Programme of activities 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 PoA	Distribution of ONIL Stoves—Guatemala
Version number of the PoA-DD	7
Completion date of the PoA-DD	23/01/2018
Coordinating/managing entity	HELPS International Incorporated
Host Parties	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

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PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

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The following information shall be included here:

1. General operating and implementing framework of PoA

The programme of activities, Distribution of ONIL Stoves — Guatemala, involves the distribution of fuel-efficient, improved cook stoves to households across the Republic of Guatemala (hereafter referred to as "Guatemala") in households that currently use conventional open fire [1]. The replacement of open fires with more efficient devices in households reduces the amount of fuel wood consumption through improved combustion efficiency, thus reducing the GHG emissions linked to non renewable biomass and incomplete combustion of fuel wood.[2]

The boundary of the SSC-CPA is determined by the sum of the locations of the individual households within which the ONIL Stoves in this SSC-PoA are installed, but all limited to the Guatemala. The ONIL stove is a high efficiency rocket fuel wood improved cook stove (ICS[3]) with a thermal efficiency higher than 20%, a combustion chamber, a single or multi-pot cooking surface and a chimney. Different variations of ONIL Stoves fitting the above mentioned description will be allowed under this PoA, but all models should be approved by the CME before incorporation into the Programme and all models will have over 20% thermal efficiency. Examples of model variations of ONIL Stoves eligible to participate in the PoA include modifications in material (e.g. solid insulation instead of pumice insulation), variations of the shape of the stove or variations of its components (skirt attachment to improve efficiency). This PoA is exclusive to ONIL Stoves manufactured or approved for distribution by HELPS International. ICS that do not meet the specifications outlined above (i.e., 20% efficiency, rocket stove, combustion chamber, etc.) or that do not meet the criteria defined in methodology II.G will not be eligible to participate the PoA. The first CPA under this PoA will be comprised of the ONIL "Plancha' Stove pictured below.

Figure 1: ONIL "Plancha" Stove made of concrete block with combustion chamber and griddle multi pot top

[1] Open fires in this PoA are defined as "conventional system with no improved combustion air supply or flue gas ventilation system, i.e., without a grate or chimney as defined in methodology II, G, paragraph 6.

[2] FAO, Woodfuels and climate change mitigation. Case studies for Brazil, India and Mexico, Rome 2010, page 62. The document describes how and ICS in other parts of the world are effective reducing anthropogenic GHGs.

[3] For the purpose of this PoA the term ONIL Stove and ICS are used interchangeably

Each household within this PoA will be clearly identified with a unique geographical identification (using information such as GPS coordinates). This information will be maintained on a database and continuously monitored and checked by the coordinating entity; it will be made available to the DOE.

HELPS International Incorporated ("HELPS International") will be the Coordinating Managing Entity ("CME") for the PoA and the CPA implementer of the first SSC CPA. C-Quest Capital LLC ("CQC") and Ecoeye Co., Ltd will be the project participants.

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2. Policy/measure or stated goal of the PoA

The goal of the PoA is to transform the fuel-efficiency of Guatemala's traditional home cooking systems by distributing efficient improved cook stoves to households, thus supporting widespread use and implementation. By doing so, the programme will abate greenhouse gas emissions through reduced fuel wood usage and save household expenditures on fuel.

3. The following are contributions of the PoA to sustainable development:

Environmental sustainability

(i) The programme reduces the use of non-renewable biomass:

In Latin America, and in particular Guatemala, the consumption of non-renewable biomass for energy generation has been growing for the past 30 years. More than a quarter of forest production in Latin America goes towards firewood production.[4]

By adopting the higher efficiency ONIL Stove, households reduce the quantity of fuel wood they must consume for daily cooking needs. Independent laboratory test (Annex 3) shows that when compared to firewood consumption of conventional open fires, the ONIL Stove on average reduces firewood consumption by 58 percent.[5] Since a very high proportion of fuel wood comes from non-renewable sources,[6] this translates directly into reduced emission reductions from non-renewable extraction of wood. For example, it is estimated that every stove will, on average, save 3.837 tons of carbon dioxide equivalent in each year of its operation. Thus, the PoA lowers the Greenhouse Gas (GHG) Balance for the country.

(ii) The programme also supports the objectives of national climate change policies and programs.

The *Programa Nacional de Cambio Climatico* (PNCC) within the Environment Ministry of Guatemala is charged with assessing the risks of climate change and recommending policies to reduce the country's vulnerabilities. The PoA is in line with the PNCC aim of generating projects within Guatemala that promote forest management, a critical and vulnerable sector identified by the Program.[7] By installing improved cook stoves, households reduce firewood consumption, thus helping maintain forest stocks within the country.

The PoA also supports the "Climate Change Studies in Guatemala with Emphasis on Adaptation Project" which has the specific objectives of:

- Strengthening key players (of community) and local and regional institutions.
- Supporting forestry and agroforestry projects with the potential for removing carbon.

[4] UNEP (2003): GEO Latin America and the Caribbean: Environment Outlook 2003. www.unep.org/geo/pdfs/GEO__lac2003English.pdf

[5] The Aprovecho Test results (Annex 3 and page 2 of report) show a hot start efficiency of 26%, which signify increased efficiency of 62% and a cold start efficiency of 20%, translating to 50% improved efficiency. Taking into account cooking behaviour, which includes one cold start in the morning and two hot starts throughout the day, the weighted average stove efficiency of 24%, which translates to 58% increased efficiency for the stove.

[6] See calculation in section E.6.3.

[7] wikiadapt.org/index.php?title=Methodology_of_Guatemala_NCAP_Project

- Incorporating the subject of climate change into the region's agenda.[8]

(iii) The programme produces real and measurable reductions in GHG emissions:
The programme will utilize the approved methodology, AMS II.G, version 3, "*Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass*", to ensure that all measurements of greenhouse gas emission reductions are robust, conservative and verifiable. The programme will maintain high standards of monitoring to ensure that all emission reductions claimed are measurable and real.

Economic Sustainability
(i) The programme reduces household expenditures:
The PoA will contribute significantly to Guatemala economic sustainability through the more efficient use of firewood. Energy savings at both individual household and national levels make important contributions to their economic efficiency and sustainability. As shown in laboratory test, the use of the ONIL Stoves will reduce firewood consumption by approximately 58 percent from baseline consumption, significantly reducing household expenditures.

According to World Bank reports, in 2000 approximately 56 percent of the population or 6.4 million people in Guatemala lived in poverty. About 16 percent of the population lives in extreme poverty, and of those classified as "poor", 79 percent are chronically poor.[9] The majority of these households live in the countryside or rural areas. By installing improved cook stoves, these households would save significantly on household expenditures related to firewood purchases along with saving time spent gathering firewood, which would free up time for households for other income generating activities. These savings would help improve living conditions for households in Guatemala.

(ii) The programme results in creation of new jobs and development of new skill sets:
The ONIL Stove distribution program, which all CPAs will follow, relies on community organizers to facilitate demonstrations and organize training sessions. As these community organizers increase their knowledge about stoves, they often become professional installers and help maintain the stoves in their community. In addition, there are two stove-manufacturing facilities in Guatemala that employ about 20 people each. As uptake of stove technologies spreads, it will allow for expansion of manufacturing facilities to meet increased demand, thus generating more employment opportunities within the country.

Social Sustainability
The programme helps to improve health conditions:
There are very tangible and significant health benefits associated with the switch in technology from conventional open fires to improved cook stoves as well. Traditional cooking methods involve conventional open fires that result in the emissions of local pollutants such as carbon monoxide and particulate matter in often poorly ventilated rooms, which lead to respiratory problems. In addition, conventional open fires are frequent causes of burns and other injuries. Switching from conventional open fires to ONIL Stoves reduces the incidence of such injuries and health problems.

Through demonstration, training and implementation, the PoA will also generate a range of less tangible social outcomes in education and awareness. This programme will build awareness of the health problems associated with conventional open fires traditionally used for cooking and create an opportunity for collective action on climate change, enhancing a sense of community, and empowering individual households.

[8] Ministry of the Environment and Natural Resources and National Climate Change Programme Guatemala (2004): "Climate Change Studies in Guatemala with emphasis on Adaptation".

[9] World Bank (2003): Poverty in Guatemala, p. 2, bit.ly/9M40Lq

Implementation Schedule
HELPS International, the CPA Implementer for this PoA, plans on installing around 15,000 stoves starting in 2012 and grow the program to 50,000 stoves in 2017, as described in the implementation schedule Table 1 below.

Year	2012	2013	2014	2015	2016	2017	2018	2019
New ICS installed per year	15,000	20,000	26,000	34,000	44,000	50,000	50,000	50,000

Table 1: HELPS International implementation schedule

A.2. Physical/geographical boundary of PoA

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Definition of the boundary for the PoA in terms of a geographical area (e.g., municipality, region within a country, country or several countries) within which all small-scale CDM programme activities (SSC-CPAs) included in the PoA will be implemented, taking into consideration the requirement that all applicable national and/or sectoral policies and regulations of each host country within that chosen boundary;

All CPAs associated with this PoA will be implemented within the geographical boundary of Guatemala.

The geographic coordinates for Guatemala, the PoA 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. Geographic boundary of PoA—Country of Guatemala[10]

A.3. Technologies/measures

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The program will provide ONIL Stoves to replace conventional open fires used by households. The PoA is a Type II 'Energy Efficiency Improvement Project', category G, 'Energy efficiency measures in thermal applications of non-renewable biomass'.

The ONIL Stove is a fuel-efficient stove that reduces the amount of firewood required by households by up to 58 percent, and results in lower emissions based on its construction and design. Since the efficiency of a traditional open fire is 10%[11] and the efficiency of an ONIL Stove is 24%[12], and depending on the specific stove model the efficiency can be higher, the ONIL Stove is more efficient than the traditional open fire. Complete combustion and efficient energy transfer to pots and cooking surfaces ensures fast heating and fuel-efficiency. The fire is contained in the

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

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

[12] Note that 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 the first CPA. Manufacturers can specify the efficiency of the ICS through WBTs conducted by independent third parties.

insulated combustion chamber, thus burning the oil vapor that is normally emitted as smoke. Energy is then efficiently transferred to cooking pots and surfaces. Insulation prevents the heat from being wasted heating the stove body. Hot gases that do not touch the cooking surface waste their energy but insulation lets all the hot gases come in contact with the cooking surfaces thereby 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.

The ONIL stove can be manufactured assembled and installed locally or be imported. The implementation of the PoA or SSC-CPA does not require any technology transfer from Annex 1 countries to Guatemala.

Energy studies for Latin America show that fire wood use is expected to increase in Guatemala throughout the projected period (to 2018).[13] The projections demonstrate that it is unlikely that another more efficient technology will replace the ONIL cooking stove during the expected project period.

A.4. Coordinating/managing entity

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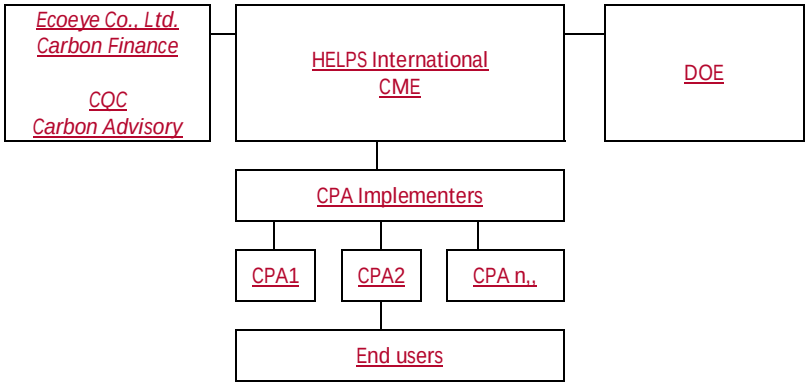
The following information shall be included here:

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

2. Project participants being registered in relation to the PoA. Project participants may or may not be involved in one of the CPAs related to the PoA.

