Mean	Expected mean

Required data for calculation of the sample size

Data	Source
N	CME sales records
SD	Calculated based on the emission reduction spreadsheet
Mean	Calculated based on the emission reduction spreadsheet

For ex-ante estimation the following data shall be used for calculation of expected sample size for $BS_{k,y}$

Parameter	Value	Source
N	13100	Based on the number of stoves expected to be distributed until the date of first monitoring
SD	0.12	Estimated - See Sample size calculation sheet
Mean	0.47 tonne/yr litres	Estimated based on project proponent experience - See Sample size calculation sheet
Sample size n	48 (24per stove type)	Calculated
Student t-value	54 (27per stove type)	Calculated

If the calculation of the sample size returns a value of less that 30 then the surveyor will apply student t-distribution since the parameter of interest is a mean as recommended by the Standard Sampling and surveys for CDM project activities and programme of activities version 04.1. The sample size of this parameter shall be calculated based on the type of stove i.e single burner or double burner

Sample size calculation for $NCV_{biomass}$

$NCV_{biomass}$ being a mean parameter the sample size calculation will be based on equation (4) paragraph 27 of the '*Guidelines: sampling and surveys for CDM Project Activities and Programme of Activities version 03.0.*'

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

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

Where:

n	Sample size
N	Total number of population
V	Variance
SD	Expected standard deviation
0.1	Precision
1.96	Represents the 95% confidence required when biennial survey is chosen. When annual survey is selected 1.645 will be value used for sample size calculation as shown on sample size calculation spreadsheet.
Mean	Expected mean

Required data for calculation of the sample size

Data	Source
N	Proponent sales records
SD	Conservatively estimated based on international accepted values of IPCC-see sample size calculation sheet
Mean	Conservatively estimated based on international accepted values of IPCC-see sample size calculation sheet

For ex-ante estimation the following data shall be used for calculation of expected sample size for $NCV_{biomass}$

Data	Value	Source
N	13100	Based on the number of stoves expected to be distributed in the end of first crediting period
SD	10.05	Conservatively estimated-see sample size calculation sheet
Mean	27	Conservatively estimated based on international accepted values of IPCC -see sample size calculation sheet
Sample size n	54	Calculated-see sample size calculation sheet
Oversampling n	71	Calculated-see sample size calculation sheet

If the calculation of the sample size returns a value of less that 30 then the surveyor will apply student t-distribution since the parameter of interest is a mean as recommended by the *Standard Sampling and surveys for CDM project activities and programme of activities version 04.1*

Reliability for sampling results

Depending on the monitoring frequency the sample size will be expected to reach either 90/10 confidence precision level for annual monitoring or 95/10 for the case of biennial monitoring.
In case the sample will not attain the required precision the following options shall be used depending on which is appropriate as recommended by Standard Sampling and surveys for CDM project activities and programme of activities version 04.1

- Perform additional data collection that is a supplemental or new sample to reach the required precision level; or
- Apply a correction to the estimates using one of the options below:

(i) Discounting the emission reduction estimates by either,

a. Taking the lower or the upper bound, whatever is conservative, of the 90 or 95 per cent confidence interval, depending on the type of methodologies applied; or

b. Discounting by no less than three times (x3) the percentage precision points missed (e.g. if the attained precision is 90/11 then the emission reduction estimates are discounted by 3 per cent)

Sampling frame

The PoA will be composed of different sampling frames based on the characteristics of the CPAs and the host country of CPA implementation.

At minimal the CME will classify the sampling frame based on the below characteristics:

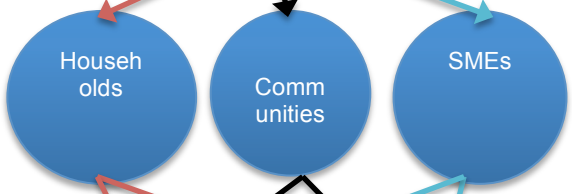
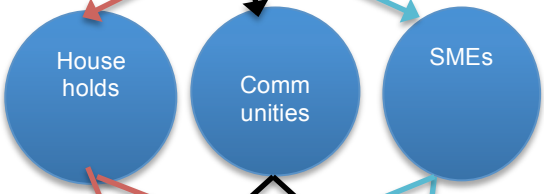
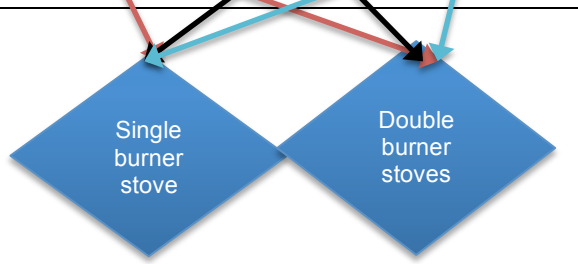
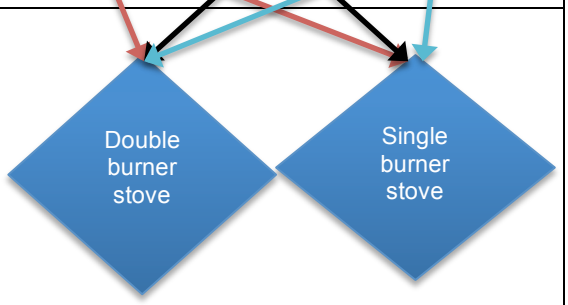
Country**:** Since the PoA is envisaged to include CPAs from different countries the sampling frame will start to be identified at the country level in that CPAs will be differentiated by country

