DISTRIBUTION OF ONIL STOVES – MEXICO, SAN FELIPE USILA 1

Document Prepared by

C-Quest Capital Stoves Asia Limited

Project Title	Distribution of ONIL Stoves – Mexico, San Felipe Usila 1
Version	03
Date of Issue	08 November 2021
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1 PROJECT DETAILS

1.1 Summary Description of the Project

ONIL Stoves – Mexico, San Felipe Usila 1 small-scale CPA (SSC-CPA) involves the distribution and installation of ONIL Stoves for use by households in Mexico. This CPA is the first included under the "Distribution of ONIL Stoves – Mexico" PoA. Before the adoption of the ONIL Stove, households in Mexico used inefficient, conventional open fires.

The ONIL Stove is an improved cook stove that reduces the significant amount of firewood required by households and results in lower emissions based on its construction and design. Since the efficiency of a traditional open fire is 10%[1] and the efficiency of an ONIL Stove is 24%, the ONIL Stove is more efficient than the traditional open fire.

HELPS International A.C. is the implementer of this project. HELPS International A.C. manufactures the ONIL stoves and distributes them to communities throughout Mexico.

This project was registered under the CDM as the "ONIL Stoves —Mexico, San Felipe Usila 1" which is first CPA included under the "PoA: Distribution of ONIL Stoves—Mexico" (CDM PoA 8521). The first ONIL stove to participate in the PoA was installed on 30-December-2009. To date, the project has installed 31,178 stoves (3 stoves in 2009, 4,361 stoves in 2010, 8,524 in 2011, 3,883 in 2013, 5,900 in 2014, 4,067 in 2015 and 4,440 in 2016) located across Mexico. During ongoing monitoring and verification, 30,869 stoves were found to be operational, therefore same number has been considered for ex-ante calculation in the ER sheet submitted for RCP.

The average annual GHG emission reduction from the project is expected to be 84,538 t CO2e

1.2 Sectoral Scope and Project Type

The project is categorized under type/category as below:

a) Sectoral scope: 03 - Energy demand

b) Type: II – Energy efficiency improvement projects

The project is not a grouped project.

1.3 Project Eligibility

The project involves energy efficient cookstove distribution which falls under the category of efficiency improvements in thermal applications, therefore it is eligible under the scope of VCS Program.

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

1.4 Project Design

The project has been designed to include multiple project activity instances. Instances under this project consist of the distributed ICS with a thermal efficiency of at least 20% to household users cooking with non-renewable biomass in the baseline scenario.

Eligibility Criteria

The project is not a grouped project.

1.5 Project Proponent

Organization name	C-Quest Capital LLC
Contact person	Isabel Alegre
Title	Managing Director
Address	1015 18th Street NW Suite 730 Washington, DC 20036 United States of America
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Email	ialegre@cquestcapital.com

1.6 Other Entities Involved in the Project

No other entity is involved in the project.

1.7 Ownership

The project ownership is with C-Quest Capital LLC.

1.8 Project Start Date

30-December-2009, which is the date of the first ONIL stove installation under this project.[2].

1.9 Project Crediting Period

[2] Note: stoves installed in 2009 could not be accessed in the previous monitoring period due to social instability in the area of installation leading to unsafe conditions at the time of monitoring and hence were removed from the CPA. Evidence of unsafe conditions was provided to the Verification Body at the time of the previous monitoring.

The project has been operated since 2011. The first crediting period was from 01-January-2011 to 31-December-2020; ten years; renewable twice, but not extending beyond 06-December-2033 when the maximum CDM crediting period expires.[3]

This PD is being developed under the second crediting period in which will start from 01-January-2021. After the initial crediting period of ten years, subsequent renewals of the crediting time may be considered depending on the status of the project activity and baseline revision at that time.

Second crediting period: 01-January-2021 to 31-December-2030; both dates included.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
2021	84,538
2022	84,538
2023	84,538
2024	84,538
2025	84,538
2026	84,538
2027	84,538
2028	84,538
2029	84,538
2030	84,538

[3] This is in accordance with the VCS standard version 3.5 paragraph 3.8.1 that states "For non-AFOLU projects and ALM projects focusing exclusively on reducing N2O, CH4 and/or fossil-derived CO2 emissions, the project crediting period shall be a maximum of ten years which may be renewed at most twice." Paragraph 3.8.3 of the standard mentions "Projects registered under other GHG programs are not eligible for VCU issuance beyond the end of the total project crediting period under those programs. For example, a CDM project with a seven year twice renewable project crediting period is not eligible for VCU issuance beyond the end of those 21 years".

