Component project activity design document form
(Version 08.1)

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

BASIC INFORMATION	
Title of the CPA	ONIL Stoves —Guatemala – CPA 002
Scale of the CPA	☐ Large-scale ☒ Small-scale
Version number of the CPA-DD	03
Completion date of the CPA-DD	12/07/2018
Title and UNFCCC reference number of the registered CDM PoA	Distribution of ONIL Stoves—Guatemala – 8480
Title and reference number of the corresponding generic CPA	ONIL Stoves—Guatemala – CPA XXX
Coordinating/managing entity	HELPS International
Host Party	Guatemala
Applied methodologies and standardized baselines	AMS-II.G: "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" (Version 03)
Sectoral scopes linked to the applied methodologies	Sectoral scope 3: Energy demand
Estimated amount of annual average GHG emission reductions	42,773 t CO_2

Deleted: 2

Deleted: 11/04/2017

SECTION A. Description of component project activity (CPA)

A.1. General description of CPA

>>

Purpose of the project activity

The "ONIL Stoves – Guatemala – CPA 002" small-scale CPA (SSC-CPA) will involve the distribution and installation of ONIL Stoves for use by households in, Guatemala. This CPA is the second CPA of the Guatemalan "Distribution of ONIL Stoves – Guatemala" PoA and includes 11,148 improved cook stoves benefiting families throughout the country. Before the adoption of the ONIL Stove, households in Guatemala used inefficient, conventional open fire. The ONIL Stove is a fuel-efficient stove that reduces the amount of firewood required by households by up to 58%, as shown in laboratory tests, and results in lower emissions based on its construction. A single ONIL Stove will save 3.837 tons of CO_2e per year

HELPS International is the managing entity of the CPA. HELPS International will manage the day-to-day stove distribution and management of the CPA. HELPS International is responsible for data collection, storage, and management of the central database where all relevant information required for monitoring will be maintained. HELPS International will assign a CDM monitoring officer and prepare the monitoring report.

HELPS International manufactures the ONIL Stoves and distributes them to communities throughout Guatemala. HELPS International sells improved cook stoves to community organizations, private landowner or government agencies. In addition to manufacturing, HELPS International also provides demonstrations, delivery, implementation help, training, and customer service follow-through.

ONIL Stove Technical Details

The ONIL Stove is an improved cook stove that reduces the amount of firewood required by households by up to 58% and results in lower emissions based on its construction and design. Since the efficiency of a traditional open fire is 10%[1] and the efficiency of an ONIL Stove is at least 24%, the ONIL Stove is more efficient than the traditional open fire. The stove is made of cast concrete, manufactured in Guatemala, and assembled and installed locally. The stove's construction allows it to be more efficient: complete combustion and more efficient energy transfer of energy to pots ensure fast heating and fuel-efficiency. The cast concrete body is moulded in fiberglass moulds and the clay combustion chamber insulated with pumice. The fire is contained in the insulated combustion chamber, thus burning the oil vapor that is normally emitted as smoke. Energy is then efficiently transferred to cooking pots and cooking surfaces. Wood ashes or pumice provides insulation that prevents the heat from being wasted heating the stove body. Normally, hot gases do not touch the "*plancha*" (griddle), wasting their energy. Since the insulation fills the stove cavity to within 1 inch (2.5 cm) of the metal "*plancha*", all the hot gases are forced into contact with the cooking surfaces, transferring their energy to the pot and leaving only enough heat in the exhaust gases to provide a draft up the chimney.

The stove's construction allows it to be more efficient: complete combustion and more efficient energy transfer of energy to pots ensure fast heating and fuel-efficiency. Energy is then efficiently transferred to cooking pots and cooking surfaces. These technology improvements make the ONIL stove more efficient than a traditional open fire.

According to independent stove efficiency tests performed by the independent Aprovecho Research Center ONIL stoves have a "cold start" thermal efficiency is 20 per cent, compared to 10 per cent[2] from the traditional open fire method. The ONIL Stove uses 107 grams of wood to boil a

[1] Default value for open fires as stated in AMS II.G methodology, version 3, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass"

[2] 10% default value specified in methodology AMS II.G, version 3

liter of water, while the traditional open fire method uses approximately 200 grams[3]. The "hot start" efficiency from Aprovecho testing is 26%. Since the stove retains heat once it has been started in the morning the efficiency used in the methodology is a combination of the cold start efficiency of 20% to account for morning use and the 26% efficiency to account for lunch and evening meals. Thus, the weighted average efficiency used in calculations is 24% (0.20*(1/3)+0.26*(2/3)). Annex 3C shows the results from the Aprovecho testing. Note that at time of writing this document, no national nor international standard body (hence no certifying agent recognized by it) exists hence the CME has opted to use the manufacturers' specification for this CPA. The manufacturer obtained the thermal efficiency results from the Aprovecho Research Center.

Deleted: 4C

Voluntary Coordinated Action and User Agreements

When a household purchases an ONIL Stove, the household owns the stove. However, as CDM funding is subsidizing the sales of the ONIL Stoves, users agree in the Registration Card[4] to:

- Cede all CERs to HELPS International as the implementing organization.
- Cooperate with HELPS International for monitoring purposes.
- Replace their conventional open fires with the ONIL Stove.
- Inform HELP International if the ONIL Stove is not in use anymore or handed over to another household.

The Registration Card also holds information regarding:

- The unique stove identification number.
- The GPS coordinates of the stove.
- The name of the buyer, their contact details (village, local government area, municipality, mobile phone number, if applicable), street name and number (if applicable).
- The name of the user and their contact details (if different from the buyer, e.g. the wife of the buyer).

The buyer confirms in the Registration Card (warranty, purchase receipt, Short Message Service - SMS or Information and Communication Technology-ICT or other means) that up to the date of purchase, wood has been used as primary fuel. Households that were only using fossil fuels (LPG, kerosene) or electricity for cooking are not eligible to receive the ONIL Stove at the reduced price. The buyer also confirms that his conventional open fires will not be used anymore and will be disposed of. This will be confirmed when technician's follow-up and check on installation.

Structure of Project Database Information

Each ONIL Stove will start to generate emission reductions in the month following the delivery of the ONIL Stove to account for delays between signing the Purchase Contract and first use.

If replacement of the ONIL Stove within the same household is necessary, e.g. due to damage or theft, the household will get a new ONIL Stove and a new purchase contract will be signed. A new database entry for the replacement stove will be made and the date of last use of the old ONIL Stove will be recorded.

In case of a dropout of a user (e.g. due to shift of the household to a location outside of the boundary of the CPA, or if the user is not using the ONIL Stove anymore), the ending date of the ONIL Stove will be noted and recorded in the database. Dropouts will be identified through field checks by monitoring personnel. In addition, the CPA implementer will remind the user to notify HELPS International if the user moves to a different location. Other interested households may replace the dropouts so that the number of improved cook stoves operating refers to the actual number of stoves in use, not to the number sold.

[3] Aprovecho Research Center, 2004, HELPS "ONIL" Griddle Stove Fuel efficiency and Emissions. Page 2

[4] The term Registration Card refers to a document or set of hard copy or electronic documents that contain information needed for the PoA database. It may include contracts, warranties, surveys, etc.

In case of a change of ownership of the ONIL Stove, whereby the new owner remains within the boundary of the CPA, the name of the old owner will be replaced in the database and in the purchase contract by the name of the new owner. These changes will be recorded during monitoring or communicated to the CPA implementer by ONIL stove users. In case the improved cook stoves are disseminated via focal points, the information about the respective contact person will be entered into the database.

The ONIL Stove implementation process will be monitored and verified.

Implementation Schedule

The "ONIL Stoves – Guatemala – CPA 002" SSC-CPA implementation schedule is the following:

Event	Date	Database activity
Delivery at community	02/2011	Generated database entry including household name, national ID number, and address.
Build database	02/2011	Additional database entry, including GPS coordinates, confirmation of prior conventional open fires use, collect comments
Follow up/monitoring	Ongoing	Data quality check
Complete CPA DD	11/04/2017	N/A
CPA inclusion	19/04/2017	N/A
Verification	To be determined	Review

Deleted: 01/11/2016

Deleted: To be determined

CDM Consideration

The project is being developed under *the* Distribution *of* ONIL Stoves- Guatemala PoA and therefore, *the* CDM has been considered since the beginning of the typical CPA. Prior consideration for the PoA is explained in the PoA DD.

A.2. Location of CPA

>>

Each SSC-CPA will contain a delineated set of households in which ONIL Stoves have been installed within Guatemala. (CPA Implementer) will record names of end-users and the exact location in the SSC-CPA in the program database. End-user names and locations and stove identification numbers will be collected on stove purchase contracts. The sum of The location of these households as within Guatemala, will define the spatial boundary of the SSC-CPA.

The key geographic location of the applied measure (improved cook stoves) is determined using the database of unique stove IDs, the household addresses, GPS coordinates and owners' names and national ID card numbers. These parameters uniquely identify the household. The CPA boundaries equal Guatemala's borders. The geographic coordinates for Guatemala, the CPA boundary, are: Northernmost point N 17° 48.744894' W 89° 9.902344 (*Reserva de la Biosfera Calakmul*), Westernmost point: N 14° 32.202449' W 92° 13.483887; Southernmost point: N 13° 45.280865'W 90° 7.910156 (*Carretera del Litoral);* Easternmost point: N 15° 43.469738' W 88° 13.872070(*Carretera 13*).

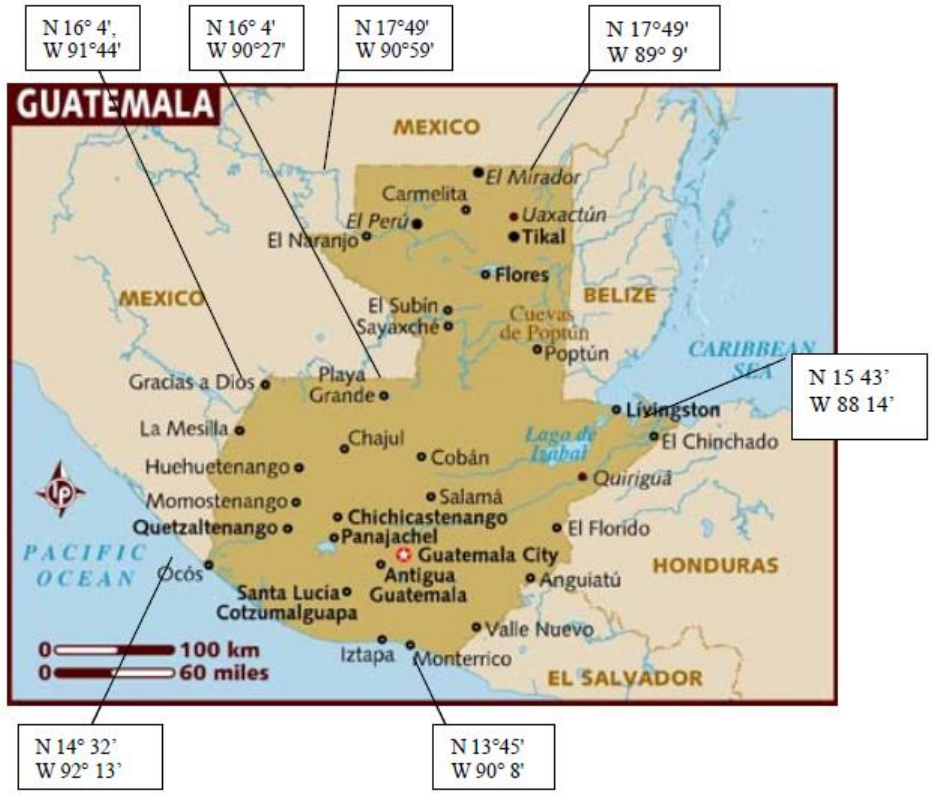


Figure 1. Map of Guatemala, Uspantán CPA[5]

A.3. Technologies/measures

>>

ONIL Stove Technical Details

The ONIL Stove is an improved cook stove that reduces the amount of firewood required by households by up to 58% and results in lower emissions based on its construction and design. Since the efficiency of a traditional open fire is 10%[6] and the efficiency of an ONIL Stove is at least 24%, the ONIL Stove is more efficient than the traditional open fire. The stove is made of cast concrete, manufactured in Guatemala, and assembled and installed locally. The stove's construction allows it to be more efficient: complete combustion and more efficient energy transfer of energy to pots ensure fast heating and fuel-efficiency. The cast concrete body is moulded in fiberglass moulds and the clay combustion chamber insulated with pumice. The fire is contained in the insulated combustion chamber, thus burning the oil vapor that is normally emitted as smoke. Energy is then efficiently transferred to cooking pots and cooking surfaces. Wood ashes or pumice

[5] www.lonelyplanet.com/maps/central-america/guatemala/map_of_guatemala.jpg

[6] Default value for open fires as stated in AMS II.G methodology, version 3, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass"

provides insulation that prevents the heat from being wasted heating the stove body. Normally, hot gases do not touch the "*plancha*" (griddle), wasting their energy. Since the insulation fills the stove cavity to within 1 inch (2.5 cm) of the metal "*plancha*", all the hot gases are forced into contact with the cooking surfaces, transferring their energy to the pot and leaving only enough heat in the exhaust gases to provide a draft up the chimney. These technology improvements make the ONIL stove more efficient than a traditional open fire.