   HELPS International will be Coordinating/Managing Entity (CME) of this SSC-PoA and is the entity which communicates with the CDM Executive Board. CQC will provide carbon advisory to CME and support the development of the programme. Ecoeye Co., Ltd. (Ecoeye) will be responsible for financing the implementation of the PoA. CQC and Ecoeye are currently the two project participants to the SSC-PoA (project participants may or may not be involved in one of the component project activities (CPAs) related to the SSC-PoA.



[13] OLADE, Energy Statistics Report, 2007, www.olade.org, page 89

A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Guatemala (host)	HELPS International Incorporated (Private entity)	No
Government of the Netherlands	C-Quest Capital LLC (Private Entity)	No
Republic of Korea	Ecoeye Co., Ltd	No

A.6. Public funding of PoA

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No public funding is being used for the program. If public finance is used, confirmation that there is no diversion of ODA will be provided.

SECTION B. Management system

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Roles and Responsibilities

HELPS International will be the CME of the proposed PoA and will also be a CPA Implementer. The responsibilities of the CME are described below:

Operational Category	Management Responsibilities & Arrangements	Responsible Party
Capacity building, record management, CPA inclusion/verification and overall PoA coordination	- Define the roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies - Manages records of arrangements for training and capacity development for personnel (such as field personnel (technicians), monitoring personnel, and feeding the database - Provides procedure for technical review of inclusion of CPAs - Provides procedure for avoiding double counting - Manages records and documentation controls process for each CPA under the PoA - Manages measures for continuous improvements of the PoA management system - Manages any other relevant elements - Reviews all CPAs to confirm that all eligibility requirements are met before a CPA is proposed for inclusion - Coordinates the implementation of the monitoring plan - Maintains database and all other records necessary to verify stoves installed or	- CME

Operational Category	Management Responsibilities & Arrangements	Responsible Party
	distributed within each CPA and the PoA overall; - Implements and oversees day-to-day operation of the POA; - Coordinates with DOEs inclusion of CPAs, verification of emissions reductions from CPAs.	
Demonstration, Household Recruitment, and Overall market development	- Household buy-in to implement new technology - Recruit initial households for training of installation, use, and maintenance; these initial households will spread knowledge to other households within the community - Plan and implement market promotion	- CPA Implementer

Operational Category	Management Responsibilities & Arrangements	Responsible Party
Product Supply	- Manage manufacturing facilities in Guatemala - Ensure timely production and supply of ONIL Stoves for each SSC-CPA	- CPA Implementer
Transport &Storage Logistics	- Arrange transport of stoves from manufacturing facilities - Arrange storage prior to distribution - Delivery of stoves to distribution hubs	- CPA Implementer
Distribution to Households	- Management of distribution points; stock; customer transactions and staff - Household data collection (through Registration Card) - Train main user in household on installation, use and maintenance of stove - Coordinate the efforts of all local partner organizations for ONIL stove distribution/installation - Maintain all records necessary to verify stoves installed or distributed within each CPA it is implementing; - Implement and oversee day-to-day operation of the CPA, including ensuring users of the stoves are aware of how they should be used - Household asked to dispose of the traditional open fire	- CPA Implementer
Monitoring Emission Reductions	- Conduct baseline surveys of households - Collection of sample data for each monitoring period - Ensure all stoves are installed and in use (that households have not reverted back to old cooking methods) - Preparation of monitoring reports for emission reduction verification - Be responsible for tracking stoves to end users and verifying use - Spot check end user tracking system	- CME and CPA Implementer

Table 2: Operational Categories and Management Responsibilities for ONIL Stoves—Guatemala PoA

Competencies of the CME

HELPS International
HELPS International is currently developing two improved cook stove PoAs: Distribution of ONIL Stoves- Mexico and Distribution of ONIL Stoves – Guatemala. HELPS International has been designing and installing ICS in Guatemala since 2002 and in Mexico since 2008 and has installed over 100,000 stoves in Latin America. HELPS International actively works on finding ways to improve cook stove technology and has a laboratory in Guatemala dedicated to testing and improving ICS designs. HELPS International staff includes some of the best-known experts in biomass cook stoves in the region and the organization has a successful distribution, capacity building and follow through system which ensures end user acceptance of the ICS. As an example, the first ONIL stove installed in Guatemala in 2002 in still in operation today. HELPS International stove experts have received multiple international awards including the Ashden Award for Factory Production of ICS in 2004; the Swanson Foundation Health Award/Tech Awards for design that helps humanity, 2007, and the Partnership for Clean Indoor Air (PCIA) Global Leadership Award, 2009. HELPS International actively participates in the global and local ICS community, including Partnership for Clean Indoor Air, UN Global Alliance for clean energy and the Mexican Bioenergy Network (REMBIO), among others.

Competencies of other project participants

C-Quest Capital, LLC (CQC)
CQC has been the leader in the development of Programme of Activities under the CDM, having developed the CFL lighting scheme - "Bachat Lamp Yojana" PoA (CDM Ref 3223) and implemented more than 4 CPAs under it (at the time of validation of this SSC-PoA).
CQC is currently the CME for three SSC-PoAs:

- POA 1: Distribution of fuel-efficient improved cook stoves in Nigeria: CME
- POA 2: Distribution of improved cook stoves in Zambia: Co-CME
- POA 3: Distribution of Improved Cook Stoves in Sub-Saharan Africa: CME

CQC staff has over 20 years of experience with ICS, having been involved and leading key operations to provide funding through multiple instruments for improved cook stove distribution in different countries. These operations have proven successful and introduced consumers to the opportunity of ICS. Many did not lead to a large-scale market due to the higher costs of ICS and lack of sustainable financing mechanisms to keep costs at the level of the willingness to pay of the poor. CQC staff has established working relationship with major international stove producers and have been involved in the development of registered methodologies and PDDs and POAs for ICS.

CQC will support the CME through the development of the tasks described above. In specific, CQC expertise in other PoAs will serve to advice the CME of this PoA to ensure that the role of the CME is properly fulfilled.

Records of arrangements for training and capacity development for personnel
Key training needs:

- Monitoring: Training, including that of field personnel, is needed to ensure monitoring activities are conducted effectively. Training for monitoring will include spot checking of a random sample of households with ONIL Stoves to ensure the stoves are continuing to be used, as well as a random sample of households selected for the stove efficiency tests (efficiency tests will be carried out by a third party using the Water Boiling Test). The procedures to complete this sampling are described in chapter J.7.2 (below) and meet EB65 Annex 2 confidence/precision requirements.
- Database: training of data input and quality, back-ups and other relevant database responsibilities
- ONIL stove distribution/installation: CPA implementers shall provide evidence of their ability to train technicians/instructors/field staff on ONIL stove assembly, manufacture, installation and distribution. Details on training for ONIL stove distribution/installation are found on Section H.3 of the PoA-DD.

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Procedures for technical review of inclusion of CPAs
The CME will undertake the following activities to ensure proper eligibility of the CPAs ***before*** they are uploaded for official inclusion into the PoA:

- CME will review each CPA document and methodically go through each and every eligibility/applicability criterion of the PoA to ensure the CPA meets each requirement with certainty. In cases where there is doubt, the CME will not upload the CPA document until the requirements are met to the CME's satisfaction.
- CME will review database/registration procedures to ensure proper ICS data collection and management in line with the methodology and PoA eligibility criteria.
- CME will review all proposed monitoring procedures to ensure they are in line with the PoA, including stove efficiency testing and ensuring the new stoves are continuing to be used as intended.
- During implementation, and as necessary, CME personnel will visit each CPA region to ensure all procedures outlined in the PoA are being followed, particularly on stove registration and database updating.

SSC-CPA Record Keeping
Each SSC-CPA will follow the record keeping and monitoring requirements stipulated in AMS II.G, version 3, and detailed in Section E below. In summary, the CME will ensure that each SSC-CPA maintains appropriate records and documents the following variables in the data management system (if applicable and available):

- Name of ICS user or head of the household
- Address of ICS user or household
- Phone number of ICS user or household
- GPS location of household
- Stove model
- Date of distribution/installation
- ICS serial number
- Retailer/distributer information

The CME will be responsible for the management of records and databases associated with each SSC-CPA.

Procedure to Avoid Double -Counting
Each ONIL stove in each SSC-CPA included in this PoA will be identified by a unique combination of customer name and geographical location, as well as a unique serial number. The serial number will start with an identifier, which will allow for a clear distinction between the stoves from this PoA with those of other potential PoAs. Each stove's serial number will be entered into a database that will keep track of which stoves are in which CPAs. Each CPA will have a set of serial numbers so a project participant or verifier can easily determine that any stove identified in any household is affiliated with one – and only one – CPA. No individual serial number can be in more than one CPA, so it will not be possible for one stove to be counted in two different CPAs. In addition, prior to including a new SSC-CPA within the proposed PoA, the managing entity will check the CDM project database,[14] as well as in any other voluntary carbon scheme (such as Gold Standard, VCS, VER+[15]) to establish whether a CPA or CPA of another PoA utilizing energy-efficient stove technologies has already been registered that covers any of the households in the proposed CPA. This search will cover registered project activities, project activities requesting registration, project activities under review and project activities for which either a review or corrections have been requested.

[14] cdm.unfccc.int/Projects/projsearch.html, http://www.vcsprojectdatabase.org, http://www.cdmgoldstandard.org/our-projects/project-pipeline

[15] VER+ is TÜV SÜD's standard for verified emission reductions.

Participating households will demonstrate that they were using traditional cooking methods (e.g. conventional open fires) when a new registration card is filled out or sent via SMS or ICT. This will ensure that no end-users will be included in a new CPA if they already own an ICS

De-bundling
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 greater than 1% of the small scale thresholds defined by the methodology applied, than that CPA of PoA is exempted from performing de-bundling check i.e. considered as being not a de-bundled component of a large scale activity."

Each CPA under this POA shall confirm that ICS implemented is no greater than 1% of the small-scale threshold of 180 GWh^{th} per year.[16] This is calculated using the following formula illustrated using the small-scale energy savings threshold of 180GWhth/year:

Annual Energy Saving of an ICS as per cent of SSC threshold =
$((NCV_{biomass}*B_{y,savings})/180GWh_{th})*100$

$= NCV_{biomass}*(B_{old}*(1-(\eta_{old}/ \eta_{new,i}))/180GWh_{th})*100$

Where:

$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne), calculated as (0.015TJ/tonne)*(0.277777GWh/TJ[17])
$B_{y,savings}$	Total biomass that is saved in tonnes in one year (*y*)
B_{old}	Baseline biomass fuel consumption per appliance (i.e. in the absence of the project activity)
$\eta_{new,i}$	Efficiency of the ICS – 1.0 (using an efficiency of 100 % results in a highest value of annual energy saving of ICS, what can be considered as conservative if referring to the de-bundling criteria)
η_{old}	Efficiency of the baseline stove – 0.10

Hence, based on the highest possible stove efficiency, it is evidenced that each ICS in a typical CPA is in the order of magnitude of 0.0138% of the SSC threshold.