Total estimated ERs	845,380
Total number of crediting years	10
Average annual ERs	84,538

1.11 Description of the Project Activity

The ONIL stove is made of cast concrete, manufactured locally in Mexico, and assembled and installed locally. The stove's construction allows it to be more efficient: complete combustion and more efficient energy transfer of energy to pots ensure fast heating and fuel-efficiency. The cast concrete body is moulded in fiberglass moulds and the clay combustion chamber insulated with pumice. The fire is contained in the insulated combustion chamber, thus burning the oil vapor that is normally emitted as smoke. Energy is then efficiently transferred to cooking pots and cooking surfaces. Wood ashes or pumice provides insulation that prevents the heat from being wasted heating the stove body. Normally, hot gases do not touch the "plancha" (griddle), wasting their energy. Since the insulation fills the stove cavity to within 1 inch (2.5 cm) of the metal "plancha", all the hot gases are forced into contact with the cooking surfaces, transferring their energy to the pot and leaving only enough heat in the exhaust gases to provide a draft up the chimney.

Technical Information of ONIL stoves

Weight	394.32 lbs
Type of Fuel	firewood
Thermal efficiency	24%
Combustion speed	30.83 g/min
Fire Power	8930 watts
Material	Concrete & reinforced steel

These technology improvements make the ONIL stove more efficient than a traditional open fire. The ONIL Stove is a fuel-efficient stove that reduces the amount of firewood required by households by more than 58%, compared to the baseline, and results in lower emissions based on its construction. Based on previous experience from 1st crediting period, it has been observed that improved ONIL stoves can have a lifetime of more then 10 years, with proper maintenance and timely replacement of metal parts.

Before the adoption of the ONIL-certified stove, households in these communities used inefficient, traditional open fires. The ONIL-certified stove helps prevent burn injuries and reduces indoor pollution, which in turn reduces respiratory health issues in rural Mexico.

Since the efficiency of a traditional open fire is 10% and the efficiency of an improved ONIL Stove is 24%, the ONIL Stove is much more efficient than the traditional open fire.

1.12 Project Location

The boundary of the PoA is determined by the sum of the locations of the individual households within which the ICSs in this PoA are installed, but all limited to Mexico.[4]

The geographic coordinates for Mexico are the following: Northernmost and Westernmost point: 32.500000 and -117.033333 (Tijuana); Southernmost point: 14.550000 and -92.166667 (desembocadura del Rio Suchiate); Easternmost point: 21.200000 and -86.716667 (Isla Mujeres).

[4] Geographic coordinates (where available) of stoves have been provided to the Validation/Verification Body (VVB).

1.13 Conditions Prior to Project Initiation

The conditions prior to project initiation are the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There are no laws and regulations governing the use of improved cookstoves in Mexico households. The project is a voluntary effort by the project proponent.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The ONIL Stoves – Mexico, San Felipe Usila 1 is registered as a Small-Scale Component Project Activity under the Clean Development Mechanism (CDM) and under the Programme of Activities "Distribution of ONIL Stoves – Mexico" (Ref. PoA 8521).[5] Evidence has been provided to the Validation and Verification Body that the emissions reductions arising from this program are not double counted under the CDM and VCS.

The project has not been submitted for validation/certification under any other GHG or environmentally related program or mechanism, so it is not eligible to create another form of GHG-related environmental credit other than CERs and VCUs.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project has not been submitted for validation/certification under any other GHG or environmentally related program or mechanism, so it is not eligible to create another form of GHG-related environmental credit other than CERs and VCUs.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit.

[5]CDM documentation can be accessed through: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/2BH1T0SFERD67JCZXAIWMKLO8PN5UQ/view (PoA) and https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/3NLVJQM5FYWDA604R2GCPS8ZOEIB9U/view (San Felipe Usila 1 project).

1.17 Additional Information Relevant to the Project

Leakage Management

Not applicable as in accordance with the applied methodology AMS II.G ver.12 para 50 (c), the project adopts a net gross adjustment factor of 95% to account for leakage.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

Environmental sustainability

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

In Mexico, approximately a quarter of the population (27 million) uses firewood for cooking.[6] Firewood is the main energy source for approximately 80% of rural households, and the majority of households still use open fires which are inefficient in regards to fuel usage.

By adopting the higher efficiency ICS, households reduce the quantity of fuel wood they must consume for daily cooking needs. Since a very high proportion of fuel wood comes from non-renewable sources, this translates directly into reduced emission reductions from the non-renewable extraction of wood. Thus, the PoA lowers the greenhouse gas (GHG) balance for the country.

(ii) The project produces real and measurable reductions in GHG emissions:

The programme will utilize an approved methodology, AMS II.G., version 12 "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

The project reduces household expenditures:

The project will contribute significantly to Mexico's 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. In Mexico, households spend up to 15 to 20 per cent of their income on firewood purchases.[7] The use of efficient stoves will have a significant impact on reducing these household expenditures.

[6] Masera, Omar, Rodolfo Diaz and Victor Berrueta, "From cookstoves to cooking systems: the integrated program on sustainable household energy use in Mexico", *Energy for Sustainable Development*, Volume IX No. 1, Page 26.