According to independent stove efficiency tests performed by the independent Aprovecho Research Center ONIL stoves have a "cold start" thermal efficiency is 20 per cent, compared to 10 per cent[7] from the traditional open fire method. The ONIL Stove uses 107 grams of wood to boil a liter of water, while the traditional open fire method uses approximately 200 grams[8]. The "hot start" efficiency from Aprovecho testing is 26%. Since the stove retains heat once it has been started in the morning the efficiency used in the methodology is a combination of the cold start efficiency of 20% to account for morning use and the 26% efficiency to account for lunch and evening meals. Thus, the weighted average efficiency used in calculations is 24% (0.20*(1/3)+0.26*(2/3)). Annex 3C shows the results from the Aprovecho testing. Note that at time of writing this document, no national nor international standard body (hence no certifying agent recognized by it) exists hence the CME has opted to use the manufacturers' specification for this CPA. The manufacturer obtained the thermal efficiency results from the Aprovecho Research Center.

Deleted: 4C

A.4. Coordinating/managing entity

>>
Coordinating or managing entity of the PoA as the entity that communicates with the Board is HELPS International

A.5. Parties and CPA implementers

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)
Guatemala (host)	HELPS International	No

A.6. Public funding of CPA

>>
The CPA has not received public funding.

A.7. History of CPA

>>
To date, there are no other SSC-CPAs included in any other PoA or in a project activity involving the distribution or installation of improved cook stoves (ICS) within the UNFCCC or the VCS.[9]

HELPS International, as the CPA implementer, ensures that there is no duplication or double - counting between SSC-CPAs. *(CPA implementer)* has cross-checked the data management system of the PoA to check for duplicates and, if found, has removed any households participating in multiple SSC-CPAs within the PoA. *(CPA implementer)* will confirm during the monitoring process that each household is not already involved in any other CPA or CDM project involving the

[7] 10% default value specified in methodology AMS II.G, version 3

[8] Aprovecho Research Center, 2004, HELPS "ONIL" Griddle Stove Fuel efficiency and Emissions. Page 2

[9] cdm.unfccc.int/Projects/projsearch.html; www.vcsprojectdatabase.org

distribution and/or installation of ICS (as outlined in section K of the PoA defining eligibility criteria for inclusion of CPAs).

Deleted: A.4.2.2

In addition, each CPA will be cross-checked with other CPAs in the PoA and with CPAs in any other PoA or in a CDM project activity operating in the country using the UNFCCC, the Gold Standard, or another relevant voluntary carbon schemes to ensure that the CPA is not included in any other PoA, CDM project activity or voluntary carbon project activity.[10]

The proposed CPA is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

A.8. Debundling

>>

As per section B in the PoA DD, the ONIL Stoves — Guatemala — CPA 002 is exempted from performing de-bundling check.

Deleted: A.4.4.1

According to EB 54, Annex 13, paragraph 10, "If each of the independent subsystems/measures (e.g. biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small scale thresholds defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e. considering as not being a de-bundled component of a large scale activity." (*Insert* "The small-scale threshold is 180 GWh^{th} per year. Each stove in this project is estimated to save around 0.016 GWh^{th} per year, representing only $9*10^{-3}$ percent of the small-scale threshold, thus exempting the SSC-CPA from performing a de-bundling check. The CPAs shall be sized such as to not exceed a total number of ICS that generate more than 180 GWh^{th} in energy efficiency savings per annum.[11]

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

>>

AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass, version 03

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

>>

Only CO_2 is considered in this PoA program. Other greenhouse gasses eligible under the Kyoto Protocol are either not applicable to the project (SF_6, HFC and PFCs), or are considered minor sources of emissions (CH_4 and N_2O) for simplification and therefore excluded from the PoA.[12] This approach is conservative, since in reality the emissions of these gasses will be reduced.

Summary of gases and sources included in the project boundary and justification/explanation where gases and sources are not included:

[10] *Ibid.*

[11] The threshold limit for each CPA with the HELPS International Onil stove is 11,148 obtained by dividing 180 GWh_{th} by the energy savings per stove of 0.016 GWh_{th}/year.

[12] GIRA, 2003, Biomass use as energy source in households, effects on the environment and health y potential solutions *El uso de biomasa como fuente de energía en los hogares, efectos en el ambiente y la salud, y posbles soluciones. Informe final del Grupo Interdisciplinario de Tecnología Rural Apropiada* (GIRA), A.C., p. 9.

	Source	GHG	Included?	Justification/Explanation
Baseline	Firewood for conventional open fire	CO_2	Yes	Important source of emissions
		CH_4	No	Gas is excluded for simplification. This is a conservative assumption.
		N_2O	No	Gas is excluded for simplification. This is a conservative assumption
Project activity	Firewood for ONIL Stove	CO_2	Yes	Important source of emissions
		CH_4	No	Gas is excluded for simplification. This is a conservative assumption.
		N_2O	No	Gas is excluded for simplification. This is a conservative assumption

B.3. Establishment and description of baseline scenario

>>

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

B.4. Estimation of emission reductions

B.4.1. Explanation of methodological choices

>>

The equations under the Distribution of ONIL Stoves – Guatemala PoA section J.6.3 are applied for the CPA.

Deleted: E.6.2

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

Where:

ER_y	Emission reductions during the monitoring period y in tCO2e
$B_{y,savings}$	Total biomass that is saved in tonnes during the monitoring period (*y*)
$fNRB_{,y}$	Fraction of biomass saved by the project activity in monitoring period y that has been established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable biomass by similar consumers. The IPCC default value is selected (81.6 TCO_2/TJ)
L	A net to gross adjustment factor (0.95 default) is applied above (equation (1) of AMS II.G, version 3) in order to adjust B_{old} to account for leakages as per paragraph 13 (a) of the methodology.

Calculating $B_{y, savings}$

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

Option 2.

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

Where:

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

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

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

Where:

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

For the purposes of calculating ex-ante emission reductions a baseline adjustment factor has to be applied to Bold to account for fuel-wood used in a second stove. The baseline survey obtained the average amount of fuel wood used by households with ONIL stoves.

A secondary stove survey was performed by an independent consultant to measure the average amount of fuel wood used by baseline stoves in households that already have an ONIL stove. From this sample the households identified as having a baseline stove still in use were separated. Baseline stove fuel consumption among these households was measured and multiplied by the fraction of households using both, the baseline and the ONIL Stoves. The sampled population was 517 households with ONIL Stoves, of which 89 households or 17% of the population used a baseline stove. Of the subset that had a second stove, 49 households were selected, and the amount of fuel wood used by the baseline stove in one week was measured. The wood fuel consumption of the baseline stove was determined to be 1.22 kg/day. This amount is then excluded from B_{old} in the following way:

From the baseline survey, we have the average daily fuel wood consumption by all households not using an ONIL Stove:

= 18.2 kg/day (see Annex 3B)

Deleted: 4B

Average daily fuel wood consumption by subset of households using an ONIL Stove and a baseline stove:

= 7.08 kg/day

Average daily fuel wood consumption by subset of households using an ONIL Stove and a baseline stove weighted to the proportion of the population using the two stoves:

= 7.08 kg/day*0.172
= 1.22 kg/day

Daily B_{old} = 18.2 kg/day (see Annex 3B)

Deleted: 4B

Less correction = 18.2 kg/day - 1.22 kg/day = 16.98 kg/day
Per year = (16.98 kg/day*365)/1000
$B_{old, adjusted}$ = 6.20 tonnes/year

The percentage of households continuing to use a baseline stove in addition to an ONIL stove will be monitored in order to address paragraph 20 (b) of the AMS II.G (version 3) methodology. The monitored (ex-post) percentage of ONIL users continuing to use a baseline stove in addition to the ONIL stove (parameter SS_y) will be compared to the ex-ante percentage found in the baseline (17%). Bold will be adjusted accordingly based on the proportional SS_y change. The parameter used to calculate ex-post $B_{y,savings}$ adjusted to account for households using ONIL Stoves and baseline stoves will be $B_{old, adjusted}$. This procedure is outlined here (in the formula below 'n' indicates the *oldest* ONIL stove vintage):

$$B_{y,savings} = B_{old,adjusted} \times \left[\sum_{i=1}^{n} N_{y,i} \left(1 - \frac{\eta_{old}}{\eta_{new,i}} \right) \right]$$

Where:

$N_{y,i}$ Total number of stoves in operation for a full monitoring period equivalent within each SSC-CPA

η_{old} Efficiency of the baseline system/s being replaced. The 0.10 default value is used as the replaced systems are three-stone fires or conventional systems lacking improved combustion air supply mechanism and flue gas ventilation system i.e., traditional stoves.

$\eta_{new,i}$ Efficiency of the systems of vintage (*i*) being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol.

$B_{old,adusted} = B_{old} - 0.31 * SS_y / 0.172$

and,

0.31 Amount of biomass used by baseline stoves in households having an ONIL stove and a baseline stove adjusted to the fraction of these households in the overall sample of ONIL households (7.08 Kg/household/day*365 days/year/1000Kg/ton *0.17) according to secondary stove use studies; in tons per year

0.172 Is the fraction of households in secondary stove use study that use baseline stoves along with ONIL Stoves

SSy Is the fraction of households with an ONIL stove that are also using baseline stoves. Calculated as: Total households with ONIL Stoves that use baseline stoves (BLS)/Total number of ONIL Stoves in sample;

B.4.2. Data and parameters fixed ex ante

Data / Parameter	B_{old}
Data Unit	tonnes/year
Description	Quantity of Biomass used in the absence of the project activity (per appliance)
Source of data	Baseline survey, *ex-ante*
Value(s) applied	6.64
Choice of data or Measurement methods and procedures	The baseline survey assessed the average biomass usage per household per annum amongst users of traditional 3-stone fires or traditional pot support, according to interviews in Guatemala.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	L
Data Unit	Fraction
Description	Net to gross adjustment factor to account for leakage
Source of data	Methodology II,G, version 3 leakage adjustment factor
Value(s) applied	0.95
Choice of data or Measurement methods and procedures	A net to gross adjustment factor (0.95 default) is applied in order to adjust B_{old} to account for leakages as per paragraph 13 (a) of the AMS II.G, version 3 methodology.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	η_{old}
Data Unit	Fraction
Description	Efficiency of the system being replaced
Source of data	AMS II.G, *ex-ante*
Value(s) applied	0.10 (default for conventional open fire, as stated in methodology)
Choice of data or Measurement methods and procedures	Provided as default value since replaced system is conventional open fire.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$f_{NRB,y}$
Data Unit	Fraction
Description	Fraction of non-renewable biomass saved by the project activity
Source of data	FAO, *ex-ante*
Value(s) applied	0.913

Choice of data or Measurement methods and procedures	For biomass savings to be calculated, the portion of biomass used that is renewable must be accounted for based on the methodology. The Guatemalan Institute of Forest publications give the number of hectares of reforested area. This area was multiplied by an expected growth volume of different types of forest (m3/ha/yr) and multiplied by an average density of wood, which give the total demonstrably renewable biomass of all the reforested land. Bold is taken from the baseline survey and adjusted (Bold) to account for the quantity of fuel wood used by baseline stoves households that have ONIL and baseline stoves. Bold, is then multiplied by the estimated number of homes in Guatemala (1.746 million) that still use open fires to obtain an estimate of the total amount of fuel wood used in Guatemala ($B_{oldGuatemala}$). NRB is $B_{old,\_Guatemala}$ (excluding fuel wood used in baseline stoves) minus the DRB component. Then, $\mathbf{f_{NRB}}$ = NRB/(NRB +DRB)
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$\mathbf{NCV_{biomass}}$
Data Unit	TJ/t
Description	Net calorific value of non-renewable biomass that is substituted
Source of data	IPCC default value for fuel wood, *ex-ante*
Value(s) applied	0.015
Choice of data or Measurement methods and procedures	Default value that is provided in AMS II.G, version 3
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$\mathbf{EF_{projected\_fossilfuel}}$
Data Unit	tCO_2/TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	IPCC default value, *ex-ante*
Value(s) applied	81.6
Choice of data or Measurement methods and procedures	Default value that is provided in AMS II.G, version 3
Purpose of data	Calculation of baseline emissions
Additional comment	

B.4.3. Ex ante calculation of emission reductions

>>

Emissions reductions are thus computed as:

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

$B_{y,savings}$ per stove = 6.20* (1-.01 /.24) = 3.615 tonnes of wood saved per stove per year
CERs/stove = 3.61 * .913 * .015 * 81.6 * .95
= 3.837 CERs per stove

The maximum number of ONIL Stoves in the CPA will be dependent on the biomass saved by each ONIL Stove ($B_{y,savings}$). As a conservative assumption to estimate CPA size, Bold (6.64 tonnes/year), rather than $B_{old,adjusted}$ (6.20 tonnes/year), is used in to estimate yearly $B_{y,savings}$.[13]

The following formula is used to estimate the maximum number of stoves in the CPA: Maximum ONIL Stoves per CPA = 180 GWH_{th}/($NCV_{biomass}$*$B_{y,savings}$)

11,148 = 180 GWH_{th}/((((0.015TJ/tonne)*(277777.777778kWh/TJ)/1000000)*(6.64*(1-(0.10/[0.24]))))

Given the maximum of 11,148 stoves in this CPA, total yearly emissions reductions from this CPA, using the formula below, would be:

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

ER = 3.615 * 0.913* 0.015 * 81.6 * 0.95
= 3.837 t/CO_2 per appliance

N_y = Number of appliances in CPA
= 11,148

Thus,

ER, $_{tCO2}$ = 11,148 *3.837
= 42,773 tCO_2 per year

Thus, ex ante calculations of emission reductions over crediting period

Year	1	2	3	4	5	6	7
N_y	11,148	11,148	11,148	11,148	11,148	11,148	11,148
ER, $_{tCO2}$	42,773	42,773	42,773	42,773	42,773	42,773	42,773

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	42,773	0	0	42,773
Year 2	42,773	0	0	42,773
Year 3	42,773	0	0	42,773
Year 4	42,773	0	0	42,773
Year 5	42,773	0	0	42,773
Year 6	42,773	0	0	42,773
Year 7	42,773	0	0	42,773
Total	299,408	0	0	299,408
Total number of crediting years	7			
Annual average over the crediting period	42,773	0	0	42,773

[13] B_{old} is proportional to $B_{y,savings}$ and inversely proportional to the maximum number of stoves in a CPA. Therefore, since B_{old}>$B_{old,adjusted}$, the use of Bold to estimate $B_{y,savings}$ results in a conservative estimate of the number of stoves in a CPA.