All CPAs are subscribed to the PoA
The CME is responsible for identifying, developing, registering and managing all SSC-CPAs to be included in the proposed PoA. This will mean that those operating the SSC-CPA will be aware, and will have agreed that their activity is subscribed to the proposed PoA. Legal agreements will be in place between the CME and the CPA implementers clearly stipulating that their activities are subscribed to the SSC-PoA. Households will be made aware that they are participating in the PoA through the Registration Card purchase contract which ensures that households subscribed to the relevant SSC-CPA are aware of the nature of the program, and agree to relinquish CER rights to HELPS International.

Measures for continuous improvements of the PoA management system
The CME will undertake an annual review of the overall PoA management system, including identifying any problems with stove distribution/installation, stove use once in the households,

[16] According to SSC WG 233, 180GW^{th} is equivalent to 60 GWh

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

monitoring continued stove use and overall database maintenance. This review will take place during the verification stage, which will assist the CME in obtaining an outside perspective of the overall management process. The CME will prepare a written report for its internal team and the DOE outlining problems that occurred during the previous year and list specific actions that will take place to resolve any problems. This written analysis and improvements to the PoA management system will be done every year, with the written document being provided to the DOE upon verification. The DOE can thus assess the status and effectiveness of the recommended improvements.

SECTION C. Demonstration of additionality of PoA

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The following shall be demonstrated here:

(i) The proposed PoA is a voluntary coordinated action;
(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;
(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;
(iv) If mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

The information presented here shall constitute the demonstration of additionality of the PoA as a whole

(i) The proposed PoA is a voluntary coordinated action

It is hereby confirmed that the proposed PoA is a voluntary coordinated action by HELPS International. The PoA is within all applicable national and/or sectoral policies and regulations for Guatemala. A review of energy policies[18] shows the country currently does not regulate energy efficiency or stoves.

There are no mandatory requirements in Guatemala stipulating the use of such devices, and the PoA requires individual households to take voluntary action to participate in project activities. The signature of the warranty/purchase receipt indicates voluntary participation in the program.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA

The increasing use of fuel wood in Guatemala[19],[20] shows that even though there is a history of development of improved cook stoves,[21] these stoves are not being installed at a pace fast enough to slow the overall rate of fuel wood use in the country. A World Bank study evaluates the effectiveness of the following stove programs in the Guatemala and describes institutional, technical, financial and commercial aspects of why these programs have not continued[22]:

- *Tezulutan*: 4,129 stoves, from 1999 and the stove component of the program continued for three years.[23] Program weaknesses included lack of monitoring during construction, lack of evaluation, lack of access to certain stove components, lack of standardization of

[18] The Guatemalan Energy Policy can be found in the Ministry of Energy and Mines' Energy Policy, page 28. There are no references to stove efficiency.

[19] Instituto Nacional de Estadistica, Environmental Statistics Yearbook 2008 - Page 293

[20] Heltberg, Rasmus, 2005, Factors determining household fuel choice in Guatemala, Environment and Development Economics 10: 337-361, Cambridge University Press.

[21] Winrock, 2004, Partnership for Clean Indoor Air, Household Energy Indoor Air Pollution and Health: Overview of Experiences and Lessons in Guatemala

[22] The World Bank (2005): Environmental Health and Traditional Fuel Use in Guatemala, http://www.cddep.org/publications/environmental_health_and_traditional_fuel_use_guatemala

[23] The World Bank (2005): Environmental Health and Traditional Fuel Use in Guatemala, p 58.

components, dependence on international donations, high level of subsidies (50%) and lack of marketing structures (few stove parts available for sale).[24]

- *Social Investment Fund (SIF or FIS in Spanish):* 90,000 stoves from 1996 to 2001.[25] Weaknesses of program included lack of integration of project team, lack of feedback, no participation by users in stove design, no gender focus, lack of project self-sustainability, poor construction quality, dependence on international aid, high subsidization (90%), program dependence on project builder level and lack of marketing structures (stove parts only sold in certain towns).[26]
- *Intervida:* 9,000 stoves from 1996 to 2000.[27] Weaknesses of the program include lack of user participation in stove design, no gender focus, lack of project evaluation, lack of self-sustainability, poor construction quality, dependence on international aid, subsidization of materials, components and transport (70%), program dependence on stove builders and lack of marketing structures (stove parts only sold in certain towns).[28]

The above programs are examples of improved cook stove programs that are no longer being implemented because of the high dependence on temporary subsidies, lack of follow-through and stove use training, and lack of market development (places for users to by parts). These programs show that improved cook stoves programs in Guatemala are not self-sustaining without some level of subsidies. Summarized in another article analyzing the same three programs, (*Tezulutan*, SIF, and *Intervida*) "One glaring weakness was the lack of systematic community feedback, monitoring and evaluation… the high subsidies provided for the stoves, as well as the lack of a direct relationship between vendors and users, distorted the market, elevated prices, and constrained development of the commercial structures necessary for the projects to be sustainable." [29] According to Kirk Smith, an improved cook stove expert, the reason that most stove programs have not been successful is that "Too much emphasis has gone on technology and people at the top, too little consulting with women who actually do the cooking. When subsidies run out, the schemes have faltered…"[30] HELPS International will use income from the sale of CDM emission reductions to help reduce the total cost of the ONIL stove to the end user, to provide follow-through and training on how to properly use the stove, provide access to spare parts and help establish self-financing mechanisms (see BanRural paragraph under Prevailing Practice Barriers below) to ensure that the ONIL program is successful.

As per paragraph 2(c) of Annex 27 of the 68th meeting of the CDM Executive Board, GUIDELINES ON THE DEMONSTRATION OF ADDITIONALITY OF SMALL-SCALE PROJECT ACTIVITIES (version 9), projects are considered additional if project activities are solely comprised of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale thresholds. Annex 21 of EB 61 established 60GWh per year as the SSC threshold for type II projects. The conversion from 60 GWHe to 180 GWHth per year was approved in a clarification by the small-scale working group (SSC_233). Footnote 1 of Annex 27 of EB 68 clarifies that the size of each unit (ICS) has to be below 3000 MWh of energy saving per year.

Given that the CPAs will consist of isolated ONIL Stove units located in households and that CPAs have to comply with eligibility criteria (f)[31] as described in Section K below, the documentation of barriers is not required to demonstrate additionality as per EB 68 Annex 27.

Deleted: A.4.2.2 above

[24] *Ibid*, Page 75, Table 4.8

[25] *Ibid*, Page 61

[26] *Ibid*, Page 75 Table 4.8

[27] *Ibid*, Pages 59-60

[28] *Ibid*, Page 75, Table 4.8

[29] *Ibid*, Page 74.

[30] "Silent and deadly" The Economist, Sept 25-October 1, 2010, p 72.

[31] The equation for calculating the SSC threshold can be found in criteria f) paragraph 2.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced
This case does not apply.

(iv) If mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.
This case does not apply.

Prior consideration timeline (until publication on UNFCCC website):

29/09/2009	Meeting of HELPS International Board of Directors of discussing the consideration of CDM to help finance stoves.
7/11/2009	CDM consultant (EnergetixClimate) engaged.
16/12/2009	Contract between CQC and DOE signed.
30/12/2009	Publication of PoA-DD on UNFCCC website.

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

>>
11/01/2010[32]

D.2. Duration of PoA

>>
28 years. Each stove is expected to have a lifetime of around ten years,[33] depending on model of ONIL stove. All CPAs will be registered for a crediting period of 7 years twice renewable. As stoves reach the end of their useful life, they can be replaced, potentially allowing up to 21 years of creditable emission reductions. When the old stove is replaced, an ONIL Stove with at least the same efficiency will be placed in the household and the database will be updated to reflect that that particular household is now using a new stove and the replaced stove is no longer in use.

SECTION E. Environmental impacts

E.1. Level at which environmental impacts analysis is undertaken

>>

[32] The CDM Glossary of terms, version 6 (page 18), states that the start date in the context of a CDM project or PoA, earliest date at which either the implementation or construction or real action of the CDM project activity or PoA begins". EB 55, Annex 38, paragraph 7(d) "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-POA-DD is first published for global stakeholder consultation". The start date of this project is January 11, 2010, which is the date when real stoves were first delivered (implementation) after this POA was published online for Global Stakeholder Consultation at the UNFCCC website.

[33] The World Bank, Household Cookstoves, Environment, Health and Climate Change, A New Look at an Old Problem, 2011, page 67.

1. Environmental Analysis is done at PoA level ☑
2. Environmental Analysis is done at SSC-CPA level ☐

The PoA involves the distribution and installation of residential stove appliances. These appliances have been approved for use in households by the Government of Guatemala and do not entail significant negative impacts. For this reason, it is reasonable to undertake a single environmental analysis at the level of the PoA rather than individual assessments for each SSC-CPA

E.2. Analysis of environmental impacts

>>

The primary environmental impacts of the PoA relate to the production of stoves manufacturing operation in Guatemala, and the disposal of stoves once newer stove technologies are adopted because of economic development. Stove manufacturing produces minimum negative environmental impacts and significant positive environmental impacts (e.g., improved health and less deforestation).

Air Pollution

The effects of Indoor Air Pollution (IAP) of conventional open fires have been demonstrated to have negative health impacts, including higher likelihood of developing Acute Respiratory Infections (ARI) and Acute Lower Respiratory Infections (ALRI), lung disease, tuberculosis, asthma and other health conditions.[34] The smoke generated by burning firewood contains particulate matter (PM), carbon monoxide (CO), nitrogen dioxide, sulphur oxides, formaldehyde, and carcinogens such as benzopyrene and benzene.[35] Laboratory tests show that "because the ONIL (stove) is well sealed and has sufficient draft it removes the dangerous emissions, protecting the indoor air quality" and "the chimney on the ONIL stove removes almost all of the CO and other pollutants from the interior space.[36] The ONIL stove therefore produces significant reductions in IAP.

Biodiversity:

As stated in section A.2 above, Guatemala lost 17 percent of its forest cover between 1990 and 2005.[37] As the ONIL Stoves use less fuel wood, the impact on biodiversity is a positive one since the implementation of the project results in end-users removing less fuel wood from forests.

Transboundary impacts

Geographical: The PoA places a boundary as the sum of the household locations within each individual CPA, all within the limit of Guatemala. The emission calculation is based on the efficiency of each stove, regardless of where the stove was manufactured. No transboundary impacts are expected.

Disposal

The ONIL Stoves, with proper maintenance, are expected to have a ten-year lifespan (depending on the stove model). Once the stoves have stopped operating, the CME will evaluate if the stove can be refurbished or if they need to be completely removed. Because HELPS International keeps an inventory of the stove locations, it will visit households who have had a stove that is approaching the end of life and will help the end user install a new stove.

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[34] Edwards John and Christian Langpap, 2008, Fuel Choice, Indoor Air Pollution, and Children's Health, econpapers.repec.org/paper/tulwpaper/0803.htm

[35] *Ibid*.

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

[37] rainforests.mongabay.com/deforestation/2000/Guatemala.htm & www.fao.org/forestry/country/32185/en/gtm

E.3. Environmental impact assessment

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The Guatemalan Government's Ministerial Accord 477-2005 [38] requires that an approved environmental impact assessment be presented for the Host Country Letter of Approval (LoA). The environmental impact study was approved on June 16, 2011. The Guatemalan Ministry of Environment and Natural Resources granted the Host Country Letter LoA to the ONIL Stove Program on August 29, 2011.