[7] Masera, Omar, Rodolfo Diaz and Victor Berrueta, "From cookstoves to cooking systems: the integrated program on sustainable household energy use in Mexico", *Energy for Sustainable Development*, Volume IX No. 1, Page 26

According to World Bank reports, in 2002 approximately half of the population in Mexico was living in poverty and a fifth in extreme poverty.[8] By installing ICS, 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 more income generating activities. Thus, these saving would help improve living conditions for households in Mexico.

Social Sustainability

The project helps to improve health conditions

There are very tangible and significant health benefits associated with the switch in technology from traditional open fires to improved cook stoves as well. Traditional cooking methods involve 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, open fires are frequent causes of burns and other injuries. Switching from fireplaces to ICS reduces the incidence of such injuries and health problems.

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

Further Information

No further information is applicable.

2 SAFEGUARDS

2.1 No Net Harm

The PoA involves the distribution and installation of ONIL certified improved cook stoves to households in Mexico which currently use mostly traditional open fire for cooking. The activities under the proposed SSC-PoA promote improved cook stoves that result in reduced fuel consumption and emissions due to cooking and heating water in homes. The ICS used in this SSC-PoA have characteristics that improve the efficiency of combustion and thermal transfer to the pot compared with three-stone fires or traditional pot support. Furthermore, traditional cooking methods involve 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, open fires are frequent causes of burns and other injuries. Switching from fireplaces to ICS reduces the incidence of such injuries and health problems. Therefore the ONIL Stove installed under this project presents positive environmental impacts wherever they are applied, and no negative environmental impacts have been identified.

[8] World Bank (2009): Poverty in Mexico-Fact Sheet

2.2 Local Stakeholder Consultation

The local stakeholder consultation was done at PoA level, prior to the registration of the PoA. The first stakeholder meeting for the POA was conducted in Benito Juarez, San Miguel Chimalapa, Oaxaca in 30-December-2009. A series of similar meetings followed this.

The outcomes from the local stakeholder consultation are available in Section D of the PoA-DD[9].

PP conducted regular spot checks to observe that project ICS were being used properly and to get feedback from stakeholders on ICS usage and its benefits. Also, registration card contains contact details of local PP representative through which ICS users can contact PP for any concerns /comments on the project or project ICS. If any stove part is damaged or missing, then PP representatives immediately arrange for replacement of missing/damaged parts.

No negative comment received during the ongoing communications with stakeholders.

2.3 Environmental Impact

No negative environmental impacts have been identified from the project and environmental impact assessment (EIA) is not required for the project.

2.4 Public Comments

The local stakeholder consultation was done at PoA level, prior to the registration of the PoA. The outcomes from the local stakeholder consultation is available in Section D of the registered PoA-DD[10].

2.5 AFOLU-Specific Safeguards

This section is not applicable as the project is a non-AFOLU project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

CDM Methodology: AMS-II.G. version 12.0 - Energy efficiency measures in thermal applications of non-renewable biomass.

CDM Tools:

[9] https://cdm.unfccc.int/UserManagement/FileStorage/ST76NWH1FPCI3M05UADVXGJLQY28O9

[10] https://cdm.unfccc.int/UserManagement/FileStorage/ST76NWH1FPCI3M05UADVXGJLQY28O9

Tool 11 version 03.0.1 - Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period.

Tool 30 version 3.0 - Calculation of the fraction of non-renewable biomass

3.2 Applicability of Methodology

There is no change in applicability criteria of the methodology.

Applicability Criterion	Justification of applicability
This methodology comprises efficiency improvements in thermal applications of non-renewable biomass. Examples of applicable technologies and measures include theintroduction of high efficiency biomass fired project devices to replace the existing devices and/or energy efficiency improvements in existing biomass fired cookstoves or ovens or dryers.	The CPA includes dissemination of high efficiency biomass fired ICS to replace the existing traditional cookstoves in beneficiary households.
In the case of cookstoves, the methodology is applicable to the introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 20 per cent.	The project activity shall include only those ICS that have a rated thermal efficiency of at least 20%. Every type of ICS implemented in the project will present a certificate issued by manufacturer at the time of CPA inclusion proving the thermal efficiency as required by the CDM methodology.
The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.	PPs calculated the savings of each stove to each stove in this CPA saves around 0.018 GWh_{th} per year, representing only 0.01% of the small scale threshold. The excel calculations were presented to the DOE.
Non-renewable biomass has been used in the project region 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 31 December 1989. FAO forestry statistics[11] show that fuel wood has been harvested in Mexico since at least 1989. As seen in the FAO 2010 report (data shown in the table below), carbon stocks in the country are depleting in the project area.[12]

	1990	2000	2005	2010

[11] FAO, Global Forest Resources Assessment 2010, Country Report, Mexico "*Evaluacion de los Recursos Forestales Mundiales, Informe Nacional, 2010, Mexico*", Page 67; www.fao.org/forestry/fra/67090/en/mex/

