ONIL STOVES –GUATEMALA – USPANTÁN

Document Prepared By Earthood Services Private Limited

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Summary:

The project titled "ONIL Stoves —Guatemala – Uspantán" is a small-scale component project activity which involves the distribution and installation of ONIL Stoves used by households in Guatemala. The project is being carried out by C-Quest Capital LLC and HELPS International Incorporated. The geographic coordinates for project 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) as confirmed from the Verra project webpage (VCS ID 1721) /16/ and GPS coordinate page/9/.

The project stove is fuel-efficient as it reduces the requirement of firewood by up to 58%. This project was included as the first CPA under CDM PoA entitled "ONIL Stoves —Guatemala – Uspantán" (CDM PoA reference number - 8480, CPA reference number – 8480-P1-0001-CP1) on 19/12/2012/14/and the first ONIL Stove was installed on 11 January 2010 under this project/15/.

The project applies the following methodology:

VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1/5/.

By the end of the monitoring period, the total number of ONIL Stoves being distributed reached 11,132. The project resulted in a total GHG emission reduction of 15,897 tCO2e for the monitoring period 01/09/2020 – 19/12/2020.

Scope of verification

C-Quest Capital LLC has contracted ESPL (Earthood Services Private Limited, India) to conduct the verification of the project "ONIL Stoves —Guatemala – Uspantán" for the monitoring period 01/09/2020 – 19/12/2020 according to the requirements of the Verified Carbon Standard Version 4.1. The scope of the project is Sectoral Scope 3 – Energy Demand and VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1/5/.

The assessment team has verified the project by conducting a document review and analysis of the VCS PD/1/, VCS MR/2/, ER Sheet/3/ and other related documents provided by the Project Participant to ESPL. Remote site visit and follow up interviews with project stakeholders was conducted after which resolution of outstanding issues was done leading to the issuance of the final report and opinion. A total

of 04 CLs have been raised during the verification process and 1 FAR from the previous verification of the project activity and are successfully closed.

Conclusion

ESPL has performed the verification of the VCS project activity "ONIL Stoves —Guatemala – Uspantán". The assessment team has confirmed that:

- The project is in accordance with all relevant host country criteria (Guatemala) and VCS rules and requirements;
- the project is in accordance with all conditions of the latest version of applied methodology, "VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1;
- the monitoring plan is transparent and adequate;
- the installed equipment essential for measuring parameters required for calculating emission reductions are properly maintained;
- the monitoring system is in place and functional. The project has generated GHG emission reductions;

all the information has been consistently mentioned in the VCS-PD/1/.

1 INTRODUCTION

1.1 Objective

C-Quest Capital LLC has contracted ESPL to conduct the verification of the component project activity "ONIL Stoves —Guatemala – Uspantán" according to the requirements of the Verified Carbon Standard Version 4.1/4/.

1.2 Scope and Criteria

The scope of verification is to assess the claims and assumptions made in the VCS monitoring report (MR) against the VCS criteria, including but not limited to, VCS standard, applied methodology and other relevant rules and requirements established for VCS project activities.

The Verification is not meant to provide any consulting towards the project participants. However, stated requests for clarification and/or correction actions request may have provided inputs for improvement of the project design.

1.3 Level of Assurance

⊗ Reasonable level of assurance

○ Limited level of assurance

ESPL's verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. ESPL planned and performed the verification by obtaining evidence and other information and that ESPL considers necessary to give reasonable assurance that reported estimated GHG emission reductions are fairly stated. ESPL also conducted the remote audit visit which gave a reasonable assurance that reported estimated GHG emission reductions are fairly stated.

In our opinion, the estimated GHG emissions reductions were calculated correctly on the basis of the approved baseline and monitoring methodology VMR0006, Version 1, and the VCS standard, Version 4.1.

1.4 Summary Description of the Project

ONIL Stoves —Guatemala – Uspantán involves the distribution and installation of ONIL Stoves for use by households in Guatemala; which includes 11,132 improved cook stoves benefiting families throughout the country. Before the adoption of the ONIL Stove, households in Guatemala used inefficient, conventional open fires.