B.5. Monitoring plan

B.5.1. Data and parameters to be monitored

Data / Parameter	$n_{y,i}$
Unit	Quantity
Description	Number of ONIL Stoves in operation during the monitoring period as determined by the monitoring survey. This includes total number of stoves distributed/installed in the entire CPA.
Source of data	ONIL Stove registration data and data from the Sampling Plan.
Value(s) applied	Variable. Each CPA will have a different number of operational stoves. The monitoring survey will collect the number of stoves that are not in use and these will be removed from the CPA database. The survey will also provide a drop-out rate, which will be applied to the ER calculations for each CPA.
Measurement methods and procedures	The percentage of stoves found to be still in operation, based on the sampling plan in each monitoring period, will be applied to the total number of stoves distributed/installed in each CPA (according to the ONIL stove registration records in the monitoring database and the applicable sample frame). The proportion of sampled ONIL Stoves found to be in operation during each monitoring period will be applied to the total number of stoves for each CPA when calculating emission reductions. If, based on the sample size selected in any monitoring period, the confidence/precision requirements set out in EB 94 Annex 2 are not satisfied, then CPA-Implementers will follow the procedures outlined in the Monitoring Plan (J.7.2 of the PoA-DD) to ensure the required level of confidence/precision is met, or appropriate conservative values as defined by AMS II.G Version 3 are used.
Monitoring frequency	At least every two years
QA/QC procedures	The value will be determined through monitoring field surveys The unique identification number of each stove is logged into the monitoring database. Data from the monitoring survey will be collected each monitoring period by trained staff and applied to the emission reduction calculations. Internal crosschecks by the CME or CPA implementer will be undertaken as QC.
Purpose of data	Calculation of baseline emissions
Additional comment	See section J.7.2 of the PoA-DD for more detail on monitoring procedures

Deleted: EB69

Deleted: 4

Deleted: E

Deleted: E

Data / Parameter	$t_{y,j}$
Unit	Fraction
Description	Fraction of CPA monitoring period the stove is in operation (weeks in operation/total weeks in monitoring period)
Source of data	ONIL Stove registration data in monitoring database and length of monitoring period
Value(s) applied	For the purposes of calculating ex-ante emission reductions, assumption is 1.0.
Measurement methods and procedures	The fraction will be calculated by dividing the number of weeks from the registration date of the stove, or the start date of the monitoring period (whichever is later), until the end of the monitoring period by the total number of weeks in the monitoring period
Monitoring frequency	At least every two years
QA/QC procedures	The unique reference number of each stove shall be logged in the monitoring database. The date of registration shall be utilized to determine the portion of the monitoring period that the stove has been in operation. Any interruption in the stoves' operation (e.g. where stoves are replaced or drop out) will register as missed operating time in the monitoring database for emissions calculation purposes.
Purpose of data	Calculation of baseline emissions
Additional comment	See section J.7.2 of the PoA-DD for more detail on monitoring procedures

Deleted: E

Data / Parameter	η_{new}

Unit	Fraction
Description	Efficiency of the ONIL Stove
Source of data	Efficiency tests in each monitoring period t
Value(s) applied	CPA specific
Measurement methods and procedures	The tests will be coordinated by the CME and undertaken by and independent third party following WBT protocol 3.0 (or more recent version at the discretion of the CME) by the project team or an experienced third party. At time of writing, no national nor international standard body (hence no certifying agent recognized by it) exists hence the CME has opted to use the manufacturers' specification for this CPA.
Monitoring frequency	At least every two years
QA/QC procedures	The WBT Protocol 3.0 or a more recent version will be used at CME discretion
Purpose of data	Calculation of baseline emissions
Additional comment	See section ↓.7.2 of the PoA-DD for more detail on monitoring procedures

Deleted: E

Data / Parameter	SS_y
Unit	Fraction
Description	The fraction of ongoing baseline stove use within the population of in-use ONIL Stoves during a monitoring period.
Source of data	Monitoring of ongoing baseline stove use will be undertaken using the sampling approach outlined in section ↓.7.2 of the PoA-DD (to meet EB 94 Annex 2 confidence/precision requirements).
Value(s) applied	The value applied for the purposes of calculating expected emission reductions is CPA specific according to the baseline biomass consumption applied.
Measurement methods and procedures	A survey will be conducted surveying households if they use a second (baseline) stove as per the monitoring plan outlined in Section ↓.7.2 of the PoA DD. SS_y will be calculated in each monitoring period as follows: the number of sampled households with operational ONIL Stoves that also continue to use a baseline stove divided by the total number of operational ONIL Stoves in the sample. This parameter will be used to calculate the ex-post baseline adjustment factor in each monitoring period, as outlined in section ↓.6.3 of the PoA DD.
Monitoring frequency	At least every two years
QA/QC procedures	Data for this parameter will be collected using the same survey for the parameter ny,j (appliances in operation) conducted by trained project staff members. Internal crosschecks by the CME or CPA implementer will be undertaken as QC.
Purpose of data	Calculation of baseline emissions
Additional comment	See section ↓.7.2 of the PoA-DD for more detail on monitoring procedures. This parameter is used to address paragraph 20 (b) of the AMS II.G (Version 3) methodology.

Deleted: E
Deleted: 69
Deleted: 86
Deleted: 5
Deleted: 4
Deleted: E
Deleted: E.6.2
Deleted: E

Data / Parameter	$B_{old\_Adjusted}$
Unit	Tonnes/year
Description	If baseline stoves continue to be used, adjustment ensures that fuel wood consumption of those stoves is excluded from Bold.
Source of data	Baseline survey, *ex-ante*; monitoring survey *ex-post*
Value(s) applied	Variable - 6.20 used for the ex-ante calculations

Measurement methods and procedures	II.G/Version 3, requires that monitoring ensures that (a) Either the replaced low efficiency appliances are disposed of and not used within the boundary or within the region; or (b) If baseline stoves continue to be used, monitoring shall ensure that the fuel-wood consumption of those stoves is prorated in Bold. Since HELPS International cannot require end users to dispose of stoves, option (b) is used and the wood used for any baselines stoves that continue to be in use was discounted from Bold. The secondary stove survey captured the number of households using a baseline stove in addition to the ONIL stove. The survey also recorded the amount of woody biomass consumed by baseline stoves in households with ONIL Stoves. This last metric is multiplied by the proportion of households using baseline and ONIL stoves and then subtracted from Bold to adjust the baseline woody biomass consumption.
Monitoring frequency	At least every two years
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	See section 7.2 of the PoA-DD for more detail on monitoring procedures.

Deleted: E

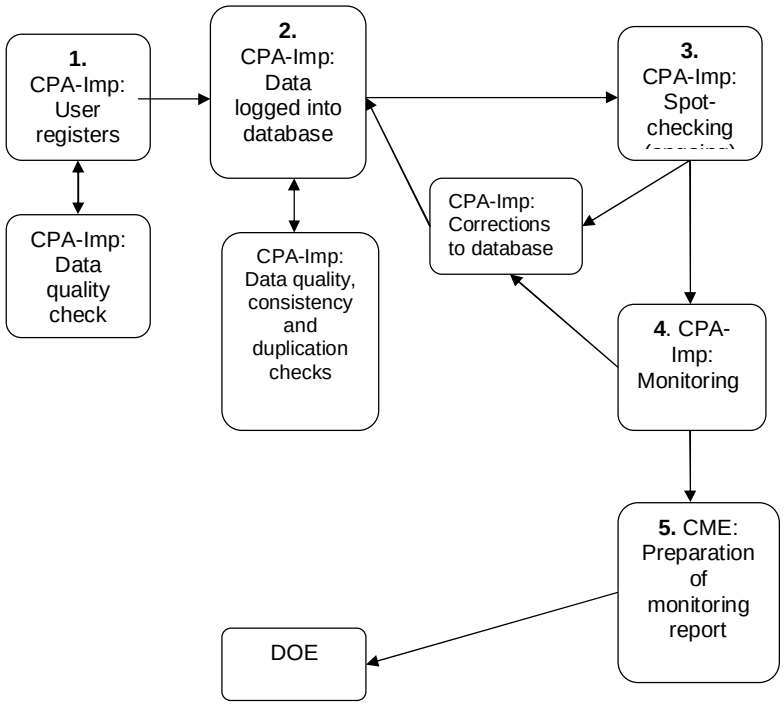
B.5.2. Sampling plan

>>

The Monitoring Plan applied in this CPA involves a number of key elements that ensure that the CME and CPA-Implementer have high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Certified Emission Reductions (CERs) following AMS II.G version 3.0 on the basis of the amount of non-renewable biomass saved by the ONIL Stove in the project activity. The key elements are the following:

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

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



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

1. **CPA-Imp: User registers stove:** CPA Implementer will collect/receive the necessary information requested on the Registration Card from the user. Means of collecting this information may be through a physical Registration Card filled by CPA-Imp staff, retailers, end-users or partner organization's staff, or through the use of ICTs or SMS. CPA Implementers' staff shall double check the accuracy of information provided, and request for field staff additional clarifications if needed;
2. **CPA-Imp: Data logged into database:** CPA Implementer trained staff will input the data in the database either manually (if data collected from physical Registration Card) or this will be automatically input if data was collected using ICTs or SMS. CPA Implementer staff shall double check the information included on the database and check for duplications. Any duplicate information shall be investigated and errors corrected or excluded from the database if it is a true duplicate entry.
3. **CPA-Imp: Spot- checking (ongoing):** CPA Implementer field staff will continually randomly select households included in the database and visit them to cross-check the information on the database with the factual evidence in the field. Any inconsistencies found (e.g. change in the address of a user) will be updated on the database, and in the case ONIL Stoves are found to be no longer in use, they will be clearly marked as such and excluded from emission reductions calculations.

Deleted:

4. **CPA-Imp: Monitoring:** CPA Implementer will follow the requirements as per SSC-POA-DD to collect the necessary information for a monitoring report.
5. **CME: Preparation of monitoring report:** the CPA Implementers or the CME will prepare the final monitoring report to be provided to the verifier DOE for verification of emission reductions. A copy of the monitoring report will remain with the CME

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

Sampling Plan

As per *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities* [14], the sampling plan is the following:

(a) Sampling Design

Due to the large number of ONIL Stoves envisioned to be distributed as part of the CPAs to be included in the SSC-PoA, it is not economically feasible to monitor each individual ONIL Stove unit distributed. Therefore, representative sampling will be undertaken as part of a PoA-wide (by grouping and sampling across CPAs) Sampling Plan that is designed in line with the requirements of the "Standard for sampling and surveys for CDM project activities and programme of activities" from EB 94, Annex 2 (the *Sampling standard*).

(i) Objective and Reliability Requirements:

The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the crediting period, and with 95/10 confidence/prevision (as per paragraph 21 of EB 94 Annex 2) for annual and 95/5 for biennial sampling across CPAs. In case a single CPA is sampled, or sampling is not done across CPAs, 90/10 precision for annual and 95/5 precision shall be required for biennial sampling.[15]

Monitored Parameters:

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

(ii) Target Populations:

- The target population for the proportion of ONIL Stoves still in operation ($n_{y,i}$) and for percentage of continued baseline stove use among ONIL households in the database (SS_y) of this this POA are all households in the POA database which are using fuel wood ONIL Stoves distributed under the POA for cooking.
- The target population for efficiency of new appliances ($\eta_{new,i}$) is the set of stoves (same model and manufacturer) distributed of vintage *i* across CPAs that are working and are in the database.