[12] FAO, Global Forest Resources Assessment 2010, Country Report, Mexico "*Evaluacion de los Recursos Forestales Mundiales, Informe Nacional, 2010, Mexico*", Page 55; www.fao.org/forestry/fra/67090/en/mex/

	<table><tr><td>Forest Biomass Carbon Stocks (millions of metric tons of carbon)</td><td>2,186</td><td>2,111</td><td>2,076</td><td>2,043</td></tr></table> Because above indicator show that non- renewable biomass has been in use since 31 December 1989, the use of the methodology II.G/Version 12 is appropriate.
For cases where the biomass is sourced from renewable sources, the project participants should use a corresponding Type I methodology	Not applicable.
If the project device requires a specific fuel for this device (e.g. briquettes, pellets, woodchips),the consumption of the fuel should be monitoredduring the crediting period.	Not applicable.
The CDM-PDD or CDM-PoA-DD/CPA-DD shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such asunique identifications of product and end- user locations (e.g. programme logo).	Procedure of distribution of the ICS to be implemented has been explained in the registered CPA DD.
The CDM-PDD or CDM-PoA-DD/CPA-DD shall also explain how the proposed procedures prevent double counting of emission reductions,for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	The CPA is uniquely identified and defined in an unambiguous manner by a database of uniquely identified households in which ONIL stoves have been installed. Each household has been assigned a unique ID in the database, which is linked to information for each entry on the following: • Precise geographical / location identification of the household (using GPS or similar technology), • Stove serial number (unique identifier) • Name of the head of household, and • Date of installation of the ONIL stove • Stove model • Date of distribution/installation • Retailer/distributer • Identification of cooking method prior to installation of stove

3.3 Project Boundary

The project was included as a CPA under CDM PoA with CDM reference 8521-P1-0001-CP1, and according to paragraph 3.19.5 of the VCS Standard (Version 4.1), this section does not need to be completed.

3.4 Baseline Scenario

Application of Tool 11, for 'Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period' version 3.0.1

Step 1

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The current baseline "projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices" is in compliance with the relevant national and sectoral policies

Mexico has undertaken significant efforts to reform its energy sector, including goals for clean energy and energy efficiency, and the adoption of implementation mechanisms via the Law for Energy Transition of 2015.

According to the recent study by Medrano et al., in 2019[13], around 40% of the rural households in Mexico still use wood fuel as cooking fuel.

Step 1.2: Assess the impact of circumstances

Mexico shows high dependency on firewood, especially for rural households. A Mexican projection study[14] determined that in 2010 fuelwood and charcoal accounted for 48% of total residential energy demand. The study also concluded that consumption will hover around 18.4 metric tonnes in the year 2030, which is only slightly lower than the 19.4 metric ton consumed in 2010. This shows that fuelwood will continue to be an important component of cooking fuel particularly in rural Mexican households.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

[13] Serrano-Medrano, M., Ghilardi, A. and Masera, O., 2019. Fuelwood use patterns in Rural Mexico: a critique to the conventional energy transition model. (http://repositori.uji.es/xmlui/bitstream/handle/10234/181750/77%2c_81-104.pdf?sequence=1&isAllowed=y)

[14] https://www.sciencedirect.com/science/article/pii/S0973082613001026?via%3Dihub

According to a study "Spatial and temporal projection of fuelwood and charcoal consumption in Mexico" conducted in 2013, fuelwood and charcoal are fundamental fuel sources for the residential sector in Mexico. A Business-As-Usual (BAU) projection by means of a spatially-explicit approach was developed to assess national fuelwood and charcoal consumption for the period 2010 to 2030.

An important future growth of mixed fuelwood–LPG users is expected pointing out that fuel stacking rather than fuel switching out of fuelwood would prevail.

Thus, the current baseline of use of traditional fuelwood stoves is still applicable.

Step 1.4: Assessment of the validity of the data and parameters

Data and parameters used for determining the original baseline, that were determined ex ante and not monitored during the crediting period and which are no longer valid have been updated.

Step 2

Step 2.1: Update the current baseline

The baseline emissions for the subsequent crediting period, have been updated based on the latest approved version of the methodology.

- Default IPCC values – Default IPCC values, other than ones defined in the methodology, have not been used and the ones specified in the latest version of the methodology are updated values.
- Emission factors, values and benchmarks- These have been updated in line with the latest version of methodology.
- The current baseline emissions have been updated for the subsequent crediting period
- Data and parameters that were fixed ex-ante and which were not monitored have been updated in accordance with the requirements of the applied methodology AMS II.G, version 12.