SECTION F. Local stakeholder consultation

F.1. Level at which local stakeholder consultation is undertaken

>>
1. Local stakeholder consultation is done at PoA level ☑
2. Local stakeholder consultation is done at SSC-CPA level ☐

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

The CPA boundaries are defined primarily by individual ICS/household location, and may extend across the SSC-PoA project area or may be limited to a specific region within the SSC-PoA boundaries. Therefore a PoA-level Stakeholder Consultation is deemed most appropriate, covering the whole project area. The environmental, social and economic impacts of the POA will be broadly consistent across CPAs, so the PP does not expect significantly different comments from stakeholders across CPAs.

In addition, HELPS International has chosen to perform stakeholder consultation at a PoA level because the organization constantly invites communities to provide input (see section D.2 below) on the ONIL Stoves and input at a PoA level allows to better capture the input from all users regardless of which CPA the stove belongs. The first stakeholder meeting for this POA was conducted in Agua Blanca, Quetzaltenango on 15 December 2009. A series of similar meetings followed this.
The most important stakeholders are end users and consultations with this group are performed in a meeting medium (face-to-face) for original demonstrations that take place approximately once a month. This medium is culturally appropriate for end-users because of the country's low educational level and multiple ethnic languages [39] and because it fits well with the stove demonstration sales model that HELPS International currently uses.

Other relevant stakeholders identified include fuel wood vendors, who were interviewed personally, the Ministry of Environment and Natural Resources (*Ministerio de Ambiente y Recursos Naturales*, *MARN*), and NGO's such as The Solar Foundation (*Fundacion Solar*), and Hearts and Hands and others.

Section F.3 below contains a summary of stakeholder comments.

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F.2. Modalities for local stakeholder consultation

>>
HELPS International, as CME, has gathered stakeholder comments from four identified stakeholder groups at a national level: the national government, non-government organizations (NGOs) operating throughout Guatemala, final stove users and fuel wood vendors. These four groups are representative stakeholders for this project in Guatemala as these are the groups

[38] http://200.12.63.122/archivos/acuerdos/2005/gtamx477-2005.pdf

[39] CIA World Fact Book, Guatemala. https://www.cia.gov/library/publications/the-world-factbook/geos/gt.html

directly affected by the implementation of this POA. HELPS International interviewed these four groups. HELPS International invites stakeholder comments through stakeholder meetings with community organizers, during stove demonstrations, through training sessions, survey interviews and follow-up visits. HELPS coordinates the initial demonstration with the community organizer, who in turn informs the community of the meeting date. The community organizer advertises the meeting through word-of–mouth or any other way the community organizer finds appropriate. The community organizer then informs HELPS of the demonstration date. Communication between HELPS and the community organizer is frequently performed via e-mail.

The ONIL Stoves sales process involves a thorough consultation process with the end user. Protocols are in place within HELPS International to systematically collect, compile and respond to both positive and negative comments from end-users. The field technicians invite comments from the communities every time a demonstration takes place and take account of comments provided by communities. HELPS International also provides follow-up visits to the community organizers and to end users to find out if there are any questions or comments on the use of the stove. Field technicians compile comments and pass them along to the central offices where comments are reviewed by HELPS International's executive and design team.

Additionally, HELPS International directly interviews all stove users as part of the GPS data gathering exercise. The survey asks what the user likes and dislikes about the stove.

CDM projects in Guatemala require an Initial Environmental Assessment (*Evaluación Ambiental Inicial*), which does not require stakeholder consultation.[40]

MARN's comments were received via personal meetings and telephone conversations.

NGO's comments were received via email.

F.3. Summary of comments received

>>
The stakeholder comments and feedback were broken down into two categories, positive and negative. The end users provide the comments below after they have used the stove for some period of time.

Positive comments from end-users:

- Requires less firewood
- Heats rapidly
- Easy to use
- Saves money by not having to buy "*comal*" (the traditional clay hot plate)
- Reduces burn risk
- Easy to install
- Easy to move
- Lowers respiratory illnesses
- Helps the whole family save money
- Improves family's sense of worth
- Can use immediately
- Can be taken apart
- Flexibility — stove can be modified (add handles, table, etc.)
- Immediately available

Negative comments from end-users:

[40] "*Diario de CentroAmerica"* Central American Diary,No 63, Ministerial Decree 477-2005

- Too small
- Requires firewood to be cut in smaller pieces
- Cultural resistance to change
- Does not heat the room
- Does not light the room
- Firewood pieces don't fit
- Not enough tubes (for chimney)
- Combustion chamber pieces break
- Many pieces – easy to get confused or lose them

Comments from firewood vendors:

- ONIL Stoves are good because they take the smoke out of the house. The amount of firewood I sell to ONIL Stove owners is less, but I also sell a lot of other things such as agricultural produce, handcrafts and fertilizer sales[41].
- The ONIL Stoves do not affect my sale of firewood; there are always other people who buy firewood.[42]

The MARN asked for an Environmental Impact of the Program and ONIL Stove manufacturing facility and a pictogram that explained to end users the CDM program. *Fundacion Solar* is pleased with the ONIL Stove project overall, complementing HELPS International staff. Hearts and Hands wanted to know how they could develop their own CDM improved cook stove project or use their stoves in the ONIL Stove PoA. Innovative Communities wanted to know the lab efficiency results for the ONIL Stoves.

F.4. Consideration of comments received

>>

HELPS International conducts training and educational community meetings on a regular basis providing many opportunities for stakeholders, in particular the end -users, to make comments and raise concerns. These community meetings take place every time a stove is implemented in a new community or when new stoves are installed in a community, so there are many opportunities for users to express their views. In addition, there are follow-up meetings 4 to 6 weeks after installation to address any technical or cultural adoption problems.

HELPS International field personnel take comments and discuss them with the organization in bi-weekly meetings. In addition, the field personnel write all comments in the activity report so there is written record of the concerns. In the personnel bi-weekly meetings, solutions for concerns are also discussed by the entire organization. In some cases, because of the sales-distribution model, the stove purchaser organization is not the end-user and this causes miscommunication. The follow-up meetings and the community leader programs are intended to resolve communication issues.

HELPS International shares negative technical comments to the ONIL Stove program director and the stove designer to discuss ways in which the stove can be improved. Examples that demonstrate how comments are taken into account are the comments on lack of light and lack of preparation space. As the ONIL Stoves remove ambient light from households, users were commenting that they had too little light in their households. As a result, HELPS International began offering solar powered lights that provide clean and pollution-free ambient light. End users also commented that they needed more space around the stove to prepare meals. As a result, HELPS International added a wood extension to the stove that gives end users additional preparation space. The technical team has a stove laboratory that constantly experiments with materials in an effort to make the stove more efficient and user friendly.

[41] Interview with Jesus Xotoy, Nov 2010.

[42] Interview with Sandra Patricia Xep, Nov 2010.

In response to the MARN requests, HELPS International developed an informational cartoon document that is distributed to all end users at the time the warranty (registration card) is signed. HELPS International also commissioned an Environmental Impact Assessment (EIA).

In response to the Hearts and Hands question, HELPS International explained the details and cost and time investment required to develop a project and that the PoA included only ONIL Stoves. Laboratory information was forwarded to Innovative Communities.

SECTION G. Approval and authorization

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Letters of Approval were issued by each of the Parties wishing to the involved in the PoA. These letters authorize the PoA and the CME and have been made available to the validating DOE. These letters are provided along with the PoA-DD.

PART II. Generic component project activity (CPA)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

>>
ONIL Stoves—Guatemala – CPA XXX

H.2. Reference number of generic CPA

>>
8480-XXXX

H.3. Purpose and general description of generic CPA

>>
Each SSC-CPA will involve the distribution and installation of ONIL Stoves in households within Guatemala. The households that make up each CPA will be identified by name and geographic location.

Implementation and management

CPA Implementers
These are entities that will manage and coordinate the promotion, distribution and/or installation of the ICS. CPA implementers are also responsible for monitoring activities of the SSC-CPAs. Examples of CPA implementers are: NGOs, religious, environmental, social organizations, farmers associations and private, public or governmental entities. CPA implementers will have an agreement with the CME establishing roles and responsibilities for the successful implementation of the SSC-CPA.

Each CPA implementer will define and establish its distribution channels. Two distribution channels are envisioned to achieve the SSC-POA objective:

- The first channel is through direct sales/field team - using networks to market the ONIL Stoves directly to end users in villages, communities, at local market days and other large community events.
- The second channel will utilize existing local, experienced commercial distributors. Each of the distributors will have their own established network of retailers.

Coordinating/Managing Entity

HELPS International, as CME, will manage and coordinate activities of CPA Implementers and also provide necessary inputs to stove businesses, including marketing and promotion. The CME will also coordinate the monitoring of the SSC-PoA and all communications with the UNFCCC Executive Board.

ONIL Stove distribution/installation methodology

This SSC-PoA allows for the distribution/installation of ONIL Stoves. ONIL Stoves are rocket stoves with insulated combustion chambers.[43]

CPA implementer installing ONIL Stoves shall demonstrate on the SSC-CPA-DD its capabilities and provide specific details on how it will distribute/install fixed stoves, including but not limited to the following:

- Design the training material for stove technicians/instructors/field trainers as well as for stove users;
- Indicate the type of training (field-based/practical, classroom or both) that shall be conducted;
- Conduct performance tests in the field to test the technicians/instructors/field trainers' ability to build/install the ONIL Stove; and
- Conduct performance tests in the field to test end-users ability to build and repair the ONIL Stove (when appropriate).

Data Collection and Transfer

Registration Card[44]

The CPA Implementer will gather the necessary information to identify households using the ONIL stove during the course of the project. To facilitate this process, the CPA implementers will assign a serial number to each ONIL Stove or to the household.[45] This number will be recorded in the Registration Card together with the following information (as appropriate and as available):

- Name of ONIL stove user or head of the household
- Address of ONIL stove user or household
- Phone number of ONIL stove user or household
- GPS location of household
- Stove model
- Date of distribution/installation
- Stove serial number
- Retailer/distributer information
- Identification of cooking method prior to installation of the stove

Means of collecting end-users' information

CPA Implementers shall ensure that the information contained in the Registration Card is collected and transferred to the CME. Collection of end-users' information will be achieved through different means, such as the following options (as appropriate and available):

- Direct contact: CPA implementer instructs their field team to fill the Registration Card with users' information when distributing/installing the stove. The CPA implementer can initially perform this manually with ink over a printed Registration Card, but new Information and Communication Technologies (ICT) to increase the efficiency of data collection and data

43 Section A.4.2.1 provides additional details on the technology to be implemented under this SSC-PoA

44 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.

45 In cases where the stove is fixed and a serial number plate is difficult to be assembled to the ICS (eg. mud stoves which are constantly being repaired by users with a new layer of mud), a serial number will be attached to the household (eg. a name plate fixed on the kitchen's wall, or just an identification card kept by the household), instead of to the stove. For instances where the serial number plate can be attached to the ICS itself, it will be.

transfer may be applied. One example of these technologies is the personal digital assistant (PDA) - a handhold device that transfers data over the Internet.

- Indirect: the users' data (same information as per Registration Card) may be directly transferred to the CPA implementer via Short Message Service (SMS) also known as text messaging service. In this instance, the CPA implementer will provide the user with instruction on how to submit the SMS to the CPA implementer.