End User: Among the eligibility criteria of the PoA is the end-users who in this case can be residential, SMEs or institutions. This will form the next differentiation of the sampling frame.

Stove type: The stoves can sufficiently be classified as homogenous due to having similar characteristic that is use of similar fuel, having the same efficiency and with the only difference of double burner and single burner stoves, which does not necessarily affect the end-user usage characteristics.

A naming system will be developed to identify the different sampling frame based on the above.

Identification of a sampling frame:

Category		
Country		
End users		
Stove type		
Sample Frame	CA-HH/C/S-SB CA-HH/C/S-DB	CB-HH/C/S-DB CB-HH/C/S-SB

The sampling frames are not fixed and may be altered from time to time with the CME in order to fit the characteristics of the CPA at hand.

Quality control /Quality assurance

In order to tackle the issue of data quality and analysis together with non-response of the end-users the CME will put in place a quality control mechanism in order to ensure that the monitoring is undertaken in a professional and conservative manner

1) **End- user awareness** at the time of sale, the end user will be made aware that they are required to participate in monitoring activities. This will be via a written statement (in English and local language where appropriate) on the carbon waiver form, or via alternative means such as training sales personnel explaining the importance of monitoring to each customer.

2) **Questionnaire design**. The design of the questionnaire will ensure that the questions are non- intrusive and easy to understand for both the interviewee and interviewer.

3) **Drawing on local knowledge.** Local third parties to be hired in each country will play an important role in tailoring the monitoring approach to suit local circumstances. For example, in some instances, it may be essential for a local person to conduct the interview in order to obtain accurate results. If the end-user needs to explain on the amount of ethanol that he/she uses, the data that they provide should be as accurate as possible. For this to happen however, the question should be well understood by the end-user and the importance of the monitoring exercise too. At most times this will be well put across by a person who understands the use of local dialect.

4) **Quality of contractors**. Any third parties hired by the CME to carry out sampling of, data will be required to demonstrate a high level of cultural awareness, local language skills and appropriate experience with data entry and data management. The CME will ensure that contractors are adequately trained for the tasks they are contracted. Training will also be provided on how to deal with non-responses, refusals and other problems should these occur.

If the sampling results are insufficient to achieve the target reliability levels, the CME has a number of options to address this e.g. selecting a larger than necessary sample size (buffer) before commencing monitoring and having a buffer in which he can rely on in doing extra surveys

The data contained in each individual CPA Monitoring Record and collected during field measurements will be transferred to the CME by the Monitoring Agents. Either the originals of the CPA Monitoring Records or scanned copies of each Record will also be provided to the CME to enable cross-checking. The CME will crosscheck the data provided by contractors against the original Monitoring Records.

5) **Sample size calculation**. The calculation of the sample size will be carried out using estimates for proportions, mean of values and standard deviations as the actual characteristics of the population/sampling frame are unknown ex-ante. In order to ensure the quality of the sampling results, the CME can draw on the provisions for reliability calculations as provided by Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities. In the event that the initial sampling results do not fulfill the required level of precision, the CME will Perform additional data collection that is a supplemental or new sample to reach the required precision level; or

- Apply a correction to the estimates using one of the options below:

(i) Discounting the emission reduction estimates by either,

a. Taking the lower or the upper bound, whatever is conservative, of the 90 or 95 per cent confidence interval, depending on the type of methodologies applied; or

b. Discounting by no less than three times (x3) the percentage precision points missed (e.g. if the attained precision is 90/11 then the emission reduction estimates are discounted by 3 per cent)

As a last resort, the sampling exercise may be repeated entirely with an increased sample size.

The data contained in each individual CPA monitoring record and collected during field measurements will be transferred to the CME by the Monitoring Agents. Either the originals of the CPA Monitoring Records or scanned copies of each record will also be provided to the CME to enable cross-checking.