Step 2.2: Update the data and parameters

Ex-ante Parameter	1st Crediting Period	2nd Crediting Period
$B_{old, i, j}$ (tons/year)	5.34	6.597
f_{NRB} (fraction)	0.87	0.70
$NCV_{biomass}$ (TJ/ton)	0.015	0.0156
$EF_{projected\_fossilfuel}$ (t CO_2/TJ)	81.6	68.6

Determination of the average annual biomass consumption per household (B_{old})

(Based on the historical data from available literature).

The estimation of baseline fuelwood consumption has been done using section 5.5 option b of applied methodology AMS II.G version 12 which is based on the historical data from available literature. A Baseline Fuelwood consumption assessment spreadsheet is being submitted to the VVB for reference.

SN	Parameter	Value	Unit	Source
A	Total Population of Mexico in 2020	12,89,32,753	number	Population, total - Mexico | Data (worldbank.org)
B	Percent Rural Population in 2020	19.27%	percentage	Rural population (% of total population) - Mexico | Data (worldbank.org)
C	Total rural population in Mexico in 2020	2,48,44,052	number	Calculated A*B
D	Total urban population in Mexico in 2020	10,40,88,701	number	calculated A-C
E	HH size rural Mexico	4.45	number	Average household size - Area Database - Global Data Lab
F	HH size _urban Mexico	4.28	number	Average household size - Area Database - Global Data Lab
G	Clean cooking access rate in Mexico rural	57%	percentage	*SDG7_Tracking_Progress_2021.pdf The Energy Progress Report 2021
H	Clean cooking access rate in Mexico_ urban	92%	percentage	*SDG7_Tracking_Progress_2021.pdf The Energy Progress Report 2021
I	Mexican Population that lacks access to clean cooking fuel (conservatively assumed to be 100% firewood)_ rural	43%	percentage	Calculated 1-G
J	Mexican Population that lacks access to clean cooking fuel (conservatively assumed to be 100% firewood)_ urban	8%	percentage	calculated 1-H
K	Total Rural households using firewood in Mexico	2400661	number	calculated (I*C)/E
L	Total Urban households using firewood in Mexico	1945583	number	calculated (J*D)/F
M	Total firewood consuming households in Mexico	4346244	number	calculated K+L
N	Total firewood consumption	28672547	tonnes	FAOSTAT
	Average annual firewood consumption per household	**6.597**	**tons/HH/annum**	**calculated N/M**

Determination of the share of non-renewable biomass (f_{NRB})

The determination of the share of non-renewable biomass (f_{NRB}) in the project area is based on report by C4 EcoSolutions (Pvt.) Ltd which has been calculated in accordance with latest version of CDM Tool 30.

Variable	Unit	Value
Total woody biomass consumption	t/yr	5,45,95,017
Renewable biomass	t/yr	1,61,95,210
Non-renewable biomass	t/yr	3,83,99,807
f_{NRB}	-	0.70

All estimations/ extrapolations/projections have been included in the f_{NRB} calculation spreadsheet, which is submitted along with this VCS-PD.

Determination of Net Calorific Value of Biomass

The NCV value of biomass has been revised to 0.0156 TJ/ton from the value of 0.015 TJ/Ton considered in previous crediting period. This is in accordance with the latest version of the applied methodology.

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 Version 12, the Emission Factor default emission factor of 68.6 tCO_2/TJ for Latin America and Caribbean under which Mexico is included[15] is applied. In addition, Version 12 allows a default leakage adjustment factor of 0.95 to be applied to $B_{old,i,j}$ to account for leakages (paragraph 48c). This project activity will also use this default value.

3.5 Additionality

The project was included as a CPA under CDM PoA with CDM reference 8521-P1-0001-CP1. There is no regulatory requirement to use ICS in Mexico[16], therefore according to 3.8.9 of the VCS Standard (Version 4.1), this section does not need to be completed further.

3.6 Methodology Deviations

The project did not apply any methodology deviations.

[15] AMS II.G. version 12; Appendix 1

[16] Mexico Market Assessment (cleancooking.org)

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Emissions reductions can be calculated as per methodology AMS-II.G version 12 using the following equations:

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{o,i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel}$$

According to footnote 20 under para 50 (c) of the applied methodology, "the methodology allow the use of a net to gross adjustment factor of 0.95 in lieu of conducting a survey to account for leakage emissions".