(iii) Sampling Frame

[14] EB 94 Report Annex 2

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

Deleted: 86
Deleted: 3
Deleted: 86
Deleted: 3
Deleted: 86
Deleted: 3

To ensure the homogeneity of the CPAs included for a single sampling plan, two sampling frames shall be defined. In overall, all CPAs will have the same group of end users which is from rural area. The CPAs are to be implemented in Guatemala (specifically in rural area), thus it is expected that the geographical locations do not have influence on the parameter of interest. Therefore, all these 3 parameters can be assumed to be highly homogeneous for each ICS model regardless of how the end user group and distribution/installation location is defined.

Deleted: Two sampling frames shall be defined:

1) Sampling frame for proportion of ONIL Stoves still in operation ($n_{y,i}$) and percentage of continued baseline stove use among ICS households in the database (SS_y)

The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: the Registration Card for newly distributed ONIL stove and the Monitoring Survey (which includes a household questionnaire and visual inspection of ONIL Stoves) that will be used throughout the lifetime of the SSC-PoA. The registration card (or equivalent) is used to populate the stoves Database and the Monitoring Survey follows the EB 94 Annex 2 "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities".

Deleted: 86
Deleted: 3

The SSC-POA is open to different CPA Implementers and different models of ONIL approved Stoves. As explained below (on section "sampling method"), to take the different characteristics of different CPA Implementer and ONIL Stove models into consideration, CPAs shall be grouped together to create a Primary Sampling Unit which is homogenous. As per EB 94 Annex 2, section 5, paragraph 21 allows for the use of a single sampling plan covering a group of CPAs, provided the homogeneity of population can be demonstrated, or differences are taken into account in the sample size calculation, a 95/10 confidence/precision is applied for annual sampling. As per Methodology AMS II.G version 03 paragraph 22, a 95/5 confidence/precision shall be achieved for biennial sampling. In case a single CPA is sampled or sampling is not done across CPAs, 90/10 precision for annual and 95/5 precision shall be required for biennial sampling.

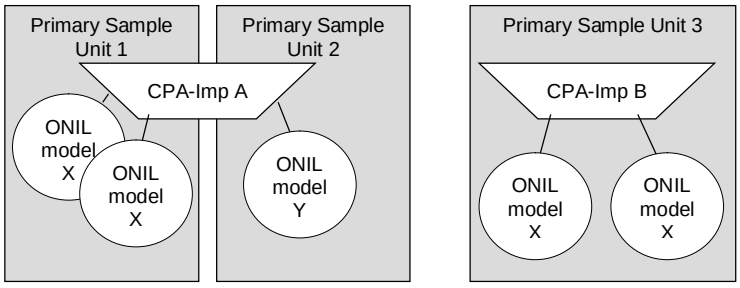
Deleted: 86
Deleted: 3

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

1. The same CPA Implementer
2. The same ONIL Stove model

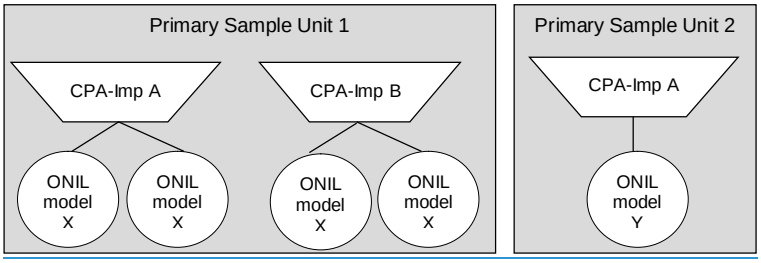
I.e. CPAs with the same CPA Implementer and same ONIL stove model can therefore be grouped together and form a Primary Sampling Unit. In the event the SSC-POA has two different CPA Implementers using the same ONIL stove model, these form two different Primary Sampling Units. Same is true if the same CPA Implementer has two different ONIL stove models being implemented – this will form two Primary Sampling Units.

The below schematics illustrates the example used above. This is justified by the fact that CPA Implementer might vary in terms of performance and it is important for the CME to collect and monitor accurate data for each CPA Implementer distributing each stove model.



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

The thermal efficiency of operational ONIL Stoves shall vary in accordance with its model, but not within different CPA Implementers.
The thermal efficiency of the ONIL Stove is expected to change over the time. Hence for parameter $\eta_{new,i}$ the Primary Sampling Unit shall be defined as the group of ONIL Stoves of the same model and same vintage. If the same CPA Implementer has two different ONIL Stove models being implemented in the same vintage – this will form two Primary Sampling Units. Finally, two primary sampling units will be formed by ONIL Stove from two different vintages and all other factors (Stove model and CPA Implementer) remaining equal. The below schematics illustrate the example used above assuming all stoves in the schematic are in one vintage.



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

(iv) Sampling Method

Simple Random Sampling will be used and samples will be randomly selected from the primary sampling units as illustrated above.

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

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

$n_{y,i}$: Visual inspection of the premises to see if ONIL stove is operational and in use. Interview with end user if required to verify that ONIL stove is still in use (Yes/No)

SSy: Interview with end user and visual inspection to determine if a baseline (replaced) stove is still being used in addition to ONIL stove (Yes/No)

$\eta_{new,i}$: ONIL Stoves will be tested using WBTs (ONIL stove thermal efficiency)

Deleted: Municipalities where ONIL Stoves are distributed in Primary Sampling Units will form Secondary Sampling Units.

Deleted: Hence for parameter $\eta_{new,i}$ the Primary Sampling Unit shall be defined as the group of ONIL Stoves of the same model and same vintage. Ie. Take the example of

Deleted: The sampling method for both monitored parameters $n_{y,i}$, SS_y and $\eta new,i$ is multi-stage sampling (as per EB 86 Annex 4 Section 5.5). This is the most appropriate method given the large number of ONIL Stoves and the geographical area of the country where ONIL Stoves are expected to be disseminated, using this approach the sampling effort can be concentrated in a set of localities (municipalities in this case), thereby reducing travel needs and associated costs. This method is justified by the fact that though the baseline of the POA is homogenous, the ONIL Stove models and CPA Implementer may vary for different CPAs, hence it is appropriate to use a two-step approach so to take these variations into consideration.¶
¶
A multi-stage sampling combines the cluster and simple random sampling approaches in a multi-stage sampling approach, and can be thought of as sampling from a group of CPAs, and then going on to sample units within each group (paragraph 39, Appendix 1 of EB 86 Annex 4). In a first stage, all CPAs that have been included in the monitoring period are grouped into Primary Sampling Units - following the 2 sampling frames described above (ie. Primary Sample Units for $n_{y,i}$ and SS_y are CPAs with same CPA Implementer and same ONIL Stove model; and Primary Sample Units for $\eta_{new,i}$ are CPAs with the same ONIL Stove model and same vintage regardless of CPA Implementer). Each Primary Sampling Unit will be comprised of a number of municipalities– the Secondary Sampling Units – and the number of households/ ONIL Stoves within each sampled municipality which will be visited/sampled. The number of municipalities to be sampled is selected using a simple random sampling approach from a list of all municipalities present in each Primary Sampling Unit[16]. Once the municipalities are defined, ONIL Stoves /households present in each municipality will be randomly selected.

Deleted: municipalities and

Deleted: This is also applicable to towns, as the database will contain all the towns where ICSs are located and therefore each town can be assigned a number at 1 and increasing up to the total number of towns in the Database for that pre-defined sampling frame.

The efficiency of ONIL Stoves ($\eta_{new,i}$) as determined by the water boiling test evaluated during the monitoring period. The efficiency of ONIL Stoves will be determined across CPAs using the same stove model and same vintage (Primary Sample Unit). Using the formulas below, the CME will randomly sample the required number of ONIL Stoves the primary sampling units. It is important to note that $\eta_{new,\ i}$ and hence the thermal efficiency test must take into consideration --and be conducted for-- each ICS vintage. As an illustrative example, consider a PoA that distributed a single ICS manufacturer/model but had two vintages: 75% of the total ONIL Stoves distributed have been in use for less than 365 days (i.e. vintage 1) and 25% have been in operation for over 365 days but less than 730 days (i.e. vintage 2). In this case, 2 Primary Sampling Units shall be formed with each sampling unit represents one vintage. For each vintage, a number of ONIL Stoves are to be randomly selected and sampled and the sample sizes are to be determined using the below equations. The mean thermal efficiency of each vintage shall be used for calculating emission reductions for all stoves of vintage *i*. I.e. if $\eta_{new,i}$ for stoves vintage 1 is 26% and vintage 2 is 24%, then all ONIL Stoves which have been in use for less than a year will use a thermal efficiency of 26% in its calculations, while stoves vintage 2 will use 24%. In the event the monitoring period is over one year (let's use the example of 2 years) and an ONIL stove has began its operation on the first day of the monitoring period, the stove shall apply the equivalent number of days in operation under vintage 1 and the equivalent number of days of operation under vintage 2. For avoidance of doubt, in every monitoring period, all ONIL Stove vintages will be sampled and the thermal efficiency for each vintage shall be established and used for the calculation of emission reductions for that monitoring period.

(v) Sample Size

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 threshold for annual and 95/5 for biennial monitoring periods). In case a single CPA is sampled, or sampling is not done across CPAs, a 90/10 confidence/precision is required for annual sampling and 95/5 confidence/precision shall be required for biennial sampling.[17]

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using a 95 per cent confidence level, and a 10 per cent margin of error, the samples will be randomly selected from each Primary Sampling Unit. There are three parameters that will be estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($n_{y,i}$), the fraction of baseline stoves in use within the population of operational ONIL Stoves during a monitoring period (SS_y) and the average ONIL stove efficiency, ($\eta_{new,i}$). Of these three parameters to be monitored, two are proportions/percentages (SS_y and $n_{y,i}$) and one is a mean value $\eta_{new,i}$.

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

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

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

[17] As per Methodology AMS-II.G version 03 paragraph 22

Deleted:

Deleted: from a certain (dictated by the calculations below) number of municipalities. Eg. In the below calculations, in order to meet the minimum sampling size, the CME will randomly sample 10 ONIL Stoves in each of the 3 municipalities

Deleted:

Deleted: municipalities and

Deleted: within those municipalities

Deleted: appropriate number of municipalities and households

Deleted: a random

Deleted: of municipalities

Deleted: Households within the selected municipalities will therefore be randomly selected among the population in the selected municipalities.

Deleted: The parameter $n_{y,i}$ and SS_y will be sampled in a single survey with a random sample of households and municipalities using the above described confidence/precision levels depending on annual or biennial monitoring frequency.¶
¶
An overview of the estimated sample sizes for a hypothetical population of 265 municipalities and 70 ONIL units applying a level of 95/10 is provided below.

Deleted: ¶
The proposed multi-stage sampling approach requires the estimation of municipality sample sizes for each Primary Sampling Unit. The CME shall decide the number of ONIL Stove to sample within each municipality and calculate the municipality sample sizes accordingly to meet the required level of confidence/precision. All Primary Sampling Units (unique combinations of ONIL Stove models and CPA Implementer, or groups of same ONIL Stove model and vintage) will be sampled. Therefore, the selection of a sample of Primary Sampling Units will not be required. However, given the multitude of Secondary Sampling Units (municipalities) and ONIL Stove envisaged to make part of the proposed PoA, using a sampling approach for these sampling units is considered appropriate. The municipalities and then the ONIL Stove within municipalities to sample shall be randomly selected. ¶

Deleted: In order to calculate the required sample size estimates, values for the proportions and the mean values are required. Furthermore, the standard deviation needs to be assumed in case of sampling for a mean value.

Deleted: the values as described below are applied

Deleted: into account

To estimate the number of sample size for parameters $n_{y,i}$ and SS_y the following equation[18] is used:

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

Where:

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

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

1. The population size, N, is taken as 100,000 households. (Assuming one ONIL Stove for one household).
2. It is expected at least 80% of ICS still in operation, hence the expected proportion *p* for $n_{y,i}$ is taken as 0.8.
3. According to Baseline study, it is expected that 17.2% of baseline stove still in use. As per Standard for sampling and surveys for CDM project activities and programme of activities, a proportion can describe either of the two possible scenarios of the success rate or the failure rate and project proponents may use the larger of the two proportions in the sample size calculation, which is *p* or (1−*p*). The sample size calculation is therefore based on anticipating a discontinued use of 80%. Thus the expected proportion *p* for SS_y is taken as 0.828 which is the value of the larger proportion.
4. The expected mean of ICS thermal efficiency is 0.24 and its standard deviation is 0.048.

Sample size calculation:
The calculation of the required sample size for each parameter in the first monitoring period is illustrated below for a 95/10 level of confidence and precision (for biennial monitoring periods the sample sizes will be recalculated using 95/5 values as per Methodology AMS-II.G version 03 paragraph 22). In all cases a conservative approach is taken, however if for any parameter the required 95/10 confidence/precision is not met then the CME will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds.