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

This project was registered under the CDM as the "ONIL Stoves —Guatemala – Uspantán"/14/ which is first CPA of "PoA 8480: Distribution of ONIL Stoves—Guatemala" (CDM PoA 8480) /14/

Remote Site Visit was conducted on 20/12/2021 and it was confirmed that the current monitoring period from 01/09/2020 –19/12/2020 involves the total of 11,132 stoves that were installed/distributed in the entire project activity resulting in emission reductions of 15,897 tCO_{2e}.

The project is based on Sectoral Scope 3- Energy Demand and uses the methodology: VMR0006 for Installation of High Efficiency Firewood Cookstoves, Version 1.

Year	Baseline emissions or removals (tCO2e)	Project Emissions or removals (tCO2e)	Leakage emissions (tCO2e)	Net GHG emission reductions or removals (tCO2e)
01/09/2020 – 19/12/2020	15,897	0	0	15,897
Total	15,897	0	0	15,897

This verification covers the second monitoring period from 01/09/2020 – 19/12/2020 resulting in a reduction of 15,897 tCO_2e GHG emissions.

2 VERIFICATION PROCESS

The registered VCS project is undergoing fourth verification and the approach adopted to ensure the quality of emission reductions is described in the following sub-sections.

2.1 Method and Criteria

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using ESPL's internal procedures. The Project was verified against the latest requirements (Version 4.1) /4/ and guidance set out in VCS Standards as applicable.

The validation/verification process consists of the following three phases;

- A desk review of the VCS PD/1/, VCS MR/2/ and ER Sheet/3/ (described in section 2.2)
- Telephonic call with the end-users and follow up interviews with PP and Client (described in section 2.3)
- The resolution of outstanding issues and issuance of final report and opinion.

DOE's Sampling Approach:

In order to meet the requirements of Standard for Sampling and surveys for CDM project activities and programmes of activities version 9.0 /17/, the verification team applied acceptance sampling in the verification (in accordance with para 28). The verification team selected random samples of PP's sampled records, checked the acceptability (or otherwise) of the data for each such record with PP's sample records, and then based on the number of records where there is agreement, determined if the PP's sample records meet the requirements.

The verification team determined the sample size for acceptance sampling by evaluating the following, using its own professional judgement and guidance in the Standard 'Sampling and Surveys for CDM Project Activities and programme of Activities' version 9.0 /17/:

- The proportion of discrepancies between the CME's data and verification team's (field or onsite inspection results) data that can be considered acceptable. This is referred to as the AQL (Acceptable Quality Level): 0.5% was considered in this verification.
- The proportion of discrepancies between the CME's data and verification team's (field or onsite inspection results) data that would be considered unacceptable. This is the UQL (Unacceptable Quality Level): 20% was considered in this verification.
- The producer risk: 10% was considered.
- The consumer risk: 10% was considered.

Considering the above input values, a sample size of 11 was required as per Table (Sample size and acceptance number based on AQL, UQL, and producer and consumer risks) in the referred Standard /17/.

Accordingly, acceptance number (c) thus determined for the sample size is 0. A sample size of 11 meets the criteria. The samples to be surveyed by DOE were randomly selected from the list of monitored samples using the random sample generator on Microsoft excel.

. In this monitoring period, following was observed;

Accordingly, the verification team has verified 11 samples collectively during remote audit and observed that the sampling survey results of the CME for all the CEPs checked were found to be consistent with DOE's field survey results. The sampling method used is in-line with the Standard: Sampling and surveys for CDM project activities and programme of activities /17/ and Guideline: Sampling and surveys for CDM project activities and programme of activities /11/. In all, the verification team interviewed 11 end users and no discrepancies were found.

The sample size estimations follow Appendix 2 of Guideline for Sampling and surveys for CDM project activities and programmes of activities, version 04.0/11/.

2.2 Document Review

The verification is performed primarily as a document review of the documents submitted at various stages of assessments. The review is performed by assessment team using dedicated protocols. The assessment team cross checks the information provided in the documents (Project Description & Monitoring Report/1,2/) and information from sources other than those used, if available, and also conducts independent background investigations. Earthood conducted a desk review as under;

a) A review of the data and information presented to verify their completeness;

b) A review of the monitoring plan, the monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;

c) An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions;

2.3 Interviews

No site visit was conducted for this verification due to outbreak of global pandemic (caused by COVID- 19) and increased risk of exposure and contraction due to travel as elaborated under section 2.4 of this report. Thus, the VVB team could not conduct on-site visit to verify the project implementation.