Therefore:

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{o,i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel} \times 0.95$$

Where:

$ER_{y,i,j}$	Emission reductions by project device of type *i* and batch *j* during year *y* (tCO_2e)
$B_{y,savings,i,j}$	Quantity of woody biomass that is saved per cookstove device of type *i* and batch *j* during year *y* (tonnes)
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass (0.70)
$NCV_{biomass}$	Net calorific value of non-renewable woody biomass that is substituted (IPCC default value for fuel wood 0.0156 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 68.6 tCO_2/TJ
$N_{0,i,j}$	Number of project devices of type *i* and batch *j* commissioned (number)
$n_{y,i,j}$	Proportion of commissioned project devices of type *i* and batch *j* ($N_{0,i,j}$) that remain operating in year *y* (fraction)
μ_y	Adjustment to account for any continued use of pre-project devices during the year *y*
0.95	net to gross adjustment factor to account for leakage

To calculate $B_{y,savings,i,j}$, we use para 32 Option 3 equation 7 of applied methodology AMS II.G

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

Where:

$B_{old,i,j}$	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate thermal energy equivalent to that provided by the project device type *i* and batch *j* (tonnes/year)
$\eta_{\text{old,i,j}}$	Efficiency of the old devices being replaced by project devices of type *i* and batch *j* (fraction). A default value of 0.10 may be optionally used if the replaced system is three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.
$\eta_{new,i,j}$	Efficiency of the project device *i* and batch *j* (fraction), as determined using the Water Boiling Test (WBT) protocol.

For ex-ante estimates:

$B_{y,savings,i,j}$ = 6.597 x (1 – 0.10/0.24)

= 3.8483

$ER_{y,i,j}$ = 3.8438 x 30,869 x 1 x 1 x 0.70 x 0.0156 x 68.6 x 0.95

= 84,538.82

= 84,538 (Rounded down value)

4.2 Project Emissions

Not applicable as per the applied methodology.

4.3 Leakage

Not applicable as per the applied methodology.

4.4 Net GHG Emission Reductions and Removals

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2021	84,538	-	-	84,538
2022	84,538	-	-	84,538
2023	84,538	-	-	84,538
2024	84,538	-	-	84,538
2025	84,538	-	-	84,538
2026	84,538	-	-	84,538
2027	84,538	-	-	84,538
2028	84,538	-	-	84,538
2029	84,538	-	-	84,538
2030	84,538	-	-	84,538
Total	845,380	-	-	845,380

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$B_{old,I,j}$
Data unit	Tonnes/year
Description	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate thermal energy equivalent to that provided by the project device type i and batch j
Source of data	Baseline surveys, ex-ante
Value applied:	6.597
Justification of choice of data or description of measurement methods and procedures applied	The estimation of baseline fuelwood consumption has been done using option (a) which is based on the historical data from available literature
Purpose of the data	Calculation of baseline and project emissions
Comments	See CDM PoA-DD for more details on the baseline measurement

Data / Parameter	$\eta_{old,i,j}$
Data unit	Fraction
Description	Efficiency of the old devices being replaced by project devices of type i and batch j
Source of data	Equation 7, Option 3 of the AMS II.G methodology, version 12, default
Value applied:	0.10 (default for conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney, as stated in the methodology)
Justification of choice of data or description of measurement methods and procedures applied	Provided as default value since replaced system is conventional open fire.
Purpose of the data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of non-renewable biomass saved by the project activity
Source of data	FAO, ex-ante, calculated
Value applied:	0.70
Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante. C4 EcoSolutions (Pty) Ltd was appointed as third party to study and derive the f_{NRB} value for Mexico.
Purpose of the data	Calculation of baseline and project emissions
Comments	The report of f_{NRB} will be made available to VVB during the validation

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,* AMS II.G methodology, version 12.
Value applied:	0.0156
Justification of choice of data or description of	Default value that is provided in AMS II.G, version 12

measurement methods and procedures applied	
Purpose of the data	Calculation of emission reduction
Comments	-

Data / Parameter	$EF_{projected\_fossilfuel}$
Data unit	tCO_2/TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	IPCC default value for non-renewable woody biomass, *ex-ante,* AMS II.G methodology, version 12.
Value applied:	68.6 t CO2/TJ
Justification of choice of data or description of measurement methods and procedures applied	Default value that is provided in AMS II.G, version 12
Purpose of the data	Calculation of emission reduction
Comments	-

5.2 Data and Parameters Monitored

Data / Parameter	$N_{0,i,j}$
Data unit	Number
Description	Number of commissioned project devices of type *i* and batch *j*
Source of data	Actual installation record as stored in database
Description of measurement methods and procedures to be applied	Measured directly from the installation database
Frequency of monitoring/recording	Once at the time of project implementation
Value applied	30,869
Monitoring equipment	*Not Applicable*
QA/QC procedures to be applied	-

Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	-

Data / Parameter	$n_{y,i,j}$
Data unit	Fraction
Description	Proportion of commissioned project devices of type *i* and batch *j* ($N_{0,i,j}$) that remain operating in year *y* (fraction)
Source of data	Monitoring survey
Description of measurement methods and procedures to be applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of Standard for sampling and surveys for CDM project activities and programme of activities.
Frequency of monitoring/recording	At least once every two years
Value applied	30,869
Monitoring equipment	Monitoring surveys
QA/QC procedures to be applied	Staff will be trained to obtain unbiased and reliable survey data. Monitoring database will be checked for errors.
Purpose of data	Calculation of emission reduction
Calculation method	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value
Comments	It is assumed that 100% project devices are being used.