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

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

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

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

Deleted: To estimate the number of towns to be sampled for parameters $n_{y,i}$ and SS_y the following equation[19] is used:¶

$$c \geq \frac{\frac{SD_B^2}{\bar{p}^2} \times \frac{M}{M-1} + \frac{SD_W^2}{\bar{p}^2} \times \frac{(\bar{N}-\bar{u})}{(\bar{N}-1)}}{\frac{precision^2}{z} + \frac{1}{M-1} \times \frac{SD_B^2}{\bar{p}^2}}$$ ¶

¶
Where¶
¶
c = number of municipalities that should be sampled¶
M = total number of municipalities in the population¶
$\bar{u}$ = number of households/ONIL Stoves to be sampled within each municipality ¶
$\bar{N}$ = average number of households with ONIL Stoves per municipalities ¶
SD_B^2 = Unit variance (variance between municipalities)¶
SD_W^2 = average of group variances (average within municipalities variation)¶
$\bar{p}$ = overall proportion¶
z = Constant (z-score) referring to the level of confidence (e.g. 1.96 for 95% ¶
confidence).¶
Precision = Required precision (e.g. 10% = 0.1)¶
¶
A pilot study revealed initial values to estimate sample sizes for Primary Sampling Units where the CPA Implementer is HELPS International and the stove model is the "ONIL plancha" stove. These values (obtained for parameters $\mathbf{SS_y}$ and $\mathbf{n_{y,i}}$) are used to exemplify the sample size calculations and are presented below:¶
¶
… [1]

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

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

Parameter SS_y:

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

$$n \geq \frac{1.96^2 \times 100{,}000 \times 0.828(1-0.828)}{(100{,}000-1) \times 0.1^2 \times 0.828^2 + 1.96^2 \times 0.828(1-0.828)} = 80$$

The required sample size to be sampled from the primary sampling unit is at least 80.

As in the case of parameter ny,i, if the resulting sample size based on the above equation is smaller than 30 ONIL Stoves, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion.

Parameter $\eta_{new,i}$:

For the purposes of determining sample size in the first monitoring period, the performance of ONIL Stoves can be characterized into two groups, which are characterized by the range of likely mean efficiency and the likely values of SD relative to the mean, according to the type of ONIL Stoves. The ONIL Stoves models that are manufactured in modern factories tend to be very highly efficient and have been designed to meet stringent efficiency specifications so the standard deviation is expected to be relatively low. Where key components of ONIL Stoves (e.g. the combustion chamber and flue) are not manufactured but instead are installed on-site or handmade, then the mean efficiency is expected to be in the range of 20-30% with relatively higher variability.

To estimate the sample size for parameter η_{new} the following equation[25] is used:

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

Where:

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

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

[25] Equation 4 of Appendix 2, *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities (EB 86, Annex 4)*

Deleted: ¶
¶
¶
$$c \geq \frac{\frac{0.033}{0.861^2} \times \frac{265}{265-1} + \frac{1}{63} \times \frac{0.091}{0.861^2} \times \frac{(70.04-6}{(70.04-1}}{\frac{0.1^2}{1.96^2} + \frac{1}{265-1} \times \frac{0.033}{0.861^2}}$$
¶
¶
Therefore, in this case a sample size of 16 municipalities where 63 stoves are sampled in each municipality is sufficient to achieve the required confidence/precision for the $n_{y,i}$ value. In case the resulting sample size to achieve the desired confidence/precision levels is smaller than 30 ICS, then the sample size shall increase to 30 accordance with EB 69 Annex 4, Section IV, paragraph 12 and footnote 15 to approximate normal distribution. The increase shall be made in the number of ONIL Stoves sampled per municipality or the number of municipalities to sample.¶

Deleted: pilot study results and the

Deleted: [24]¶
¶
$$c \geq \frac{\frac{0.020}{0.828^2} \times \frac{265}{265-1} + \frac{1}{63} \times \frac{0.14}{0.828^2} \times \frac{(70.04-6}{(70.04-}}{\frac{0.1^2}{1.96^2} + \frac{1}{265-1} \times \frac{0.020}{0.828^2}}$$
¶
¶
The resulting sample size in this case is 11 municipalities where 63 stoves are sampled in each municipality.¶

Deleted: then the sample size shall increase to 30 in accordance with EB 69 Annex 4, Section IV, paragraph 12. The increase shall be made in the number of ONIL Stoves sampled per municipality or the number of municipalities to sample.¶

Deleted: (30-50% thermal efficiency)

Deleted: number of municipalities to be sampled

Deleted: 33

Deleted: *69*

Deleted: *5*

Deleted: , *Version 1.0*

$$n \geq \frac{1.96^2 \times 100{,}000 \times \left(\frac{0.048}{0.24}\right)^2}{(100{,}000-1) \times 0.1^2 + 1.96^2 \times \left(\frac{0.048}{0.24}\right)^2} = 15.36$$

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

The sample size for parameter $\eta_{new,y,i}$ is referred to the equation below[26]:

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

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

$$n = \left(\frac{1.96 \times 0.048}{0.1 \times 0.24}\right)^2 = 15.37$$

Thus n is rounded up to 16.
The calculation now need to repeat using t-value for 95% confidence and n = 16

$$n = \left(\frac{2.131 \times 0.048}{0.1 \times 0.24}\right)^2 = 18.17$$

And n is rounded to 19.

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

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

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

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

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

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

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

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

(b) Data:

(i) Field Measurements:

To monitor the number of stoves that continue to be in use (***$n_{y,i}$***) and the percentage of continued baseline stove use among ONIL Stove households in the database (***SS_y***), the data collected will be a representative number of stoves in the database that are in use for the monitoring period. The scope is a representative sample of stoves only across CPAs with the same CPA Implementer and same ONIL Stove model in this-PoA. The method of collecting data will be field surveys of required sample size of ONIL stove users in the database. Frequency of data collection is one survey per monitoring period. Data will be collected from the field surveys, entered in the database and included in the monitoring report. To monitor the efficiency of the stove at least every two years (as required by the AMS II.G version 3 methodology) a new test will be conducted to determine the rate at which a sample of stoves from a given vintage year deteriorate in efficiency. The method to collect the efficiency data will be the Water Boiling Test.

The table below summarizes field measurement data requirements

Parameter	Timing (indicative)	Frequency (required by AMS II.G –Version 3)	Methods to be applied	Comments on seasonal fluctuation
$n_{y,i}$	Monitoring will likely occur every 12 months	No less frequently than every two years	Visits to the premises, visual inspection and interview with ONIL stove end-user	Unlikely to be due to any seasonal fluctuation.
SS_y	Monitoring will likely occur every 12 months	No less frequently than every two years	Visits to the premises, visual inspection and interview with ONIL stove end-user.	Unlikely to be due to any seasonal fluctuation.
$\eta_{new,i}$	Monitoring will likely occur every 12 months, and will include ONIL Stove from all	No less frequently than every two years	Water Boiling Test (WBT) Protocol Version 3.0 (or more recent at the discretion of the CME).	Unlikely to be due to any seasonal fluctuation

Deleted: ¶
¶

$$c \geq \frac{\frac{SD_B^2}{Clustermean^2} \times \frac{M}{M-1} + \frac{1}{\bar{u}} \times \frac{SD_W^2}{Overallmean^2}}{\frac{precision^2}{z^2} + \frac{1}{M-1} \times \frac{SD_B^2}{Clustermean^2}}$$

¶
¶
Where:¶
c = number of municipalities that should be sampled¶
M = total number of municipalities in the population¶
$\bar{u}$ = number of households/ONIL Stoves to be sampled within each municipality¶
$\bar{N}$ = average number of households with ONIL Stoves per municipality¶
SD_B^2 = Unit variance (variance between municipalities)¶
SD_W^2 = average of group variances (average within municipality variation)¶
Clustermean = average efficiency of ONIL Stoves across municipalities¶
Overallmean = average efficiency of all ONIL Stoves monitored ¶
z = Constant (z-score) referring to the level of confidence (e.g. 1.96 for 95% ¶
confidence).¶
Precision = Required precision (e.g. 10% = 0.1)¶
¶
Given that the same number of stoves will be tested in each municipality, the weight of each ONIL Stove to the Clustermean and to the Overallmean is the same. Hence the Clustermean is equal to the Overallmean – ie. the average of efficiency of ONIL Stoves across municipalities is the same of the average efficiency of all ONIL Stoves monitored. The above equation shall, therefore, be simplified as:¶
¶
¶

$$c \geq \frac{\frac{SD_B^2}{mean^2} \times \frac{M}{M-1} + \frac{1}{\bar{u}} \times \frac{SD_W^2}{mean^2} \times \frac{\left(\bar{N}-\bar{u}\right)}{\left(\bar{N}-1\right)}}{\frac{precision^2}{z^2} + \frac{1}{M-1} \times \frac{SD_B^2}{mean^2}}$$ ¶

Where:¶
Mean = mean thermal efficiency of the monitored ONIL Stoves¶
¶
Given that variability is mostly dependent on the inherent characteristics of the units (ONIL Stoves) and is not expected to be affected by local conditions, the variation in efficiency across municipalities is thought to be lower than the variation within municipalities. For the example below, it is assumed that the efficiency is the same as the ICS for this CPA, or 24%. The unit standard deviation is 1.92% and the average of within municipality standard deviation is 4.35%.[27] The number of ONIL to be sampled from each municipality is set at 5 for the purposes of exemplifying the calculations and the thermal efficiency of the ONIL Stoves model is 24%[28]. ¶
¶

$$c \geq \frac{\frac{0.0192^2}{0.24^2} \times \frac{265}{265-1} + \frac{1}{6} \times \frac{0.0435^2}{0.24^2} \times \frac{(70.04-}{(70.04-}}{\frac{0.1^2}{1.96^2} + \frac{1}{265-1} \times \frac{0.0192^2}{0.24^2}}$$

¶
¶ ... [2]

	vintages for which emission reductions are to be claimed in that monitoring period			

(ii)Quality Assurance/Quality Control

The CME will apply measures to ensure the required confidence/precision for each sampled parameter is met, allowing for non-response and the possible removal of outliers from the sample, as part of a Quality Control/Quality Assurance system. The choice of measure applied to each parameter will depend on the cost of each data collection approach and logistics required. The CME will determine the most effective measure for each parameter from the following list (illustrated using a required sample size of 20 and an effect of non-response of 2 to 4 ONIL Stoves[29]):

- Oversampling: Randomly draw a sample of minimum 24 ONIL Stoves and collect data from each
- Buffer Group: Randomly draw a sample of at minimum 24 ONIL Stoves and collect data from only 22 ONIL Stoves. If this would not result in the required sample size data would be collected from the additional 2 ONIL Stoves that were selected in the sample.
- Draw an additional sample: Randomly draw a sample of 22 ONIL Stoves and collect data from these. If the required sample size is not achieved, an additional sample of 2 elements will be drawn and included in the sample.
- Use lower confidence bound (of $n_{y,j.}$ or $\eta_{new,i}$) or, with a conservative approach according to the parameter definitions, the upper confidence bound of SS_y.

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

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

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

The calculation of the sample size will be carried out using estimates for parameter proportions, mean values and standard deviations, as the actual characteristics of the population/sampling frame are unknown. In order to ensure the quality of the sampling results, the CME can draw on the provisions for reliability calculations including estimating the bounds of the confidence interval, the standard error of the mean value or proportion, and the t-value as derived from the t-distribution[30]. In the event that the sampling results do not fulfil the required level of confidence and precision, the CME can undertake additional samples. If the reliability is still not sufficient after raw data and summary statistics are scrutinized and after additional samples have been collected,[31] the sampling may be repeated with an increased sample size. Alternatively, the CME may choose to apply the lower bound (or higher bound according to the more conservative approach, as for example in the proportion of end-users who continue to use a baseline stove, SS_y) of the sampling results as is allowed for by the methodology (AMS II G v3, paragraph 22).

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

Deleted: The following approach will be used t

Deleted: ¶
¶
Because the sample size of parameter $\eta_{new,i}$ will by definition be 30 or above in any monitoring period, o

Deleted: for parameter $\eta_{new,i}$

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

(i) Data archiving

Hard copies of the surveys will be kept and the registration database will have back up. Original stove purchase contracts (SMS data and/or paper registration card or equivalent) or other means of acceptance by the users will be stored in the main office for the coordinating entity. A back-up of the registration database will also be stored on an electronic medium by the CME. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

(ii) Analysis

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

- A list of households participating in each CPA, including name, community/location, distribution/installation date and unique serial number;
- Testing to ensure that the stoves are still operating above the minimum 20% efficiency required by the AMS II.G (version 3) methodology, by the CPA Implementer, CME or a third party certified by a national standards body or an appropriate certifying agency recognized by it.
- Where replacements are made, assurance that the efficiency of the new ONIL Stoves is similar to the specified.

Data obtained from the samples will be used to estimate proportions and mean values for the parameters described above. The values will then be factored into the emissions reduction calculations and result in the request for issuance of CERs for that group of CPAs – the primary sampling Units. The parameters are applied for emission reduction calculations as outlined in J.6.3 of the SSC-PoA-DD. The stoves that are not in use will be excluded from emissions reductions calculations and will not be counted towards the total number of ONIL Stoves in operation during

Deleted: [32]

Deleted: E.6.2

[30] As provided by the *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities* (EB 86, Annex 4)

[31] As per EB 86 Annex 4

Deleted: 69

Deleted: 5 paragraphs 220 to 290

Deleted: 69

Deleted: 5 paragraphs 258 to 314

the monitoring period. The thermal efficiency of new stoves ($\eta_{new,i}$) will be used in the calculation of the per stove emission reduction, which will be multiplied by the number of stoves in operation in the CPA to obtain the emission reductions per CPA.