However, alternate means were selected to verify the project implementation. Along with the alternate approach, remote interviews with the end users and PP representatives were conducted to discuss aspects of project implementation such as monitoring plan implemented, the operations at the project site (outages, if any), and other details like calibration of the monitoring equipment used during the current monitoring period, etc.

The required documents and details for the verification of project activity implementation were collected from team of C-Quest Climate LLC, through emails, Skype video calls and a telephonic interview on 20/12/2021.

The details of the telephonic interview are as follows-

No.	Interviewee			Date	Topics
	Last name	First name	Affiliation		
1	De Leon	Oscar	Helps International	20/12/2021	Monitoring Plan, Monitoring frequency, Project Implementation, Location, Technology Monitoring Survey
2	Garg	Vineet	CQC LLC	20/12/2021	Monitoring Survey
3	Diaz	Mildred	End User	20/12/2021	DOE End-user survey
4	Leticia	Orozco	End User	20/12/2021	DOE End-user survey
5	Velazco	Teresa	End User	20/12/2021	DOE End-user survey
6	Josefa	Cuteres	End User	20/12/2021	DOE End-user survey
7	Ventura	Juana	End User	20/12/2021	DOE End-user survey
8	Gomez	Maria	End User	20/12/2021	DOE End-user survey
9	Sanchez	Melchor	End User	20/12/2021	DOE End-user survey
10	Escon	Maria	End User	20/12/2021	DOE End-user survey
11	Tziquin	Santos	End User	20/12/2021	DOE End-user survey
12	Pacheco	Noemi	End User	20/12/2021	DOE End-user survey
13	Vicente	Juana	End User	20/12/2021	DOE End-user survey

2.4 Site Inspections

During the current verification, the on-site visit was not possible due to the outbreak of COVID-19 global pandemic and India was experiencing the second highest number of COVID-cases/10/ at the time of assessment was being carried out so, the verification team avoided the risk of getting infected during the physical onsite assessment.

It is important to note that the VCS Program does not explicitly mandate site visits as part of the verification process, however, VVBs must achieve a reasonable level of assurance in verifications (per Section 4.1.2 of the VCS Standard, v4.1). If a VVB can achieve a reasonable level of assurance (as mentioned in the section 1.3 of this report) without conducting a site visit, or through a remote site visit, this is in conformance with the VCS rules. Therefore, in this verification, ESPL has achieved the reasonable level of assurance by applying the various alternative means as explained below under section 4.1 of this report.

2.5 Resolution of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and onsite assessment. The verification team prepares and/or updates a verification protocol (internal document) that records the conformities and nonconformities, which may be of following types:

CAR (Corrective Action Request) is raised if one of the following occurs:

a) Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient.

b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants

c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions

d) Change to the key sustainable development indicators

e) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable requirements have been met. All CARs and CLs raised by the Earthood during verification shall be resolved prior to submitting a request for issuance.

FAR (Forward Action Request) is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

The total of 04 CLs were raised in the current verification. 1 FAR was raised and closed from the previous verification. All the findings that are raised and communicated to project participant during the verification are included under Appendix 4. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.5.1 Forward Action Requests

This is the fourth verification of the Project Activity and 1 FAR was raised from previous verification/7//8/. The FAR is addressed in the report and stands closed.

2.6 Eligibility for Validation Activities

Not applicable since there was no such undertaking for the given project.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

"ONIL Stoves —Guatemala – Uspantán" 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 – Guatemala" (Ref. PoA 8480).

The documents can be accessed from the following links below:

https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/NQIZR3S1J58FLTHUKMB2X6PY07CE49/view/ (PoA)

https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/Q158GU3XA9MFE0H2Z6OI4JTNDL7WRP/view/ (CPA 001)

3.2 Methodology Deviations

There was no methodology deviation for the given project.

3.3 Project Description Deviations

The project description deviations have been described as below:

Sampling method: The sampling method applied in the registered monitoring plan is multi-stage sampling. Multi-stage sampling is a sophisticated method which is not easy to be implemented and the data analysis is difficult. Given that the population being studied is relatively homogeneous with respect to the parameter being studied, therefore simple random sampling was chosen to replace the existing sampling method from first VCS verification.