Data / Parameter	μ_y

Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year *y*
Source of data	Monitoring survey
Description of measurement methods and procedures to be applied	This parameter will be monitored using one of the following methods: If the pre-project devices are decommissioned and no longer used, as determined by the monitoring survey its value will be 1.0. If both the project devices and pre-project devices are used together, surveys will be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices.
Frequency of monitoring/recording	At least once every two years
Value applied	1
Monitoring equipment	Monitoring surveys
QA/QC procedures to be applied	Staff will be trained to obtain unbiased and reliable survey data.
Purpose of data	Calculation of emission reduction
Calculation method	Measured based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of Standard for sampling and surveys for CDM project activities and programme of activities
Comments	It is assumed that pre-project device is not being used after installation of ICS

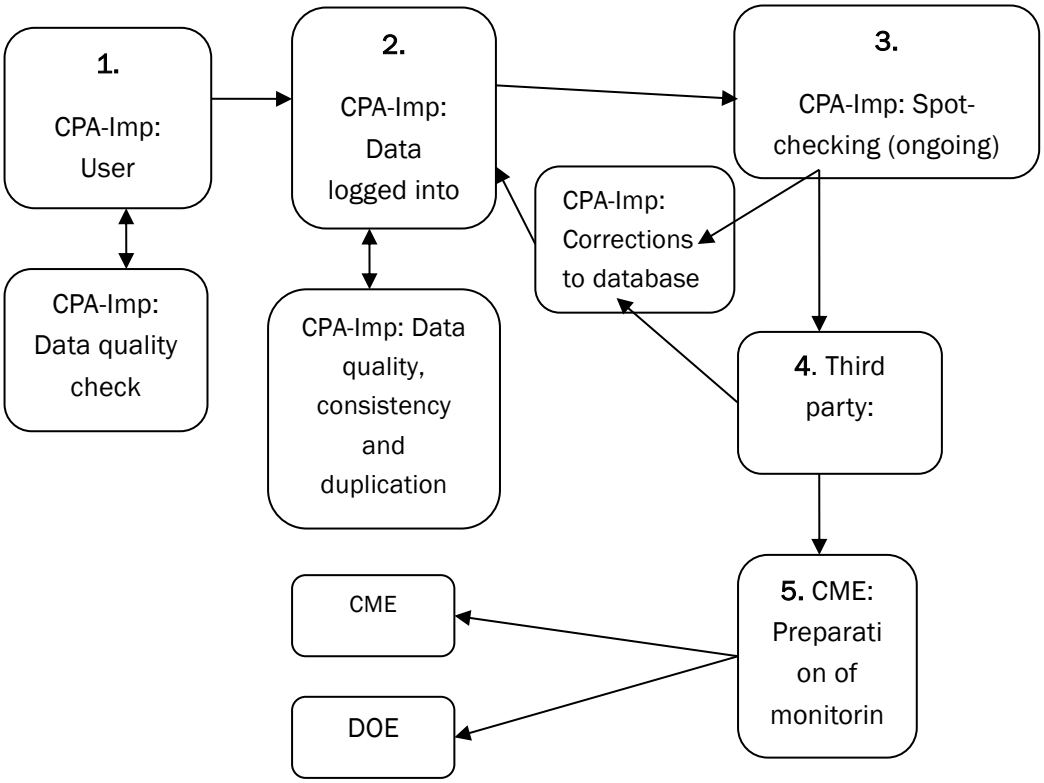
Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity

Source of data	Efficiency tests conducted in monitoring period
Description of measurement methods and procedures to be applied	The Water Boiling Test (WBT) protocol will be used. The WBTs will be conducted by trained staff. Stoves will be tested at the place of installation (i.e. in stove user households) using firewood available in the same households. Each sampled stove will be tested once for the cold start phase and once for hot start phase.
Frequency of monitoring/recording	At least once every two years
Value applied	24%
Monitoring equipment	Weighing Scale, Digital Thermometer, Digital Moisture meter
QA/QC procedures to be applied	The reliability calculation will be conducted to ensure that the result obtained from the survey meets the precision required.
Purpose of data	Calculation of emission reduction
Calculation method	WBT protocol calculation methods.
Comments	-

5.3 Monitoring Plan

The project's monitoring system follows the monitoring plan described in section E.7.2 of the PoA DD.

Organizational structure, responsibilities and competencies: To obtain the monitoring variables, the CPA implementer follows the steps, organizational structure and responsibilities in the flow chart below.



The CME coordinated, managed and assisted HELPS international A.C. and monitoring third parties with each element of the monitoring plan. Details of the monitoring steps on the flowchart are the following:

1. **HELPS international A.C.: User registered stove**. HELPS International A.C. field personnel collected the information in the Registration Card from the users. Information was collected via a Registration Card filled by HELPS International A.C. staff and partner organizations. HELPS International A.C. staff double-checked the accuracy of the information and requested clarifications if needed.