Users' participation on the SSC-POA, transfer of Carbon Rights to the CME and use of three-stone open fire

During the distribution/installation of the ONIL Stoves, the user shall confirm the ONIL Stove is replacing a traditional three-stone fire or pot support and the CPA implementer shall inform the end user of the household's participation on the SSC-PoA and that CDM finance is being used to fund the ONIL Stove. Users shall agree, as per the Registration Card, that it previously did not own an ONIL Stove and to transfer the rights of any emission reduction generated by the ONIL Stove to the CME.

In case of direct contact, the collection of users' information can be achieved by instructing the CPA implementer's sales/field or retailer team members to read out the required information to users (ie. that user previously did not own an ONIL Stove and transfer of carbon rights) and if possible have users sign the Registration Card or the sales/field or retailer team members can sign the paper ascertaining that they have read out the clauses. In this instance, CPA implementers shall tick a box next this clause once end-user acknowledges it.

When SMS is used, this clause can be written on the instruction for the user on how to submit the information to the CPA implementer. By sending the SMS, users are acknowledging that they are voluntarily participating in the SSC-PoA, that the ONIL Stove is replacing a three-stone fire or traditional pot support and that the user agrees to transfer the carbon rights to the HELPS International.

Project Data-Base

The information collected by the CPA implementer is stored in the CME's database.

CPA implementer will have the hardcopy of data to input into the electronic database. For information transferred via ICT or SMS, there will be no hardcopy. The electronic data is transferred from the ICT device to the database managed by the HELPS International. Similarly, SMS data is transferred directly to the electronic database. The database will be backed up to HELPS International's server throughout the lifetime of the project. The hardcopy of the Registration Card (if applicable) shall be archived.

The CME will maintain copies of the database from all of the CPAs. Personnel entering the data from each ONIL Stove will be trained in the basic functions of Excel (or other appropriate software used to build the database) to reduce the chance for errors. HELPS International staff will sample and cross-check the data at minimum once every three months by randomly selecting at least 20 database (across all its CPAs) entries and comparing the information in the cells with the information from Registration Cards. The database will be sortable by the information collected as per Registration Card and will be made available to the DOE at verification.

The CPA implementer will verify accuracy and completeness and confirm that there is no double entry of serial numbers in the database. The CPA implementer will identify any discrepancy and the correct information will be entered into the database.

In case a replacement stove is being issued / sold to a customer already registered on the project database, a new registration will not be required. The replacement stove will be recorded in the project database in such a way that it is clear that the replaced stove ceases to be included in the CPA; and the replacement stove is associated with the customer's details as a new stove, and is included in the CPA as a new stove.

Responsibilities of Operational and Management Entities and CPA Implementer

HELPS International is the CME for this SSC-POA. HELPS International or other third parties may act as CPA Implementers. HELPS International is the CPA Implementer for the first CPA. The responsibilities of each party are summarized in Section A.4.4.1 below. Local partners will be required to conform to systems designed by CME under services agreements signed with CME.

Location and scale

CPAs will be defined as the sum of identified locations of in-use ONIL Stoves installed or distributed to consumers previously using three stone fires or traditional pot supports, based on the detailed sales or registration record described above (including ICT/SMS data as applicable). The sum of the location of these ONIL Stoves will define the spatial boundary of the SSC-CPA, which in turn will fall entirely within the geographical boundary of the SSC-PoA.

Each CPA will define a limit to the number of stoves based on the specific technology and context, such that each is under the SSC energy saving threshold of 180 GWh^{th}/year (as appropriate for small scale projects).

The maximum number of stoves in any one CPA will be dependent on the biomass saved by each ONIL Stove ($B_{y,saving}$) in one year and shall be calculated in the following manner

Maximum stoves per CPA = 180 $GWH_{th}/(NCV_{biomass}*B_{y,savings})$

Where:

$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne) – which can be calculated as ((0.015TJ/tonne)*(277777.7777778kWh/TJ)/1000000)
$B_{y,savings}$	Total biomass that is saved in tonnes in one year (*y*)

H.4. Technologies/measures

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The program will provide ONIL Stoves to replace conventional open fires used by households. The PoA is a Type II 'Energy Efficiency Improvement Project', category G, 'Energy efficiency measures in thermal applications of non-renewable biomass'.

The ONIL Stove is a fuel-efficient stove that reduces the amount of firewood required by households by up to 58 percent, and results in lower emissions based on its construction and design. Since the efficiency of a traditional open fire is 10%[46] and the efficiency of an ONIL Stove is 24%[47], and depending on the specific stove model the efficiency can be higher, the ONIL Stove is more efficient than the traditional open fire. Complete combustion and efficient energy transfer to pots and cooking surfaces ensures fast heating and fuel-efficiency. 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 surfaces. Insulation prevents the heat from being wasted heating the stove body. Hot gases that do not touch the cooking surface waste their energy but insulation lets all the hot gases come in contact with the cooking surfaces thereby

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

[47] Note that 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 the first CPA. Manufacturers can specify the efficiency of the ICS through WBTs conducted by independent third parties.

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.

The ONIL stove can be manufactured assembled and installed locally or be imported. The implementation of the PoA or SSC-CPA does not require any technology transfer from Annex 1 countries to Guatemala.

Energy studies for Latin America show that fire wood use is expected to increase in Guatemala throughout the projected period (to 2018).[48] The projections demonstrate that it is unlikely that another more efficient technology will replace the ONIL cooking stove during the expected project period.

SECTION I. Application of selected methodologies and standardized baselines

I.1. Reference to methodologies and standardized baselines

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The approved small-scale baseline and monitoring methodology used is AMS II.G, version 3, *Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass*.

I.2. Applicability of methodologies and standardized baselines

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AMS II.G, version 3, states that:

This category comprises small appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency biomass fired cook stoves or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers.

This methodology is applicable to SSC-CPAs because these projects concern the distribution, installation and use of fuel-efficient improved cook stoves in households, creating demand-side energy savings and reductions in greenhouse gas emissions. The technology to be deployed by SSC-CPAs is listed in the methodology. The programme will result in savings in non-renewable biomass, which would have been consumed by less efficient cooking methods.

[48] OLADE, Energy Statistics Report, 2007, www.olade.org, page 89

Eligibility Criteria	Justification
This category comprises of appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency (1) biomass-fired cook stoves (2) or ovens or dryers and/or improvement of energy efficiency of existing biomass-fired cook stoves or ovens or driers. (1) The efficiency of the project systems as certified by a national standards body or an appropriate certifying agent recognized by it. Alternatively manufacturers' specifications may be used. (2) Single pot of multi pot portable or in-situ cook stoves with a specified efficiency of at least 20%	The PoA consists in the distribution of high efficiency biomass-fired cooking stoves. The program saves non-renewable biomass that would have otherwise been used by less efficient cook stoves (conventional open fires). As explained in sections A.2 and A 4.2.1 above, the stove has a combustion chamber, which contains the fire. Hot gases come in contact with the cooking surfaces thereby transferring their energy to the pots and leaving only enough heat in the exhaust gases to provide a draft up the chimney. Energy is transferred to the cooking pots and cooking surface and the heat is retained within the stove body. The transfer of heat energy from the source of the heat (fire) to the cooking pot is more efficient in the ONIL Stove than in the traditional open fire. Methodology II.G, version 3, requires that high efficiency systems as certified by national standards body or an appropriate certifying agent recognized by it; or alternatively by manufacturer's specifications and that the in-situ cook stove have a specified efficiency of at least 20%. Since the ONIL cook stove has a manufacturer-certified efficiency of 24% (see footnote 4 and section A.2) it is more efficient than the traditional open fire, which has an efficiency of 10% (see footnotes 10 and 11), the program is eligible to use the methodology.[49]
Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	The baseline survey confirms that participants have been using non-renewable biomass since at least 31 December 1989. A comparison of Guatemalan household energy use by the national census[50] show that in 1981, 77.3% of households used firewood thus demonstrating that non-renewable biomass has been in use since 1989. The following indicators listed in the methodology demonstrate that non-renewable biomass has been used since 1989. 1. Survey results, national or local statistics, studies, maps or other sources of information such as remote sensing data that show that carbon stocks are depleting in

[49] Aprovecho Research Center, 2004, HELPS "ONIL" Griddle Stove Fuel efficiency and Emissions, page 2

[50] Winrock, 2004, Partnership for Clean Indoor Air, Household Energy Indoor Air Pollution and Health: Overview of Experiences and Lessons in Guatemala, page 19.

	the project area; As seen in the FAO 2010 report (data shown in the table below), carbon stocks in the country are depleting in the project area.[51] 2. Increasing trends in fuel wood price indicating scarcity of fuel wood; An analysis comparing the *Encuesta Nacional de Condiciones* ENCOVI (Living Standards Measurement Survey) from national surveys taken in 2000 to 2006 show that the price of rural fuel wood consumption went up by 21.6% from 2000 to 2006.[52] Data from the national census also shows that the number of households using fuel wood for cooking has also increased from 889,899 in 1981 to 1,261,952 in 2002[53]and to 1,746,326 in 2006.[54] . Thus, it is reasonable to assume that the increasing trend in price also holds true for the time period since December 31, 1989, thus meeting the NRB indicator requirements. Because at least two indicators show that non-renewable biomass has been in use since 31 December 1989, the use of the methodology II.G/Version 03 is appropriate.

	1990	2000
Biomass Carbon Stocks (millions of metric tons of carbon)	***365.2***	***323.6***

Leakage

According to AMS II.G version 3, leakage estimation under a programme of activities uses a net adjustment factor as an option to account for any leakages. The methodology states the following: As an alternative to subparagraphs (a) and (b), B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case the surveys are not required. If equipment currently being utilized is transferred from outside the boundary to the project activity leakage is to

[51] FAO, Evaluacion de los Recursos Forestales Mundiales, Informe Nacional, 2010, Guatemala, FRA2010/084, www.fao.org/forestry/20262-1-174.pdf, page 33

[52] Heltberg, Rasmus, September 7, 2010, Trends In Fuelwood Use And Scarcity In Guatemala, 2000-2006.

[53] Winrock, 2004, Partnership for Clean Indoor Air, Household Energy Indoor Air Pollution and Health: Overview of Experiences and Lessons in Guatemala

[54] *Instituto Nacional de Estadistica*, *Anuario Estadistico Ambiental 2008*", National Statistics Institute, Environmental Statistics Yearbook 2008, Page 299 "

be considered. Since it is very unlikely that the installed ONIL Stove will be moved into Guatemala, leakage due to this reason does not apply.

The household survey showed that 97.6% of households are using wood fuel as their main cooking energy. Renewable energy sources have not gained any significant importance in the country. The number of non-project users who previously used renewable energy sources and will now use the biomass saved under the project activity can therefore be neglected.

Limit of the Small-Scale Activity CPA

No CPA will exceed the threshold limit of small-scale activity of 180 GWh^{th} annual thermal energy savings.

I.3. Application of multiple methodologies

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Not applicable. Only one small scale methodology is applied under this PoA

I.4. Project boundary, sources and greenhouse gases (GHGs)

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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 not considered as sources of emissions (CH_4 and N_2O) for simplification and therefore excluded from the PoA.[55] This approach is conservative, since in reality the emissions of these gasses would be reduced.

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

	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

[55] GIRA, 2003, Use of biomass as energy source for homes, environmental and health effects. Final Report to Interdisciplinary Appropriate Rural Technology Group. *El uso de biomasa como fuente de energía en los hogares, efectos en el ambiente y la salud, y posibles soluciones. Informe final del Grupo Interdisciplinario de Tecnología Rural Apropiada* (GIRA), A.C., p. 9.