(c)Implementation

Sampling for the purpose of emission reduction calculation and elaboration of the monitoring report will occur at the end of each monitoring period. This sampling will be conducted by trained personal either part of the CPA Implementer or CME team, or an experienced third-party entity. The credentials and/or training materials for the sampling personal will be provided to the DOE at verification. The maximum length of one monitoring period will be two years (duration, not calendar years), as AMS II.G., version 3, provides the option for annual or biennial monitoring. The CPA Implementer will be responsible for managing household data collection and entry into the project database. Field personnel will receive training on how to properly deal with surveying techniques and reduce errors and sign a document certifying that there is no conflict of interest of those involved in data collection and analysis. If there is conflict of interest, the personnel will not be allowed to participate in data collection and analysis. The project database will record the start and end dates of each monitoring period and record the emission reductions attributable to each monitoring period. Appropriate record keeping procedures will be implemented to ensure that each monitoring period data set can be transparently attributed to its corresponding CPA, preventing any occurrences of double counting. An internal review of the project database will be able to determine the current status of each SSC-CPA—the duration of previous monitoring periods, the households delivering monitoring data, and current verification activities.

(i) Assessment for Leakage

See Section E.2. According to methodology II.G, version 3, leakage related to the non-renewable woody biomass saved by the project activity shall be assessed on *ex-post* surveys of users and the areas from which the woody biomass is sourced. The methodology offers the alternative that if B_{old} is multiplied a net to gross adjustment factor of 0.95 to account for leakages, surveys are not required. This -PoA will use the 0.95 leakage adjustment factor instead of *ex-post* surveys.

The other source of leakage occurs if equipment currently being utilised is transferred from outside the boundary to the project activity. All ONIL Stoves in the PoA will be newly manufactured/assembled or newly installed. Where second-hand/used ONIL Stoves are distributed to an end-user the ONIL Stoves will be from within the project (ie previously newly manufactured/assembled and either a demonstration model or transferred from one end-user within the project to another new or existing end-user). In both of these cases there will no equipment (ONIL Stoves) being utilized outside the project area (any project non-participant) that is transferred to the project area (included as an ONIL Stove in the database) so leakage defined in paragraph 14 of the AMS II.G (version 3) methodology is not considered. Where second-hand/used ONIL Stoves are transferred within the project area (between end-user project participants) the database will be updated to reflect this change to ensure there is no double counting of ONIL Stoves.

(ii) Disposal of Low Efficiency Appliances and Use of Baseline Stoves

When an ONIL Stove is distributed the end user receives information explaining that the conventional open fire appliance must no longer be used. Follow-up meetings with end users will ensure that those who have received an ONIL Stove are using it properly and that the conventional open fire is no longer in use. As per methodological condition 20 (b), if it is determined that the conventional open fire is still in use and the ONIL stove is also in use, the wood used in conventional open fire will be subtracted from B_{old}. The number of households continuing to use a baseline stove in addition to their ONIL Stove, will be monitored throughout the project lifetime. This will be achieved using a single sample for in-use appliances ($n_{y,i}$) described above, and will meet EB 94, Annex 2 confidence/precision requirements. The number of households continuing to use a baseline stove, in addition to their ONIL stove, will be used to calculate the percentage of households with operational ONIL stove that also use a baseline stove (*SSy*).

Deleted: 69

Deleted: 4

(iii) Monitoring Reporting

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

B.5.3. Other elements of monitoring plan

>>

Please refer to Section I.7.2.

SECTION C. Start date, crediting period type and duration

C.1. Start date of CPA

>>

19/02/2011[33]

C.2. Expected operational lifetime of CPA

>>

The CPA is expected to have an operational lifetime of 21 years and 0 months (total of 252 months).

C.3. Crediting period of CPA

C.3.1. Type of crediting period

>>

Renewable crediting period

C.3.2. Start date of crediting period

>>

01/01/2017 or date of CPA inclusion, whichever is later

C.3.3. Duration of crediting period

>>

7 years, renewable period.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

This information is provided at the PoA level.

D.2. Environmental impact assessment

>>

This information is provided at the PoA level.

[33] The CDM Glossary of terms, version 6 (page 18), states that the start date "In the context of a CDM project or PoA, the earliest date at which either the implementation or construction or real action of the CDM project activity or PoA begins." EB55, Annex 38, paragraph 7(d) states "The starting date of the CPA cannot be prior to the commencement of validation of the programme of activities, i.e. the date on which the CDM-POADD is first published for global stakeholder consultation." The start date of this project is 19/02/2011, which is the date when stoves were first delivered (implementation).

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>
This information is provided at the PoA level.

E.2. Summary of comments received

>>
This information is provided at the PoA level.

E.3. Consideration of comments received

>>
This information is provided at the PoA level.

SECTION F. Eligibility for inclusion

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence[34]
1	Geographical boundaries of CPAs consistent with the geographical boundary of the PoA.	(a) The geographical boundary of the CPA is Guatemala. CPA implementers may use self-declaration to prove that all the ONIL Stoves from the CPA will be located in Guatemala.	Refer to left column	The PPs self-declare that all stoves will be sold within the boundary of Guatemala. Self-declaration was provided to validator.
2	Conditions to avoid double counting of GHG emission reductions or net anthropogenic GHG removals, such as unique identifications of product and end-user locations.	(b) Each CPA must ensure no double counting takes place. Each SSC-CPA shall be uniquely identified and defined in an unambiguous manner by a database of uniquely identified households in which ONIL stoves have been installed. Each household will be assigned a unique ID in the database, which will be linked to information for each entry on the following (as appropriate and available): • Name of stove user or head of the household • Address of end user or household • Phone number of end	Refer to left column	The CPA is uniquely identified and defined in an unambiguous manner by a database of uniquely identified households in which ONIL stoves have been installed. Each household has been assigned a unique ID in the database, which is linked to information for each entry on the following: • Name of stove user or head of the household • Address of end user or household • Phone number of end user or

[34] Per EB 70, Annex 5, paragraph 13, eligibility criteria need to demonstrate usability to assess inclusion of the CPA.

		user or household • GPS location of household • Stove model • Date of distribution/installation • ONIL Stove serial number • Retailer/distributer information • Identification of cooking method prior to installation of stove The compliance with the criterion is confirmed via checks on the database.		household • GPS location of household • Stove model • Date of distribution/installation • ONIL Stove serial number • Retailer/distributer information • Identification of cooking method prior to installation of stove HELPS International has provided the database
3	Conditions to check only ONIL stoves will be installed in the CPA and where applicable, distribution mechanisms.	(c) Each SSC-CPA will involve the distribution and installation of ONIL Stoves, either by CPA Implementers or authorized installers under the PoA. CPA implementers must show the database with information as detailed in criterion (b).	Refer to left column	This CPA has only distributed and installed ONIL Stoves by HELPS or authorized installers Database has been presented with information in criterion (b)
4	Conditions to check the start dates of CPAs through documentary evidence;	(d) Each CPA must demonstrate through documentary evidence that the PoA start date is before the CPA start date. Compliance check is done through supporting documentation, like a Registration Card, confirming date of receipt of first stove in the CPA.	Refer to left column	PPs provided the validator with proof of installation of the first stove in this CPA to be 15/03/2017_which is not before the than the start date of the PoA which is 19/12/2012.
5	Conditions to ensure compliance with the applicability of the applied methodologies.	(e) Each SSC-CPA must implement version 3 of the baseline and monitoring methodology AMS II.G, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" and ensure CPA compliance with applicability of the methodology. Criteria confirmed by evaluating 1) ONIL Stove efficiency report and 2) Documentary evidence that fuel wood has been used since 1989, and 3) through Specific CPA-DD Monitoring Plan.	Refer to left column	Compliance with applicability conditions and other requirements of AMS.II.G._Ver. 03 are applied and followed by the PPs. The compliance with the two applicability criteria are evidenced by: WBT proving that the ONIL Stove implemented under this CPA has an efficiency of 24% as per the manufacturers specifications, hence over the 20% minimum specified in

				Paragraph 1 of the methodology; and published literature, which was given to the DOE, providing evidence that nonrenewable biomass has been used since 31 December 1989 in Guatemala. The monitoring plan presented in the CPA DD is in compliance with methodology AMS II. G version 3
6	Conditions to ensure that CPAs meet the requirements for demonstration of additionality.	(f) According to paragraph 2 (c) of EB 68 Annex 27 "Guidelines on the Demonstration of Additionality for Small-Scale Project Activities" version 09.0, the documentation of barriers is not required for "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." Implementers should demonstrate additionality by confirming the following: 1) The CPA is solely composed of isolated ONIL Stoves; this is evidenced by eligibility criteria b) which defines that each ONIL Stove distributed is an isolated unit with a single serial number attached to it. 2) The sum of all ONIL Stoves in the CPA (maximum number of ICSs in the CPA) will generate equal or less than 180 GWh^{th} in energy savings per year, so to remain below the small scale threshold	Refer to left column	1. Each unit in the CPA has a unique serial number associated, as evidenced by the CPA database. In addition, each stove will be associated to a household by listing the name of the individual who is the ICS user or head of household. 2. The number of stoves in the CPA is capped at 11,148 as to not exceed the 180 GWh^{th}/year small-scale threshold limit. Calculations outlining the maximum number of stoves in this CPA have been provided to the validator. 3. Calculations have been provided demonstrating that the ONIL model distributed under this CPA does not result in more than 5% small-scale CDM thresholds. The energy savings per stove (assuming a perfectly efficient stove with 100% efficiency) are 0.0277 GWh^{th} per year,

		limit; this will demonstrated by the following equation which will be presented to the DOE at time of CPA inclusion: Maximum ICS per CPA = 180 $GWH_{th}/(NCV_{biomass}*B_{y,savings})$[35]. 3) ONIL Stoves units installed under the CPA do not exceed 5% of the SSC threshold; this is evidence by eligibility criteria (j), which evidences that each ONIL Stove saves in fact no more energy than 1% of the small-scale thresholds[36].		representing only 0.0138 % the small-scale CDM thresholds of 180 GWh^{th}.
7	Conditions to check the target group of ONIL Stove and cooking method prior to installation of ONIL Stoves.	(g) Each CPA must show that the target group of ONIL Stoves is households that were using open cooking fires and not already involved or covered by any other CPA or CDM project involving the distribution and/or installation of improved cook stoves. Each household self-identifies the cooking method used prior to the installation of the ICS at the time when geographic coordinates and unique identification numbers are collected. Confirmation of this criterion is done via the Registration Cards where the user acknowledges he/she was not previously using an ICS and that it was previously using open cooking/traditional stoves. The Registration Cards and the database will be available to the CME and for verification of emissions reductions.	Refer to left column	Each household self-identified the cooking method used prior to the installation of the ONIL Stove at the time when geographic coordinates and unique identification numbers were collected. At time of inclusion of this CPA, no other CPA using the same name was found in any other PoA or project activity operating in Guatemala. The CME researched the web on the relevant websites of the registries. The UNFCCC, the Gold Standard, and other relevant voluntary carbon schemes databases were reviewed. The CME has provided the Registration Card

[35] $B_{y,savings}$ calculation is presented in section E.6.3. of the PoA DD, and parameters (n_{new} and SS_y) can be checked by reviewing laboratory results and monitoring survey results.

Deleted: E.6.2

[36] The procedure to demonstrate that each ICS implemented under this CPA will generate energy savings of below 1% of the SSC is evidenced in Section A.4.4.1 of the PoA under "de-bundling", where it is shown that using the highest possible stove efficiency (100% efficiency), still the ICS is in the order of magnitude of 0.015% of the SSC limit – hence way below the 1% limit and so 5% limit.

				format that will be used under this CPA and will make available the set of Registration Cards corresponding to each of the CPA stoves to the CME and for verification of emissions reductions.
8	If the generic CPA applies sampling for the determination of parameter values for calculating GHG emission reductions or net anthropogenic GHG removals, conditions related to sampling requirements for the PoA in accordance with the "Standard: Sampling and surveys for CDM project activities and programme of activities.	(h) Each CPA must follow sampling requirements for PoA in accordance to approved standards (EB 94, Annex 2), as outlined in section 7.2 of the PoA DD, where simple random sampling is the selected approach.37	Refer to left column	This CPA comply with all the requirements for EB 94, Annex 2. The precise monitoring plan this CPA will follow is the one outlined in section 7.2 of the PoA-DD and presented in Annex 4 of this CPA-DD. The sampling method for all three monitored parameters $n_{y,j}$, SS_y and $\eta_{new,i}$, is Simple Random sampling (as per EB 94 Annex 2). ONIL stoves within this CPA will belong to one or more Primary Sampling Units for parameter $\eta_{new,i}$. These Sampling Units are groups of stoves of the same ONIL Stove model and same vintage.
9	Conditions to ensure that CPAs that will be included meet the small-scale thresholds and remain within those thresholds throughout the crediting period of the CPAs.	(i) Each CPAs shall be sized such that no CPA will exceed a total number of ONIL Stoves that generate more than 180 GWhth in energy savings per annum and will remain within that threshold throughout the crediting period of the CPA to conform to the SSC threshold for type II projects as per EB 61	Refer to left column	PPs have calculated a maximum number of stoves in this CPA to be limited to 11,148 stoves. Together the stoves energy savings do not exceed 180 GWh^{th} per year. A separate Excel spread sheet with this information

Deleted: 69
Deleted: 92
Deleted: 4
Deleted: 69
Deleted: 92
Deleted: 4
Deleted: E
Deleted: multi-stage
Deleted: E
Deleted: multi-stage
Deleted: 69
Deleted: 86
Deleted: 5
Deleted: 4
Deleted: This CPA will be part of a Primary Sampling Unit for parameters ny,i and SSy, and will be grouped with other CPAs where HELPS International is the CPA Implementer and where the stove distributed is the ONIL "Plancha" Stove (refer to PoA-DD Section EI.7.2 Subsection iv "Sampling Method" for details).