The CME will be responsible for maintaining a secure PoA Distribution and Monitoring Database, which includes all the data relating to the CPAs within the PoA. The Database will be located on the CME's secure server. The system automatically backs up on regular basis any files that have been modified. The files are backed up onto separate hard drives that are regularly swapped to ensure there is always one drive located securely offsite. The CME may improve this system over time with new technology.

6) **Dealing with discrepancies in data**

In cases where the surveyor based on his experiences sees that the data being provided by the end user is not true then the survey will be deemed nullified and more sample from the buffer will be drawn from the buffer selected to cater for that which has been nullified**.**

7) **Dealing with non-cooperation by the end-user**

In cases where the end-users refuses to be interviewed during monitoring, the surveyor will not force him/her to do so but rather will treat the case as non-response and will draw an extra stove from the buffer.

8) **Quality check of the data**

Through out the lifetime of the project the project developer will have random checks to confirm that the data entered for a specific stove is correct, this will be either through calling or having physical visitation to the end-user household.

The data to be checked will include but not limited to:

- The serial number of the stove visa vie what has been captured on the records.
- The type of stove
- The physical address
- The phone number
- The type of fuel used and the source

If this is found not to be correct the developer will correct this to avoid missing the location of the end-user during monitoring.

Data Analysis

The data obtained from sampling of each group of CPAs will be used to estimate values for the parameters described above. The values will then be factored into the emissions reduction calculations and the monitoring report for each monitoring period, and this will result in the request for issuance of CERs.

SECTION E. Approval and authorization

At the time of writing this CPA-DD, the letter of Approval had not been provided by the Designated National Authority of Ethiopia.

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Appendix 1. Contact information of CPA implementer(s) and responsible person(s)/ entity(ies) for completing the CDM-SSC-CPA-DD-FORM

CPA implementer and/or responsible person/ entity	☒ CPA implementer(s) ☐ Responsible person/ entity for completing the CDM-SSC-CPA-DD-FORM
Organization	Gaia Association
Street/P.O. Box	Bole Sub-City Kebele 03 1460 Addis Ababa 1250 Ethiopia
Building	House Number 2003 2/B
City	Addis Ababa
State/Region	Addis Ababa
Postcode	1250 Ethiopia
Country	Ethiopia
Telephone	+251 11 618 3540
Fax	+251 11 662 7402
E-mail	gaiaassociation@ethionet.et
Website	www.projectgaia.com
Contact person	Wubshet Tedele
Title	Project Cordinator
Salutation	Mr
Last name	Tedele
Middle name	-
First name	Wubshet
Department	-
Mobile	-
Direct fax	+251 11 662 7402
Direct tel.	+251 11 618 3540
Personal e-mail	wubshet.t.tsehayu@gmail.com

CPA implementer and/or responsible person/ entity	☐ CPA implementer(s) ☒ Responsible person/ entity for completing the CDM-SSC-CPA-DD-FORM
Organization	Carbon Africa Ltd
Street/P.O. Box	Muthangari Drive
Building	Gath Plaza
City	Nairobi
State/Region	Nairobi
Postcode	14938-00800-Nairobi
Country	Kenya
Telephone	+254 731 851 754 or +254 706 374 150

Fax	+1 (717) 334-7313
E-mail	info@carbonafirica.co.ke
Website	www.carbonafrica.co.ke
Contact person	Adriaan Tas
Title	Director
Salutation	Mr
Last name	Tas
Middle name	-
First name	Adriaan
Department	-
Mobile	-
Direct fax	-
Direct tel.	+254 731 851 754 or +254 706 374 150
Personal e-mail	adriaan@carbonafrica.co.ke

Appendix 2. Affirmation regarding public funding

Not applicable

Appendix 3. Applicability of methodology(ies) and standardized baseline(s)

Not applicable

Appendix 4. Further background information on ex ante calculation of emission reductions

Not applicable

Appendix 5. Further background information on monitoring plan

Not applicable

Appendix 6. Summary of post registration changes

Not applicable

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Document information

Version	*Date*	*Description*
04.0	9 March 2015	Revisions 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; • Editorial improvement.
03.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the component project activity design document form for small-scale CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document form for small-scale component project activities" (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-SSC-CPA-DD-FORM in A.14. and Appendix 1; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and **Error! Reference source not found.**; • Change the reference number from *F-CDM-SSC-CPA-DD* to *CDM-SSC-CPA-DD-FORM*; • Editorial improvement.
02.0	13 March 2012	EB 66, Annex 17 Revision required to ensure consistency with the "Guidelines for completing the component project design document form for small-scale component project activities".
01.0	27 July 2007	EB33, Annex44 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: component project activity, project design document, SSC project activities