I.5. Establishment and description of baseline scenario

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The baseline scenario would be the use of traditional cooking methods (i.e. open fires) using fuel wood in Guatemalan households prior to the replacement by improved cook stoves supplied by the PoA. The alternative scenarios are:

1. Utilization of current cooking methods (i.e. conventional open fires), or
2. Autonomous replacement of current cooking methods with new appliances of the same efficiency.

As per paragraph 4 of 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." The baseline survey and other literature sources show that end-users of improved cook stoves in Guatemala use LPG as an alternative fuel to meet cooking needs. [56] 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 tCO2/TJ is conservative.

Fuel wood use in Guatemala

Approximately 57 percent of the entire population of Guatemala (6.4 million people) uses fuel wood for cooking. In rural areas, where 60 percent of the population lives, 97 percent of households use fuel wood for cooking.[57]

The PoA targets households

The PoA targets households switching from traditional open fires to improved cook stoves. The design of the PoA involves technicians conducting demonstrations to target groups, thus ensuring stoves will be accepted and adopted by households. Households are trained on installation, use, and maintenance of stoves. The PoA also allows for retail sales of ONIL Stoves.

In the absence of the time-consuming and costly grass roots activities this PoA promotes, based on current rural cooking practices and lack of knowledge and understanding of the benefits of improved cook stoves, low-income households are unlikely to purchase efficient stoves autonomously.

Regulatory Requirements

Forestry Law: The baseline scenario is in line with regulatory requirements since there is no law regulating against the use of conventional open fires in Guatemala. The Forestry Law "*Ley Forestal (Decreto 101-96)*" and the Protected Areas Law "*Ley de Aéreas Protegidas (Decreto 101-96 y sus reformas)*" govern the forests and protected lands in the country. The forestry law allows for the collection of firewood for private household use, such as fuel wood and construction materials and allows families to consume up to 15m^3 of wood without a license. A license is required for any commercial use other than family consumption or voluntary plantations.[58]

Energy efficiency: There are currently no laws regulating the use of energy efficient appliances in Guatemala.

The baseline scenario correctly considers relevant Forestry, Protected Areas, and Energy Efficiency regulations. No other laws or regulation affect the baseline scenario.

S**tep 1: Determination of the average annual biomass consumption per household (B_y)** (from Household Baseline Survey).

[56] The World Bank (2005): Environmental Health and Traditional Fuel Use in Guatemala, page 2.

[57] The World Bank (2005): Environmental Health and Traditional Fuel Use in Guatemala, page xiv

[58] Rights and Resources, 2012, Guatemala, page 4

A household survey was conducted to determine the average annual use of fuel wood in households that are currently not using the ONIL Stoves. Annex 3A shows the survey itself, and Annex 3B shows detailed discussion of the results.

The baseline survey showed that the annual consumption of wood in households that did not have the ONIL stove was 6.64 tons of wood per household per year. There is an average of 5.7 members in each household. All those surveyed who did not use the ONIL stove used wood to cook their meals and less than 10 percent stated that they used the stove to heat the home. The survey also demonstrated that the most common non-wood-burning stoves used LPG as their fuel source and that non-renewable biomass has been used since 31 December 1989. FAO, and other official statistics confirm this finding.[59]

As demonstrated by the survey, conventional open fires represent the majority of cooking methods used by households covered by the PoA, and non-renewable biomass has been used since at least 31 December 1989.

Baseline Survey Design

The population sample parameters were 95 percent confidence with a margin of error of +/- 5%. The targeted population is 1.746 million households[60], which gave a sample size of 384; the baseline survey goal was a sample 400 to be conservative. The actual sampled population was 402 households who use fuel wood, randomly selected, thus providing more reliable results.

The survey samples were divided by department (state) and then by municipality and community. Since the cost of surveying each department would be prohibited, the surveyed departments were randomly selected across the country.[61] Key questions asked in the survey included amount of wood consumed daily, number of people fed in each household, type of fuel wood used, method and cost of obtaining firewood.

The survey results provide a value of 6.64 tons of wood per year in the absence of the appliance. Annex 3 B contains further details about the survey results.

Step 2: Determination of the efficiency of the replaced (η_{old}) and the deployed (η_{new}) system for calculation of biomass savings per user (from ONIL Stove experiments):

Since the replaced system is the conventional open fire lacking improved combustion air supply mechanism and flue gas ventilation, as stated in methodology AMS II.G, version 3, a default value of 0.10 given in methodology is used for 'η_{old}'. There are many studies that show the efficiency of conventional open fires and an analysis of these studies shows that the default value of 0.10 for η_{old} is within the range of credible values. [62]

The minimum efficiency of the exact model of stove contemplated in each CPA will be assessed by manufacturer-certified water boiling test (WBT), and detailed in the CPA-DD. The estimated savings from the HELPS-manufactured ONIL stove for the first CPA are detailed here:

To most accurately reflect cooking scenarios, the weighted average of the Aprovecho Research Center's cold start and hot start efficiency values are used in the following manner:

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[59] *Instituto Nacional de Estadistica, Anuario Estadistico Ambiental, 2008*; National Statistics Institute, Environmental Statistics Yearbook, 2008, page 303

[60] *Instituto Nacional de Estadistica*, National Statistics Institure,.Environmental Statistics Yearbook 2008, Page 299 "*Anuario Estadistico Ambiental 2008*"

[61] Of the 22 departments in Guatemala, the baseline survey was conducted in 13 departments, or 59%, chosen at random.

[62] Aprovecho Research Center, 2004, HELPS "ONIL" Griddle Stove Fuel efficiency and Emissions, page 2

Cold Start efficiency of 0.20*(1/3) + Hot start efficiency of 0.26*(2/3)=0.24

Step 3: Determination of the share of non-renewable biomass (f_{NRB})
The determination of the share of non-renewable biomass (NRB) in the project area is based on FAO data,[63] comparing the sustainable yield (the mean annual increment of woody biomass, here expressed as "production") with annual demand in the project area. The project area, as stated under Section A.4.1.2, encompasses all of Guatemala.

The following definitions, according to methodology AMS II.G., version 3, are used to calculate NRB:

Demonstrably Renewable woody Biomass (DRB), which according to methodology must meet at least one of the following conditions:

I. The woody biomass is originating from land areas that are forests where:

a) The land area remains a forest; and

b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and

c) Any national or regional forestry and nature conservation regulations are complied with.

II. The biomass is woody biomass and originates from non-forest areas (e.g. croplands, grasslands) where:

a) The land area remains as non-forest or is reverted to forest; and

b) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and

c) Any national or regional forestry, agriculture and nature conservation regulations are complied with.

Since reforested lands in Guatemala meet the conditions outlined in (1) above, that is, that the land remains a forest, that sustainable management practices ensure that levels of stocks don not decrease over time and that national or regional forestry and nature conservation regulations are complied with, then the reforested area statistics can be used to determine the DRB component. The National Forest Institute statistics [64] show that 11,178 ha are reforested each year in Guatemala. The number of hectares was then multiplied by an average forest density factor of 141 m3/ha[65] yielding the following volume of renewable biomass or DRB:

Reforested area = 11,178 ha/yr
Density of tree coverage, average value = 141 m^3/ha

And to convert to mass, an average density of 0.6 tonnes/m^3

DRB = 11,178 ha * 141 m^3/ha = 1,576,098 m^3 *0.6 tonnes/m^3
DRB = 945,660 tonnes of wood

[63] www.fao.org/forestry/country/en/gtm/

[64] *Instituto Nacional de Estadistica, (INE), 2008, Indicadores Ambientales*; National Statistics Institute, 2008, Environmental Indicators

[65] FAO, Evaluacion de los Recursos Forestales Mundiales, Informe Nacional, 2010, Guatemala, FRA2010/084, *www.fao.org/forestry/20262-1-174.pdf*

The increasing rate of Guatemalan deforestation discussed in this and the previous section shows that fuel wood harvesting is far outpacing any regeneration for household consumptions. Taking conditions I and II listed above into consideration, the small rate of regeneration makes sense.

Determination of Non-Renewable Biomass, according to methodology AMS II.G, is (NRB) is the quantity of woody biomass used in the absence of the project activity (B_y) minus the DRB component, so long as at least two of the following supporting indicators are shown to exist:

- Trend showing increase in time spent or distance travelled by users (or fuel wood suppliers) for gathering fuel wood, or alternatively trend showing increase in transportation distances for the fuel wood transported into the project area;
- Survey results, national or local statistics, studies, maps or other sources of information such as remote sensing data that show that carbon stocks are depleting in the project area;
- Increasing trends in fuel wood price indicating scarcity; or
- Trends in the type of cooking fuel collected by users, suggesting scarcity of woody biomass.

Project Proponents have literature and third party evidence showing that in Guatemala there is a trend showing increasing time and money spent on fuel wood collection[66] as well as depleting carbon stocks.[67]

To determine the Non-Renewable Biomass component, the B_{old} value (the quantity of woody biomass used in the absence of project activity) obtained from the household survey multiplied by the number of households in Guatemala who are still burning biomass in open fire (1.746 million).[68]

Combining the values provides the following NRB and DRB values:

$B_{old, adjusted\ Guatemala}$ = tons saved per appliance * number of households with open fires
= 6.20 tons of fuel wood/year * 1,746,329
B_{old} = 10823987.64 tons of fuel wood per year

DRB = 945,660 tons

$NRB = B_{old,} – DRB$
NRB tons = 10823987.64 tons – 945,660 tons = 9878328.842

$$= \frac{NRB}{NRB + DRB}$$

f_{NRB} = 0.913

Step 4: Determination of the fossil fuel most likely to be used by similar consumers ($EF_{projected\_fossilfuel}$)

In the absence of the project activity, for the purposes of emissions reductions, the baseline is assumed to be the use of fossil fuels to meet similar thermal needs. In this case, as per AMS II.G

[66] Letter from Rasmus Heltberg, 2010.

[67] FAO, Evaluacion de los Recursos Forestales Mundiales, Informe Nacional, 2010, Guatemala, FRA2010/084, *www.fao.org/forestry/20262-1-174.pdf*

[68] *Instituto Nacional de Estadistica*, National Statistics Institure,.Environmental Statistics Yearbook 2008, Page 299 "*Anuario Estadistico Ambiental 2008*"

Version 03, the Emission Factor default emission factor of 81.6tCO_2/TJ is applied. In addition, Version 3 allows a default leakage adjustment factor of 0.95 to be applied to B_{old} to account for leakages. This PoA will also use this default.

Step 5: Ex-ante calculation of emission reductions: Estimation of the number of new systems in use (N) (from Project Implementation Schedule)

As the last step, the emission reduction per system is multiplied with the number of systems operating in the project activity.