[37] Under this approach, two Primary Sampling Units are defined. One for the proportion of $n_{y,i}$ and SS_y (proportions), and another for parameter $\eta_{new,i}$ (mean value). All Primary Sampling Units will be sampled in two stages. In a first stage, municipalities to sample will be randomly selected from each Primary Sampling Unit. In a second stage ONIL Stoves/households will be randomly selected from each of the selected municipalities. The CME will ensure that the reliability requirements are met and that procedures in Section 7.2 of the PoA-DD are followed.

Deleted: E

		Annex 21 paragraph 3. Supporting calculations must be provided to ensure compliance with this eligibility criterion.		has been provided to the validator. The CPA database lists all stoves distributed under the CPA. Any ONIL Stove that takes the CPA over the 180 GWh^{th} threshold will be excluded from the ER calculations.
10	Conditions for the debundling check based on the "Methodological tool: Assessment of debundling for small-scale project activities"	(j) Each CPA must perform a debundling check and show that it is not part of larger project. Check is done by assuring that each stove included in the CPA saves no more energy than 1% of the small scale thresholds, set at 180 GWh^{th} per year. Supporting calculations must be provided to ensure compliance with this eligibility criterion.	Refer to left column	PPs calculated the savings of each stove to each stove in this CPA saves around 0.016 GWh^{th} per year, representing only $9*10^{-3}$ per cent of the small-scale threshold. The excel calculations were presented to the DOE.
11	Conditions to provide an affirmation that funding from Annex I Parties, if any, does not result in a diversion of official development assistance;	(k) Each CPA must provide affirmation that funding from Annex 1 parties, if any, does not result in a diversion of official development assistance. Confirmation via self-declaration.	Refer to left column	HELPS International provided a self-declaration letter stating that no ODA funds were diverted or used in this CPA. The letter was presented to the DOE.
12	Conditions to ensure that an agreement in place between the household user (Stove owner) and CPA implementer regarding the ownership of the CERs.	(l) Each CPA must have a contractual agreement, such as a Registration Card with the household user, indicating that CERs generated by the use of the ONIL Stove will be transferred to the CME or a Project Participant in this PoA. The precise mechanism can be established on a CPA basis. For example, a registration card, Short Message Service (SMS), Information and Communication Technologies (ICT), or other means, signed or accepted by the end-user upon distribution or installation of the stove, stating that the end-user voluntarily participates in the POA and transfers ownership of the carbon assets for the life of	Refer to left column	HELPS International had collected user data using a Registration Card. The implementation team has informed the end user that by purchasing the ONIL Stove, the end user is transferring the carbon rights to the CME or focal point entity.

		the stove. Confirmation via inspection of Registration Card or database.		
13	Conditions to check whether technology transfer exists from Annex 1 countries.	(m) Each CPA must provide a self-declaration of whether technology transfer exists from Annex 1 countries.	Refer to left column	PPs provided self-declaration that no technology transfer took place from Annex 1 countries to Guatemala.
14	Specification of the technology/measure and performance specification based on testing/certification.	(n) Each CPA must clearly show that the implementation of the improved cook stove reduces anthropogenic emissions of GHG. Confirmation via efficiency tests on the ONIL Stove model.	Refer to left column	PPs have shown through published data that the implementation of ONIL Stove reduces anthropogenic emissions of GHG.
15	Conditions to confirm the approval of CPA by the CME for inclusion of CPA into the PoA.	(o) Each CPA must be approved by the CME prior to its incorporation into the SSC-PoA. Confirmation via letter of approval signed by CME representative.	Refer to left column	Helps International is the Coordinating Managing Entity of this PoA and the Project implementer for this CPA. A declaration was provided to the validator.
16	Proof of receipt of ONIL Stoves by the household user.	(p) Each CPA must show proof of delivery and receipt of stoves already distributed under the CPA (if any). Confirmation via Registration Card or user-signed receipt.	Refer to left column	The CPA has demonstrated proof of receipt of stoves.

Appendix 1. Contact information of CPA implementers

Organization name	HELPS International Incorporated
Country	Guatemala
Address	Calzada Atanasio Tzul 21-00 Zona 12 Complejo Empresarial El Cortijo II Bodega 517 01007 Guatemala
Telephone	011(502) 2428-6600
Fax	011(502) 2428-6666
E-mail	-
Website	www.helpsintl.org
Contact person	Richard Grinnell

Appendix 2. Affirmation regarding public funding

No public funding is used for this SSC-CPA.

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

BASELINE INFORMATION

Calculation of Annual Emissions Reductions for typical SSC-CPA

Annex 4A: Questionnaire ONIL Stove Survey (before or without ONIL Stove use)

ONIL STOVE SURVEY

1. What type of stove do you use to cook? May have more than one answer.

	Answer	Mark with X	# Days/week
a.	Open fire (3 stone) /comal		
b.	ONIL		
c.	De Gas		
d.	Electricity		
e.	Other :		

2. What type of fuel do you use in your house for cooking? May have more than one answer.

	Response	Mark with X
a	Fuel wood (leña)	
b.	Agricultural waste (coconut, sugar cane, etc.)	
c.	Electricity	
d.	LPG	
e.	Other: (Specify)	

If LPG is used: what size tank do you use___? How long does this tank last_____?

3. For what activity do you use the fuel wood in your house?

Response	Mark with X

a.	Make tortillas	
a.	Cook in general	
b.	Cook beans	
c.	Boil water	
d.	Warm home	
e.	Other use:	

4. How do you obtain your fuel wood (leña)?

Response		Mark with X
a.	Purchased	
b.	Gathered in someone else's property	
c.	Gathered in own property	
d.	Forest thinning	
e.	Gather in forest	
f.	Other way: (specify)	

5. How much fuel wood do you use each day?
(The interviewee must physically show the interviewer how much wood is used daily and the interviewer will weigh it)

Amount weighed: _____ Kg.

6. How much wood do you use each week?

Response		Before having ONIL stove	Since having ONIL stove
a.	Don't use		
b	Less than 1 carga		
c.	1 carga		
d	1 bestia = 2 cargas		
e.	1 tercio = 1 vara largo x 1 vara alto		
f	½ tarea[38] = 4 cargas		
g.	1 tarea = 8 cargas= 1vara largo x4 varas alto		
h.	Otra:		

7. What tree type do you use most for leña?

Ressponse		Mark w X	Ressponse		Mark w X
a.	Avocado (*Persea americana*)		k.	Silky-oak (*Grevillea robusta*)	
b.	Aracuaria (*Araucaria* sp.)		l.	Alder (*Alnus jorullensis*)	
c.	Coffee (*Coffea sp.*)		m.	Jacaranda (*Jacaranda mimosifolia*)	
d.	Corn (*Zea mays*)		n.	Fig tree (*Ficus sp.*)	
e.	Sugar Cane (*Saccharum sp.*)		o.	*Ajachel edulis*	
f.	Wild cherry (*Prunus serotonina*)		P	*Engelhardtia guatemalensis*	
g.	Cipress (*Cupressus sp.*)		q.	Pine (*Pinus* sp.)	
h.	'Cozaniza'				
i.	*Inga sp*.				
j.	Oak (*Quercus* sp)		r.	Other:	

[38] A "Tarea" is a unit of measure used in firewood, equivalent to 400 pounds; ESMAP Technical Paper 060, "Evaluation of Improved Stove Programs in Guatemala: Final Report of Project Case Studies", December 2004. www.esmap.org/esmap/sites/.../06004GuatemalaFinalEnglishforWeb.pdf

8. How much does your family spend on firewood monthly?

Response (Quetzales)[39]		Mark with X	Amount
a.	Less than 50		
b.	Between 51 and 100		
c.	Between 101 and 150		
d.	Between 151 and 200		
e	Between 201 and 250		
f.	More than 250		
g.	Otra:		

General info:

9. Interviewee's name:_____
10. Have you always used firewood for cooking?____Y_____N _____(to cross reference with age to establish 1989 fuel wood use).
11. Gender: F_____ M_____ 11. Number of people in family: _____
12. State/Municipality/Community: _____
13. Comments:

[39] Quetzales is Guatemalan currency, eight quetzales is approximately equivalent to one dollar

Annex 4B: Survey Results

Results for households who do not have Onil Stove

Question		Unit	TOTAL	Percent of N
	Number of households interviewed (N)	N	204	102%
2	Average N° of eaters	N	5.70	
8	Fuel Wood Users	N	199	97.5%
8	Agricultural Waste	N	7	3.4%
8	Electricity Users	N	0	0.0%
8	LPG Users	N	15	7.4%
8	Kerosene Users	N	0	0.0%
8	Cardboard	N	1	0.5%
8	Wood shavings	N	2	1.0%
9	Daily wood consumption	Kg/day	18.2	
11	Fuel Wood Procurement: collecting	N	47	21.0%
11	Fuel Wood Procurement: buying	N	145	64.0%
Comments	Use of non-renewable biomass since 1989 (years using biomass)	N	27.6	
	Mean Wood Fuel consumption (incl. Charcoal) per eater	kg/day	3.19	
	Mean Annual wood fuel weight per household (incl. Charcoal)	kg/a	6,643.00	
	Standard Deviation of Mean daily wood fuel weight per household	Kg/day	13.20	

Results for households with ONIL stove:

Question		Unit	TOTAL	Percent of N
	Number of households interviewed (N)		198	100%
2	Average N° of eaters	N	5.90	
8	Fuel Wood Users	N	194	98%
8	Agricultural Waste	N	11	5.6%
8	Electricity Users	N	0	0.0%
8	LPG Users	N	23	11.6%
8	Kerosene Users	N	0	0.0%
8	Cardboard	N	0	0.0%
8	Wood shavings	N	2	1.0%
9	Daily wood consumption	Kg/day	6.9	
11	Fuel Wood Procurement: collecting	N	42	21.2%
11	Fuel Wood Procurement: buying	N	125	63.1%
Comments	Use of non-renewable biomass since 1989 (years using biomass)	N	25.5	
	Mean Wood Fuel consumption (incl. Charcoal) per eater	Kg/day	1.17	
	Mean Annual wood fuel weight per household (incl. Charcoal)	Kg/a	2,518.50	
	Standard Deviation of Mean daily wood fuel weight per household	Kg/day	4.90	

Annex 4C: Efficiency of the system being deployed as compared to the system being replaced.

Test performed by the Aprovecho Research Center in Cottage Grove, Oregon, USA[40].