Applicability of the methodology: The applied methodology is not impacted by the change in sampling method from multi-stage sampling to simple random sampling.

Additionality: The update in the sampling method has not resulted in any changes in the additionality of the project. The project still remains additional.

Appropriateness of the baseline scenario: According to the baseline scenario of the applied methodology: "It is the continued use of non-renewable wood fuel (firewood/charcoal) or fossil fuel (coal/kerosene) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity".

The verification team has reviewed the sample size calculation from the corresponding Sample calculation spread sheet and found the calculation consistent as per the Guidelines for "Sampling and survey for CDM project activities and programmes of activities"/11/. The deviation doesn't affect the accuracy or conservativeness of the emission reduction calculation and therefore has been accepted by the VCS team.

Applied Methodology: applied methodology in the registered project activity is AMS II.G, version 3. VCS methodology VMR0006 "Methodology for Installation of High Efficiency Firewood Cookstoves" Version 01 has now approved under VERRA for this type of projects. PP has switched from the registered methodology AMS II.G to VCS methodology VMR0006. There is no negative impact on conservativeness of quantification of GHG emission reduction as a result of deviation.

Applicability of the methodology: The applied methodology has been changed by the PP and thus as is visible from the deviation mentioned, the methodology has been completely changed to VMR0006.

The applicability condition of the new applied methodology was verified by the verification team as follows:

Applicability criterion	How the project complies	VVB Assessment
Project activities shall be implemented in domestic premises or in community-based kitchen	The proposed project involves deployment of ICS only in households.	VVB verified from the survey sheet/18/ and through the remote audit survey that all the project stoves were distributed to HHs.

The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot;	ONIL stoves planned to be installed under this project are single pot wood cookstoves that have an efficiency of 31.67% as per the manufacturer's specifications.	The efficiency of the project stove was verified from the manufacturer specification of the project stove/19/ and was found to be 31.67% which was found to be more than 25%. Thus, the applicability criterion was found to be met.
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 at least 31 December 1989. A comparison of Guatemalan household energy use by the national census1 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 the project area;	Non-renewable biomass has been used since 31 December 1989 in Guatemala. This can be confirmed from the following sources: 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 the project area; This indicator has been checked by FAO, Evaluation of Forest Resources, National Report, 2010, Guatemala (Evaluacion de los Recursos Forestales Mundiales, Informe Nacional, 2010, Guatemala), Page 33 www.fao.org/forestry/20262 -1-174.pdf/21/. Apart from above, A Non-Renewable biomass

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

	As seen in the FAO 2010 report (data shown in the table below), carbon stocks in the country are depleting in the project area.2 **1990** / **2000** **Biomass Carbon Stocks (millions of metric tons of carbon)** / **365.2** / **323.6** 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 2006.3 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 20024and to 1,746,326 in 2006.5. 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.	assessment (NRB) has been demonstrated by the project proponent under baseline study with following references: (a) http://rainforests.mongabay.com/deforestation.html/22/ (b) Household Energy, Indoor Air Pollution and Health: Overview of Experiences and Lessons in Guatemala prepared by Winrock International, October 2004 This study has also confirmed that deforestation is continuing since non-renewable biomass has been in use since 31 December 1989. 2. Increasing trends in fuel wood prices indicating a scarcity of fuel-wood; Increasing trends in fuel wood prices indicating a scarcity of fuel-wood has been verified with Trends In Fuel wood Use And Scarcity In Guatemala, 2000-2006 Further, same has been checked with Household Energy, Indoor Air Pollution and Health: Overview of Experiences and Lessons in Guatemala, prepared by Winrock International, October 2004 and National Statistics Institute, Environmental Statistics Year-book, 2008 (page 299). Furthermore, the VVB could confirm the results of

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

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

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

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

		the baseline study report by interviewing end-users during remote audit visit. From above sources, VVB has confirmed that carbon stocks were depleted in Guatemala and non-renewable biomass is in use since 1989. Hence applicable to this category.
For the specific case of biomass residues processed as a fuel (e.g., briquettes, wood chips	Not applicable. The ICS is introduced as energy efficiency measure to replace baseline stoves and reduce the use of non-renewable biomass for combustion.	The introduction of the project stove replaces the traditional inefficient stoves with highly efficient stoves which results in reduced use of non-renewable biomass. Thus, this criterion was not found to be applicable.