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

>>

Methodological choices for the typical SSC-CPA include the following

Methodological choice	Justification
EF $_{projected\_fossilfuel}$: The emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO_2/TJ	Default value per II.G, version 3.
Since PoA only uses option 2 **η_{old}:** Efficiency of the baseline system/s being replaced, measured using representative sampling methods or based on referenced literature values (fraction), use weighed average values if more than one type of systems are encountered; 0.10 default value may be optionally used if the replaced system is the conventional open fire or a conventional system lacking improved combustion air supply mechanism and flue gas ventilations system i.e., without a grate as well as a chimney; for the rest of the systems 0.2 default value may be optionally used.	Since the systems being replaced by the typical SSC-CPA are open fires, the default value 0.10 for **η_{old}**.
B_{old} is determined by using one of the following options a) Calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year). This can be derived from historical data or a survey of local usage; OR b) Calculated from the thermal energy generated by the new project activity as: $B_{old} = \frac{HG_{p,y}}{NCV_{biomass} * \eta_{old}}$ Where $HG_{p,y}$ is the amount of thermal energy generated by the new technology in the project in year *y* (TJ)	B_{old} is calculated using option a) of paragraph 7 of AMS.II.G (v.03) methodology: as the product of the numbers of operating appliances multiplied by the estimate of average consumption of woody biomass per appliance (tonnes/year) derived from the baseline survey of local usage.

I.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data and parameter.)

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 surveys, 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, ex-ante
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 Bold to account for leakages as per paragraph 13 (a) of the AMS II.G, version 3 methodology 0.95
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 (methodology default for conventional open fires)
Choice of data or Measurement methods and procedures	Provided as default value since replaced system is the conventional open fire.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data/Parameter	f_{NRB}
Data unit	fraction
Description	Fraction of non-renewable woody 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. $B_{old,adjusted}$ is taken from the baseline survey and multiplied by the estimated number of households 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 $B_{old,\_Guatemala}$ minus the DRB component . Then, $\mathbf{f_{NRB}}$ = NRB/(NRB +DRB)
Purpose of data	Calculation of baseline emissions
Additional comment	

Data/Parameter	**$NCV_{biomass}$**
Data unit	TJ/t
Description	Net calorific value of non-renewable biomass that is substituted
Source of data	IPCC default value for fuel wood, ex-ante
Value(s) applied	0.015 TJ/tonne
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	**$EF_{projected\_fossilfuel}$**
Data unit	tCO2/TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	IPCC default
Value(s) applied	81.6 TCO_2/TJ of LPG
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	

I.6.3. Modalities for ex ante calculation of emission reductions

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Project Activity Emissions Reduction Equations

Project emissions reductions consist of reductions in fuel wood use of the stoves compared to traditional cooking methods in households. Thermal energy savings per ONIL Stove are calculated by multiplying the annual biomass savings per ONIL Stove with the fraction of non-renewable biomass, its calorific value, the default emissions factor value ($EF_{projected\_fossilfuel}$), and a leakage adjustment in the following manner:

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

Where:

ER_y	Emissions reductions during the year in t CO_2e
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of non-renewable woody biomass that is substituted (IPCC default value for fuel wood 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 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.

Calculation of $B_{y,savings}$:

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 original efficiency (thus efficiency tests only have to be conducted once, on the new stoves). In all instances, the possible variation in performance of stoves of different vintages will be accounted for in calculating $B_{y,savings}$.

Option 2.

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

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 that have been in operation for fractions of the monitoring period the following formula is used:

$$N_{y,i} = \sum_{j=1}^{J_y} n_{y,j} . t_{y,j}$$

Where:

$N_{y,j}$	Total number of ONIL Stoves in operation for a full in monitoring period equivalent within each CPA

$n_{y,j}$ Number of ONIL Stoves in monitoring period y for j weeks

j Weeks since installation or distribution of the ONIL stove (or start date of monitoring period for ONIL stove 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/Jy). Note, for ONIL Stoves installed in prior monitoring periods $t_{y,j} = 1$.

J_y Total number of weeks in the monitoring period y

For the purposes of calculating ex-ante emission reductions a baseline adjustment factor has to be applied to B_{old} 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)

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)
Less correction = 18.2 kg/day - 1.22 k 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%). B_{old} 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):

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

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 system 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
SS_y	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;

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

(Copy this table for each piece of data or parameter.)

Data/Parameter	$n_{y,i}$
Data 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 EB69 Annex 4 are not satisfied, then CPA-Implementers will follow the procedures outlined in the Monitoring Plan (I.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 I.7.2 of the PoA-DD for more detail on monitoring procedures

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Data/Parameter	t_{yj}
Data 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 B.7.2 of the PoA-DD for more detail on monitoring procedures

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Data/Parameter	$\eta_{new,i}$
Data 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 an 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 the first 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 B.7.2 of the PoA-DD for more detail on monitoring procedures

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Data/Parameter	SS_y
Data 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 B.7.2 of the PoA-DD (to meet EB 69 Annex 4 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 B.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 B.6.3.

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Monitoring frequency	At least every two years
QA/QC procedures	Data for this parameter will be collected using the same survey for the parameter $n_{y,j}$ (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 I.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.

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Data/Parameter	**$B_{old\_Adjusted}$**
Data unit	Tonnes/year
Description	If baseline stoves continue to be used, adjustment ensures that fuel wood consumption of those stoves is excluded from B_{old}.
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 B_{old}. 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 B_{old}. 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	-

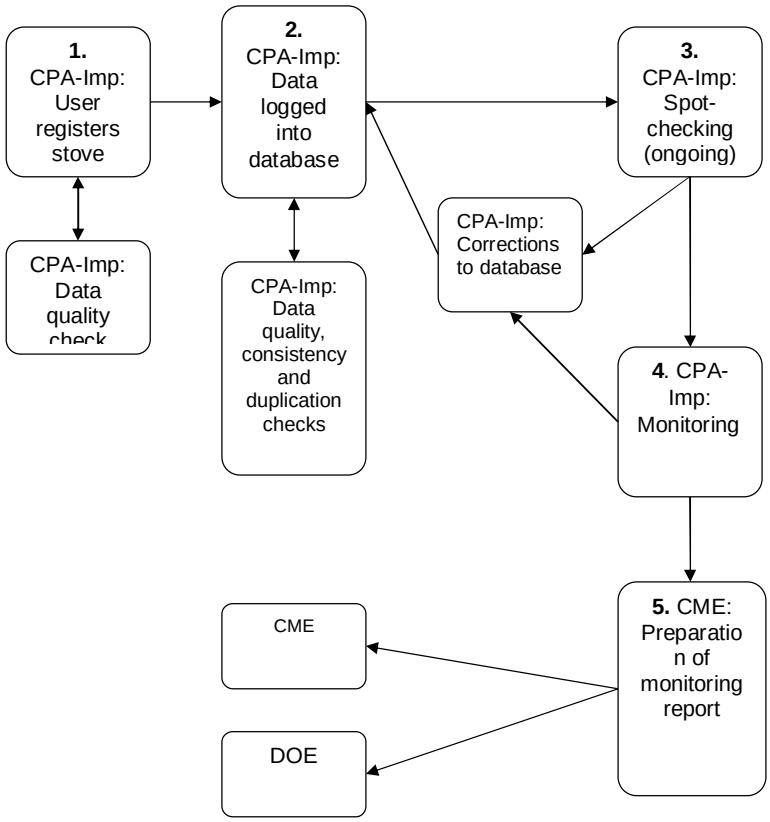
I.7.2. Sampling plan

>>
MONITORING PLAN

The Monitoring Plan applied in this PoA involves a number of key elements that ensure that the CME and CPA-Implementer have high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Certified Emission Reductions (CERs) following AMS II.G version 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.

CPA-Imp: Monitoring: CPA implementer will follow the requirements as per POA-DD to collect the necessary information for a monitoring report.

5. **CME: Preparation of monitoring report:** the CPA implementers or the CME will prepare the final monitoring report to be provided to the verifier DOE for verification of emission reductions. A copy of the monitoring report will remain with the CME

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

Sampling Plan

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

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(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 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 Sampling Plan (by grouping and sampling across CPAs) that is designed in line with the requirements of the "Standard for sampling and surveys for CDM project activities and programme of activities" from version 07.0

Deleted: EB 69, Annex 4

(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/precision (as per paragraph 20 of EB 69 Annex 4) for annual and 95/5 for biennial sampling across CPAs (as per Methodology AMS-II.G version 03 paragraph 22). In case a single CPA is sampled, 90/10 confidence/precision for annual and 95/5 confidence/precision shall be required for biennial sampling. [70]

Monitored Parameters:

Parameter	Description of Parameter
$n_{y,j}$	Proportion of ONIL Stoves still in operation

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

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 ($n_{y,j}$) and for percentage of continued baseline stove use among ONIL households in the database (SSy) of this POA are all households in the POA database which are using fuel wood ONILStoves 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) installed in vintage i across CPAs that are working and are in the database.

(iii) Sampling Frame

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 (ny,j) and percentage of continued baseline stove use among ONIL Stoves 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/installed 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 PoA. The Registration Card is used to populate the stoves Database and the Monitoring Survey follows the "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities".

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   The 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 "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 07.0, section 5, paragraph 21, , 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, 90/10 confidence/precision for annual and 95/5 confidence/precision shall be required for biennial sampling.

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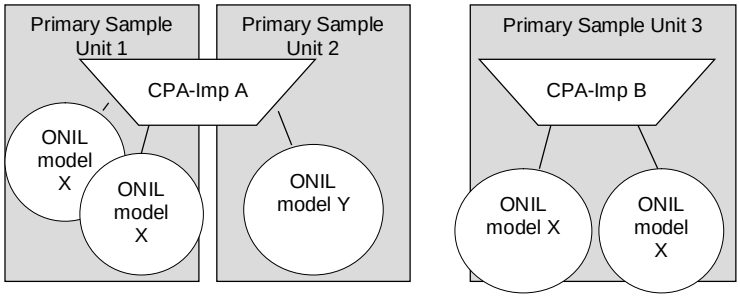
The first step is to identify the Primary Sampling Units. Primary sampling units are CPAs that have:

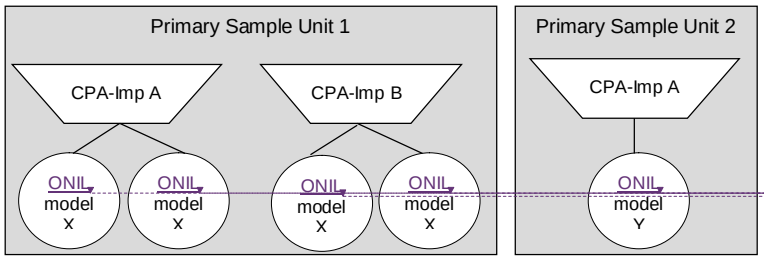
1. The same CPA Implementer
2. The same ONIL stove model

Ie. 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 POA has CPAs with two different CPA Implementers using the same ONIL stove model, these form two different Primary Sampling Units. The 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 illustrate 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 (ηnew,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 ηnew,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", implemented in different CPAs, the primary group shall consist of all ONIL Stoves implemented in different CPAs under the POA (regardless of CPA Implementer) which are of the same vintage and same model – in this example there are three primary sampling units which are: 1) 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.

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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):

- $n_{y,j}$: 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)
- SS_y: 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)

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 in the "Sample Size" section below, the CME will randomly sample the required number of ONIL Stoves from 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 ONIL Stoves 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 of vintage 1 is 26% and for 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 Stoves 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 confidence/precision for annual and 95/5 confidence/precision for biennial sampling. In case a single CPA is sampled, a 90/10 confidence/precision is required for annual sampling[73] and 95/5 confidence/precision shall be required for biennial sampling.[74]

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

Deleted: The sampling method for all three monitored parameters ny,j, SSy and Knew,i, is multi-stage sampling (as per of EB 69 Annex 5 Section II). 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 approach, and can be thought of as sampling a number of groups, and then going on to sample units within each group (paragraph 73 of EB 69 Annex 5). 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 (i.e., Primary Sampling Units for ny,j and SSy are CPAs with same CPA Implementer and same ONIL Stove model; and Primary Sampling Units for *I*new,i are CPAs with the same ONIL Stove ICS model and same vintage regardless of CPA Implementer). Each Primary Sampling Unit will be comprised of a number of municipalities[71]– 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[72]. Once the municipalities are defined, ONIL Stoves /households present in each municipality will be randomly selected.¶

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

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

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

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

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

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

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

For the registration/inclusion purpose of CPA-DD, option C shall be applied. For the first monitoring period, values from a pilot 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.