2. **HELPS international A.C.: Data logged into database**. HELPS International A.C.'s trained staff inputted the information from the Registration Card into the database. HELPS International A.C. and CQC checked the database records and removed duplicates (this included completing the serial number, checking for name duplicates, etc.).

3. **HELPS international A.C.: Spot-checks (ongoing).**[17] HELPS International A.C. visited locations in the field and reported updates to office either via telephone or forms. HELPS International A.C. personnel corrected the database and clearly marked stoves that were not installed, were given away, the end user died or left town, or had any other issues that made the stove no longer eligible to participate in the CPA. These stoves were excluded from the emission reduction

[17] PPs presented the DOE with evidences that spot checks were performed independently from monitoring during monitoring period.

calculations. During regular spot check, if the field staff noticed that any stove was not in proper working condition and needed some repairing touch or replacement of any part; the same was immediately taken care of so that the beneficiary can use the stove without any hassle. Average life of the stove is 10 years, but manufacturer guaranteed that stove can work up to 20 years with periodic maintenance and replacement of metal parts.

4. **Third Parties: Monitoring.** Third Parties followed the simple random sampling plan and reported in section D.2 below.

5. **CME Preparation of monitoring report**. CQC prepared the final monitoring report and retained copies of the document.

Data measuring, recording Method and Implementation of Sampling Approaches

Steps 1, 2 and 3 captured end user information and populated the database, as well as provided database quality control.

Step 4 involves creating sampling surveys to capture data on continuous use of stove ($n_{y,j,j}$) and use of baseline systems along with ICS (μ_y) as well as stove thermal efficiency ($\eta_{new,l,j}$) as described in the table below.

Parameter	Description of Parameter	Sampling approach (outcome in brackets)
$n_{y,i,j}$	Proportion of ONIL Stoves still in operation	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]
μ_y	Percentage of continued baseline stove use among ONIL stove households in the database	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]
$\eta_{new,i,j}$	Thermal Efficiency of operational ONIL Stoves	ONIL Stoves were tested using WBTs [ONIL stove thermal efficiency]

Sampling captured information on monitoring variables with required confidence/precision[18] and used simple random sampling (as per of EB 86 Annex 4). all the stoves were selected randomly. Since all stoves were of the same model and managed by the same CPA Implementer, no further stratification was needed to capture parameter $n_{y,l,j}$ and μ_y data. Stoves were divided into three Primary Sampling Units for $\eta_{new,l,j}$ (stoves managed by same CPA Implementer, of the same model and vintage) given that multiple stove vintages were present. Each stove vintage was sampled separately using the simple random sampling method described below.

[18] According to paragraph 48 of Methodology AMS-II.G version 12, 90/10 confidence/precision for annual and 95/10 for biennial sampling across CPAs.

Step 5 involved monitoring analyses and accuracy and precision checks. The CPA implementer and CME scrutinized the monitoring data to confirm accuracy of results, analyzed the data, and estimated the resulting emissions reductions outlined in this monitoring report.

The following parameters were obtained though sampling:

1. $n_{y,l,j}$: proportion of stoves in operation
2. μ_y: fraction of households that continue to use baseline systems (3-stone fires) along with ONIL stoves
3. $\eta_{new,l,j}$: thermal efficiency of ONIL Stoves

Simple random sampling was used for all monitoring parameters. The objective was to obtain reliable and unbiased estimates of the monitoring parameters. Reliability levels were set at 95% confidence and 10% precision as per AMS II.G version 12, paragraph 48 for biennial sampling and 90% confidence for annual sampling.

Implementation and quality assurance and control and procedures used for handling any internal auditing performed and any non-conformities identified: CME trained monitoring personnel on monitoring procedures, including provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response. The monitoring survey included several questions to support the information on the key monitoring parameters. These included visual inspections to confirm stove use and presence of baseline stoves, comments by surveyors, check of randomly selected households against actual household information, and refusal tracking. These strategies aimed at minimizing surveyor or non-response biases. The questionnaire was piloted in the field prior to implementation.

CME also scrutinized the data to check for inconsistencies and cases of non-response which indicate the stoves are no longer in use (e.g. where surveyors could see an abandoned ONIL Stove or when the user emigrated and could no longer be found). Records were flagged and fixed accordingly.

WBTs were conducted by third-party technicians trained in proper WBT implementation. WBT records were checked for data points above or below three standard deviations from the mean, as per section E.7.2 of the PoA-DD. However, no records above or below 3 standard deviations away from the mean were found. As a result of WBT if average efficiency for the stoves for any age group (i.e., vintage) found below 20%, all the stoves of same age group will no longer eligible to be considered a project device and will be excluded from the ER calculation sheet.

Monitoring staff also certified lack of conflicts of interest and agreement with the monitoring procedures.