Stove type / model	Helps ONIL stove		Total Emissions			Specific Emissions (per liter water) (corrected for moisture content and initial water temp)		
Location	Aprovecho							
Wood species	douglas fir							
Wind conditions	none							
				Phase 1				Correction Factor
1. HIGH POWER TEST (COLD START)	units	Test 1	Totals	(cold start)				0.0827
Time to boil Pot #1	min	29	CO	47.19	grams	CO	3.9000	gr/liter
Burning rate	g/min	35.55	CO2	1978	grams	CO2	163.4808	gr/liter
Thermal efficiency	--	0.20	HC(propane)	1.6114	grams	HC(propane)	0.1332	gr/liter
Specific fuel consumption	g/liter	129.25	appx PM mg	107	mg	appx PM mg	8.8627	gr/liter
Temp-corrected specific consumption	g/liter	107.12	CO/CO2ratio	0.0375				
Firepower	watts	11,090	Flame Temp	781	degrees C			
				Phase 2				
2. HIGH POWER TEST (HOT START)	units	Test 1	Totals	(hot start)				
Time to boil Pot #1	min	23	CO	23.25	grams	CO	1.9569	gr/liter
Burning rate	g/min	32.79	CO2	1524	grams	CO2	128.2684	gr/liter
Thermal efficiency	--	0.26	HC(propane)	1.2943	grams	HC(propane)	0.1089	gr/liter
Specific fuel consumption	g/liter	98.81	appx PM mg	86	mg	appx PM mg	7.2716	gr/liter
Temp-corrected specific consumption	g/liter	83.08	CO/CO2ratio	0.0240				
Firepower	watts	10,527	Flame Temp	873	degrees C			
				Phase 3				
3. LOW POWER (SIMMER)	units	Test 1	Totals	(simmer)				
Burning rate	g/min	12.71	CO	23.62	grams	CO	5.6007	gr/liter
Thermal efficiency	--	0.16	CO2	1462	grams	CO2	346.6415	gr/liter
Specific fuel consumption	g/liter	142.48	HC(propane)	2.2962	grams	HC(propane)	0.5444	gr/liter
Firepower	watts	4,081	appx PM mg	112	mg	appx PM mg	26.5504	gr/liter
Turn-down ratio	--	2.58	CO/CO2ratio	0.0254				
			Flame Temp	544	degrees C			

[40] http://www.aprovecho.org/lab/home

Annex 4D: Baseline Calculations

CER per Stove

Parameter	Unit	Value	Data Source
$B_{old,adjusted}$	t/a	6.20	Baseline Survey
L_y (Leakage, 5 %)	t/a	0.95	Calculated
$B_{old,net}$ (With gross adjustment factor for leakage)	t/a	5.89	Calculated
η_{old}		0.1	Default IPCC value per II.G, v3
η_{new}		0.24	Aprovecho Data 2004
$B_{y,savings}$	t/a	3.43	Calculated
$f_{NRB, y}$		0.913	Calculated (see below)
$NCV_{biomass\ (TJ/t)}$	TJ/t	0.015	IPCC Default Value
$EF_{projected\ fossil\ fuel}$	t CO_2/TJ	81.6	IPCC Default Value for LPG
ER_y	**t CO_2**	**3.837**	
# of households in region who cook with firewood (2006)	1746329		Instituto Nacional de Estadistica, Environmental Indicators, page 299
B_{old_Guate} (Quantity of biomass used in absence of appliance) TOTAL	945,658.8		Calculated (Tons per year)
Estimation of wood fraction fNRB,y			
Estimated density (kg/m3)	600		hypertextbook.com/facts/2000/ShirleyLam.shtml
DRB			
Average tree planted density m^3/ha	141		FAO Informe nacional Guatemala
Establishment of reforested forest 2010 (ha/yr)	11,178		INE_Guatemala_Indicadores_Ambientales 2008
Reforested volume 2010 (m^3)	1576098		Calculated
Quantity of wood (tons)	945658.8		Calculated
NRB			
NRB= By (quantity of wood use) - DRB	9878328.842		Calculated
F NRB = NRB/(NRB+DRB)	**0.913**		Calculated

Appendix 4. Further background information on monitoring plan

Details have been provided in Section B.5 of this document

Deleted: Not applicable.

Appendix 5. Summary report of comments received from local stakeholders

Details have been provided in Section F of PoA-DD

Deleted: Not applicable.

Appendix 6. Summary of post-registration changes

During the registration, the sampling method applied in the monitoring plan is multi-stage sampling. Multi-stage sampling is a sophisticated method which is not easy to be implemented and the date analysis is difficult. Given that the population being studied is relatively homogeneous with respect to the parameter being studied, therefore simple random sampling is chosen to replace the existing sampling method. Accordingly, sampling frame, sampling method and sample size calculation of monitoring plan is revised with information correlated with simple random sampling.

Deleted: Not applicable.

- - - - -

Document information

Version	*Date*	*Description*
08.1	20 October 2017	Editorial revision to remove appendix "Applicability of methodologies and standardized baselines" from the main part of the form which had been mistakenly kept in the previous version.
08.0	28 June 2017	Revision to: • Remove appendix "Applicability of methodologies and standardized baselines" as the appendix is not relevant at the CPA level; • Make editorial improvement.
07.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and PoA-DD forms; • Make editorial improvement.
06.0	24 May 2017	Revision to: • Ensure consistency with the "Standard: CDM project standard for programme of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Component project activity design document form for small-scale component project activities" (CDM-SSC-CPA-DD-FORM); • Make editorial improvement.
05.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
04.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
03.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the component project activity design document form for CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a CPA implementer and/or responsible person/ entity for completing the CDM-CPA-DD-FORM in A.13. and Appendix 1; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and Appendix 6; • Change the reference number from F-CDM-CPA-DD to CDM-CPA-DD-FORM; • Make editorial improvement.

Version	*Date*	*Description*
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project activity design document form" (EB 66, Annex 16).
01.0	27 July 2007	EB 33, Annex 42 Initial adoption.

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

To estimate the number of towns to be sampled for parameters $n_{y,j}$ and SS_y the following equation[1] is used:

$$c \geq \frac{\frac{SD_B^2}{\bar{p}^2} \times \frac{M}{M-1} + \frac{SD_W^2}{\bar{p}^2} \times \frac{\left(\bar{N}-\bar{u}\right)}{\left(\bar{N}-1\right)}}{\frac{precision^2}{z} + \frac{1}{M-1} \times \frac{SD_B^2}{\bar{p}^2}}$$

Where

c	= number of municipalities that should be sampled
M	= total number of municipalities in the population
$\bar{u}$	= number of households/ONIL Stoves to be sampled within each municipality
$\bar{N}$	= average number of households with ONIL Stoves per municipalities
SD_B^2	= Unit variance (variance between municipalities)
SD_W^2	= average of group variances (average within municipalities variation)
p	= overall proportion
z	= Constant (z-score) referring to the level of confidence (e.g. 1.96 for 95% confidence).
Precision	= Required precision (e.g. 10% = 0.1)

A pilot study revealed initial values to estimate sample sizes for Primary Sampling Units where the CPA Implementer is HELPS International and the stove model is the "ONIL plancha" stove. These values (obtained for parameters $\boldsymbol{SS_y}$ and $\boldsymbol{n_{y,i}}$) are used to exemplify the sample size calculations and are presented below:

	$\boldsymbol{SS_y}$	$\boldsymbol{n_{y,i}}$
Proportion value (p)	0.172	0.861
Unit variance (SD_B^2)	0.020	0.033
Average of group variances (SD_W^2)	0.145	0.091

If the proportion values are lower than 0.5, it is appropriate[2] to use the larger proportion (1-p) to determine the sample size. In this case, the larger proportion value of 0.828 (1-0.172) is used to exemplify the calculations of SS_y.

In addition, the following assumptions are made to exemplify the sample size calculation for parameters $n_{y,j}$ and SS_y:[3]

The total number of municipalities in the Primary Sampling Unit is 265 (also applicable to $\eta_{new,i}$)

[1] Equation 16 *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities (EB69, Annex 5, Version 2.0)*

[2] In accordance to EB 69 Annex 4 "*Standards for Sampling and Surveys for CDM Project Activities and Programme of Activities,"* paragraph 11(a)

[3] These assumptions will be updated prior to the monitoring effort to optimize the cost of the sampling effort and to reflect the actual number of municipalities to be included in the monitoring period.

The number of households • to be sampled within each municipality is 63
The average number of households with ICS per municipality is 70.04 (also applicable to $\eta_{new,i}$)

In cases where the sample size required for a municipality is larger than the number of ONIL Stoves available for monitoring in that location,[4] the sample will be complemented by selecting the next closest ONIL Stoves to the municipality until the proposed number of households with ONIL Stoves is obtained. The determination of the closest ONIL Stoves to the town will be estimated using GPS coordinates, and measured from a midpoint of the chosen municipality[5].

The sample size equation will be updated with the values obtained during monitoring from previous periods or with pilot data collected by CPA Implementers or the CME. If the number of municipalities is determined to be insufficient based on actual monitoring data, additional municipalities will be randomly selected from the Database until the desired level of confidence/precision is attained for a specific Primary Sampling Unit.

In cases where for any reason (eg. Physical access impaired by natural conditions such as flooding; or political instability leading to insecure conditions, etc) a municipality cannot be sampled, another municipality will be randomly selected from the database.

Page 25: [2] Deleted Vinit Garg 2/1/2018 7:02:00 PM

$$c \geq \frac{\frac{SD_B^2}{Clustermean^2} \times \frac{M}{M-1} + \frac{1}{\overline{u}} \times \frac{SD_W^2}{Overallmean^2} \times \frac{\left(\overline{N}-\overline{u}\right)}{\left(\overline{N}-1\right)}}{\frac{precision^2}{z^2} + \frac{1}{M-1} \times \frac{SD_B^2}{Clustermean^2}}$$

Where:
c = number of municipalities that should be sampled
M = total number of municipalities in the population
$\overline{u}$ = number of households/ONIL Stoves to be sampled within each municipality
$\overline{N}$ = average number of households with ONIL Stoves per municipality
SD_B^2 = Unit variance (variance between municipalities)
SD_W^2 = average of group variances (average within municipality variation)
Clustermean = average efficiency of ONIL Stoves across municipalities
Overallmean = average efficiency of all ONIL Stoves monitored
z = Constant (z-score) referring to the level of confidence (e.g. 1.96 for 95% confidence).
Precision = Required precision (e.g. 10% = 0.1)

[4] The ONIL Stoves available for monitoring are the number of households with ONIL Stoves in that village that are willing to respond to monitoring surveys and inspections.

[5] The midpoint of any given village shall be defined as the average GPS coordinates (longitude and latitude) of all ONIL Stoves in that village contained in the CME Database.

Given that the same number of stoves will be tested in each municipality, the weight of each ONIL Stove to the Clustermean and to the Overallmean is the same. Hence the Clustermean is equal to the Overallmean – ie. the average of efficiency of ONIL Stoves across municipalities is the same of the average efficiency of all ONIL Stoves monitored. The above equation shall, therefore, be simplified as:

$$c \geq \frac{\frac{SD_B^2}{mean^2} \times \frac{M}{M-1} + \frac{1}{\bar{u}} \times \frac{SD_W^2}{mean^2} \times \frac{\left(\bar{N}-\bar{u}\right)}{\left(\bar{N}-1\right)}}{\frac{precision^2}{z^2} + \frac{1}{M-1} \times \frac{SD_B^2}{mean^2}}$$

Where:
Mean = mean thermal efficiency of the monitored ONIL Stoves

Given that variability is mostly dependent on the inherent characteristics of the units (ONIL Stoves) and is not expected to be affected by local conditions, the variation in efficiency across municipalities is thought to be lower than the variation within municipalities. For the example below, it is assumed that the efficiency is the same as the ICS for this CPA, or 24%. The unit standard deviation is 1.92% and the average of within municipality standard deviation is 4.35%.[6] The number of ONIL to be sampled from each municipality is set at 5 for the purposes of exemplifying the calculations and the thermal efficiency of the ONIL Stoves model is 24%[7].

$$c \geq \frac{\frac{0.0192^2}{0.24^2} \times \frac{265}{265-1} + \frac{1}{6} \times \frac{0.0435^2}{0.24^2} \times \frac{\left(70.04-10\right)}{\left(70.04-1\right)}}{\frac{0.1^2}{1.96^2} + \frac{1}{265-1} \times \frac{0.0192^2}{0.24^2}} = 4.38$$

Under this approach, the number of municipalities where 6 stoves will be sampled is 5 to achieve the required 95/10 confidence/precision. As a conservative measure, if the resulting sample data is found not to meet the 95/10 threshold then additional municipalities will be randomly selected to test ONIL Stoves until the required 95/10 threshold is met.

As in the case of parameter all other monitoring parameters, if the resulting sample size based on the above equation is smaller than 30 ONIL Stoves, then the sample size shall increase to 30 in accordance with EB 69 Annex 4, Section IV, paragraph 12. The increase shall be applied to the number of ONIL Stoves to test within each municipality.

The CME may choose to use the same municipalities to monitor more than one parameter. For instance, the CME can sample SS_y, $n_{y,i}$ and $\eta_{new,i}$ –or a combination of these parameters- in the same municipality. To do this, the CME shall first randomly select a list of municipalities from the pool of municipalities in the database. The number of municipalities to select in this first stage

[6] The values were estimated using an Excel simulation of a pilot, where 6 municipalities are selected and 5 ICS are tested in each municipality for thermal efficiency. Random generators following a normal distribution were used to simulate the pilot. The simulation used a 4.9% standard deviation, based on the project planner knowledge of the data as per EB 69 Annex 4 paragraph 12 (c), and a mean of 24% based on test results.

[7] 24% is the thermal efficiency (η_{new}) of the ICS used in this CPA.

corresponds to the largest municipality sample size obtained for any of the monitoring parameters. In the examples above, the largest municipality sample size required corresponds to parameter $n_{y,i}$ ($n_{y,i}$ needs a sample of 16 municipalities, while $n_{y,i}$ and $\eta_{new,i}$ only need 11 and 3 respectively). From this pool, the CME will randomly select municipalities for the parameters that require smaller municipality sample sizes. For example, from the initial pool of 16 municipalities where $n_{y,i}$ will be sampled, the CME would randomly select 11 municipalities to sample parameter SS_y. Likewise, from the same pool of 16 municipalities, the CME will randomly select 3 municipalities to sample $\eta_{new,i}$. Sampling more than one parameter in the same municipality helps reduce travel needs for monitoring and the associated costs. At the same time this approach ensures the random selection of municipalities for every parameter, as municipalities are randomly selected.

If municipality sample sizes are the same for the three monitoring parameters, the random selection of municipalities would only be performed once for all parameters.