To estimate the number of sample size for parameters $n_{y,j}$ and SS_y the following equation[75] is used:

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

Where:

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

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

1. The population size, N, is taken as 100,000 households. (Assuming one ONIL Stove for one household).
2. It is expected at least 80% of ICS still in operation, hence the expected proportion p for $n_{y,j}$ is taken as 0.8.

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

Deleted: The parameters $n_{y,j}$ 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 Stoves per municipality 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.

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

Deleted: 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)¶
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)

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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.

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Deleted: 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 SS_y and $n_{y,i}$) are used to exemplify the sample size calculations and are presented below:¶
¶
... [1]

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 confidence/precision 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:

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

Deleted: $C \geq \frac{\frac{0.033}{0.861^2} \times \frac{265}{265-1} + \frac{1}{63} \times \frac{0.091}{0.861^2} \times \frac{(7}{(}}{\frac{0.1^2}{1.96^2} + \frac{1}{265-1} \times \frac{0.033}{0.861^2}}$

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

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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.

Deleted: sampled in each municipality is sufficient to achieve the required confidence/precision for the $\mathbf{n_{y,j}}$ value. ¶

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Deleted: 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.¶

Parameter $\boldsymbol{SS_y}$:

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

Deleted: the pilot study results and

Deleted: :[80]¶

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

Deleted: $C \geq \frac{\frac{0.020}{0.828^2} \times \frac{265}{265-1} + \frac{1}{63} \times \frac{0.14}{0.828^2} \times \frac{(7}{(}}{\frac{0.1^2}{1.96^2} + \frac{1}{265-1} \times \frac{0.020}{0.828^2}}$

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

As in the case of parameter $n_{y,i}$, 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.

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The resulting sample size in this case is 11

municipalities where 63 stoves are sampled in each municipality. ¶

Parameter $\eta_{new,i}$:

For the purposes of determining sample size in the first monitoring period, the performance of ONIL Stoves can be categorized into two groups, which are characterized by the range of likely mean efficiency and the likely values of SD relative to the mean, according to the type of 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 $\eta_{new,i}$ the following equation[81] is used:

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

Where:

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

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

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

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

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[82]:

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

[81] Equation 4 of Appendix 2, *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities*, *Version 04.0)*

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

Deleted: 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 sampled per municipality or the number of municipalities to sample.¶

Deleted: (30-50% thermal efficiency)

Deleted: number of municipalities to be sampled

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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.

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

Deleted: $c \geq \frac{\left(\frac{SD_B}{Clustermean}\right)^2 \times \frac{M}{M-1} + \frac{1}{\bar{u}} \times \left(\frac{}{C}\right.}{\left(\frac{precision}{z}\right)^2 + \frac{1}{M-1} \times \left(\right.}$

Deleted: 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 sampled ¶
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 Stoves 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:¶
¶

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

¶
¶
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 greatly 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 the first CPA, or 24%. The unit standard deviation is 1.92% and the average of within municipality standard deviation is 4.35%.[83]
The number of ONIL Stoves to be sampled from each ... [2]

Deleted: municipalities

Deleted: municipality

Deleted: 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 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 5 respectively). From this pool, the CME will randomly sel ... [3]

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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.

Deleted: 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. ¶

(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 for the monitoring period. The scope is a representative sample of stoves across all 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 .
SSy	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.
$\eta_{new,i}$	Monitoring will likely occur every 12 months, and will include ONIL Stove from all vintages for which emissions reductions are to be claimed in that monitoring period.	No less frequently than every two years	Water Boiling Test (WBT) Protocol Version 3.0 (or more recent at the discretion of the CME).	Unlikely.

(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 [85]):

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

The calculation of the sample size will be carried out using estimates for parameter proportions, mean values, variances, and standard deviations, as the actual characteristics of the population/sampling frame are unknown. In order to ensure the quality of the sampling results, the CME can draw on the provisions for reliability calculations including estimating the bounds of the confidence interval, the standard error of the mean value or proportion, and the t-value as derived from the t-distribution[86]. 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,[87] 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

[85] 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.

[86] As provided by the *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities, version 04.0* (EB 69, Annex 5 paragraphs 220 to 290)

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

approach, as for example in the proportion of end-users who continue to use a baseline stove, SSy) of the sampling results as is allowed for by the methodology (AMS II G v3, paragraph 22).

As the continued use of ONIL Stoves 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 η_{new}, 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 to

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

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 database will have back up. Original stove purchase contracts, information collected from the Registration Card) or other means of acceptance by the users will be stored in the main office for the coordinating entity. A back-up of the project database will also be stored on an electric medium by the CME. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

(ii) Analysis

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

- A list of households participating in each CPA, including name, community/location, distribution/installation date and unique serial number;
- Testing to ensure that the stoves are still operating above the minimum 20% efficiency required by the AMS II.G (version 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 6.3 of the PoA-DD. The stoves that are not in use will be excluded from emissions reductions calculations and will not be counted towards the total number of ONIL Stoves in operation during the monitoring period. The thermal efficiency of new stoves ($\eta_{new,i}$) will be used in the calculation of the per stove emission reduction, which will be multiplied by the number of stoves in operation in the CPA to obtain the emission reductions per CPA.

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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 bi-annual 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 installed the end user receives information explaining that the conventional open fire appliance must no longer be used. Follow-up meetings with end users will ensure that those who have received an 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 69 Annex 4 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 (SS_y).

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 during the monitoring period.

I.7.3. Other elements of monitoring plan

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Please refer to Section I.7.2.

SECTION J. Crediting period type and duration

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The type of crediting period for the generic CPA is renewable. The length of each crediting period is 7 years and 0 months.

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

SECTION K. Eligibility criteria for inclusion of CPAs

>>

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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
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 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.	Refer to left column
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

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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
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

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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 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 $GWH_{th}/(NCV_{biomass}*B_{y,savings})$[89]. 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[90].	Refer to left column

[89] $B_{y,savings}$ calculation is presented in section E.6.2. of the PoA DD, and parameters (n_{new} and SS_y) can be checked by reviewing laboratory results and monitoring survey results.

[90] 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.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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
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 69, Annex 4), as outlined in section E.7.2 of the PoA DD, where multi-stage sampling is the selected approach.[91]	Refer to left column

[91] 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 E.7.2 of the PoA-DD are followed.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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 GWh(th) 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 Annex 21 paragraph 3. Supporting calculations must be provided to ensure compliance with this eligibility criterion.	Refer to left column
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
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
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 the stove. Confirmation via inspection of Registration Card or database.	Refer to left column
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
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

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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
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

Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☐ Project participant
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

Coordinating/managing entity and/or project participants	☐ Coordinating/managing entity ☒ Project participant
Organization name	C-Quest Capital LLC
Country	USA
Address	1211 Connecticut Ave NW, Suite 800, Washington DC 20036
Telephone	+1 (202) 416 2410
Fax	+1 (202) 416 2499
E-mail	cqc-operations@cquestcapital.com
Website	www.cquestcapital.com
Contact person	Isabel Alegre

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

Appendix 2. Affirmation regarding public funding

No public funding will be made available for the proposed PoA, or any CPA under the proposed PoA. If any public funding it is ensured there is no diversion of Official Development Assistance (ODA).

Appendix 3. Applicability of methodologies and standardized baselines

Applicability of Methodology has been detailed in section I.

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

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

ONIL STOVE SURVEY
GUATEMALA

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.	LPG		
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	Firewood (leña)	
b.	Agricultural waste (coconut, coco, 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	

b.	Cook beans	
c.	Boil water	
d.	Warm home	
e.	Other use:	

4. How do you obtain your firewood (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 = 4 cargas		
g.	1 tarea[92] = 8 cargas= 1vara largo x4 varas alto		
h.	Other:		

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

Response		Mark w X	Response		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*		q.	Pine (*Pinus* sp.)	

[92] 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. http://j.mp/f32vhE

	sp.)				
h.	'Cozaniza'				
i.	*Inga sp*.				
j.	Oak (*Quercus* sp)		r	Other:	

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

Response (Quetzales)[93]		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.	Other:		

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:

[93] 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	100%
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)	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[94].

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							
								Correction Factor
				Phase 1				
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/CO2 ratio	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/CO2 ratio	0.0240				
Firepower	watts	10,527	Flame Temp	873	degrees C			
				Phase 3				
3. LOW POWER (SIMMER)	units	Test 1	**Totals**	(simmer)				

[94] Aprovecho Research Center, 2004, HELPS "ONIL" Griddle Stove Fuel efficiency and Emissions, page 2 for ONIL Stoves and open fire performance on page 8.

	g/min	12.71							
Burning rate			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/CO2 ratio	0.0254					
			Flame Temp	544	degrees C				

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)
$NCV_{biomass\ (TJ7t)}$	TJ/t	0.015	IPCC Default Value
$EF_{projected\ fossil\ fuel}$	t CO2/TJ	81.6	IPCC Default Value for LPG
ER_y	**t CO2**	**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**		

Appendix 5. Further background information on monitoring plan

Monitoring plan has been detailed in section I.7.2

Appendix 6. Summary report of comments received from local stakeholders

Detailed Summary of comments has been reported in Section F.3

Appendix 7. Summary of post-registration changes

The following changes have been made in the PoA-DD:

a) Addition of project participant

Ecoeye Co., Ltd is added as new project participant to the PoA and its detail is updated accordingly in PoA-DD.

b) Changes to monitoring plan

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.

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Document information

Version	*Date*	*Description*
08.1	28 June 2017	Revision to: • Remove a duplicated instruction; • Make editorial improvement.
08.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and CPA-DD forms; • Make editorial improvement.
07.0	25 May 2017	Revision to: • Ensure consistency with the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Programme design document form for small-scale CDM programmes of activities" (CDM-SSC-PoA-DD-FORM); • Make editorial improvement.
06.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: • Include provisions related to choice of start date of PoA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Add exception for generic CPA where technology is under positive lists; • Make editorial improvement.
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6; • Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM; • Make editorial improvement.
03.0	3 December 2012	EB 70 Revision to reflect changes to the *Guideline: Completing the programme design document form for CDM programmes of activities* (EB 70, Annex 6).

Version	*Date*	*Description*
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.

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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[1] 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:[2]

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

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,[3] the sample will be complemented by selecting the next closest ONIL Stoves to the municipality until the proposed number of households with ICS is obtained. The determination of the closest ONIL Stoves to the municipality will be estimated using GPS coordinates, and measured from a midpoint of the chosen municipality[4]

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.

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

[2] 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.

[3] 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.

[4] 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.

In cases where for any reason (e.g. 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

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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 sampled

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 Stoves to the Clustermean and to the Overallemean 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:

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

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 greatly 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 the first CPA, or 24%. The unit standard deviation is 1.92% and the average of within municipality standard deviation is 4.35%.[5] The number of ONIL Stoves 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%.[6]

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

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.

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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 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 5 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 5 municipalities to sample $\square_{new,i}$