Additionality: The update in the methodology has not resulted in any changes in the additionality of the project. The project still remains additional.

Appropriateness of the baseline scenario: According to the baseline scenario of the applied methodology: “It is the continued use of non-renewable wood fuel (firewood/charcoal) or fossil fuel (coal/kerosene) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity”.

The aforementioned deviations have been adequately described in section 2.3.2. of the MR and complied with according to the VCS rules and requirements/4/. The verification team is of the opinion that the PP has followed an appropriate approach and the deviation has not resulted in the overestimation of the emission reductions in any way.

3.4 Grouped Project

This project is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The implemented project involves distribution of fuel-efficient stoves in Guatemala. ONIL Stoves — Guatemala – Uspantán involves the distribution and installation of ONIL Stoves for use by households in Guatemala; which includes 11,132 improved cook stoves benefiting families throughout the country. Before the adoption of the ONIL Stove, households in Guatemala used inefficient, conventional open fires. The monitoring period 01/09/2020 – 19/12/2020 covered all these stoves.

During the remote site visit ESPL was able to verify that the project has been implemented as planned and as mentioned in the revised VCS-PD/1/, by visiting a sample of 11 households selected at random from the records available at the offices of the PP and the survey samples.

ESPL verification team performed samples among households included in the monitoring system. Few of the samples were chosen from the list of households were the ny,j were monitored, the other sample were chosen from households where the ηnew,i (stoves where the WBTs were performed) and μy - baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves were monitored.

To verify the result of the calculation of confidence/precision, ESPL has followed the Guideline: Sampling and surveys for CDM project activities and programmes of activities version 04.0/11/.

The project is already registered under CDM (another GHG program) as a CPA. Whereas, the project was included under the registered CDM PoA 8480 on 19 December 2012. Project participants have provided confirmation that the carbon credits claimed under VCS will not be double counted under the CDM and vice-versa.

In addition, during desk review and remote site visit was confirmed that the project has not received or sought any other form of environmental credit for the project. Also, it was verified that the project has not been rejected from other GHG program after validation and; therefore, it was not necessary to a complete revalidation of the project against the VCS rules.

Overall, the project activity was implemented as described in the revised VCS-PD and CDM-SSC-CPA-DD. Verification team confirmed that the component project implementation is in accordance with the project description contained in the revised VCS-PD and CDMSSC-CPA-DD. No material discrepancies were identified between project implementation and the project description.

Based on above assessment, verification team concluded that all physical features of the project activity in the registered CPA DD are in place and that the project participant has operated the project activity as per the registered CPA DD.

4.2 Safeguards

4.2.1 No Net Harm

The assessment team confirms based on the remote-site visit, document review that the project activity has no potential negative environmental and social-economic impacts. Hence no mitigation measures are required.

4.2.2 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 Agua Blanca, Quetzaltenango on 15 December 2009. A series of similar meetings followed this.

The outcomes from the local stakeholder consultation is available in Section F of the PoA-DD .

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 was received during the ongoing communications with stakeholders during this monitoring period. The information has been confirmed from the LSC report /20/ and the previous verification of the PoA.

4.3 AFOLU-Specific Safeguards

The project is a non-AFOLU projects hence, this section is not required.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The project monitoring has been carried in accordance with the revised PD/1/. The sampling method has been changed from multi-stage sampling to simple random sampling and hence ESPL has also taken up a sampling approach to cross check the values of monitored parameters. The applied methodology has been changed from AMS II.G, version 3 to VCS methodology VMR0006 "Methodology for Installation of High Efficiency Firewood Cookstoves" version 01. The assessment team has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) in the MR/2/.

Emissions reductions can be calculated as per methodology VMR0006 Version 1.0 using the following equations:

$$ER_y = \sum_i \sum_j ER_{y,i,j} \qquad \text{Equation (1)}$$

Where:

i	=	Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire
j	=	Indices for the situation where there is more than one batch of improved cookstove of type *i*
ER_y	=	Emission reductions during year *y* in t CO_2e
$ER_{y,i,j}$	=	Emission reductions by improved cookstove of type *i* and batch *j* during year *y* in t CO_2e

$$ER_{y,i,j} = B_{y,savings,i,j} \times NCV_{wood\ fuel} \times f_{NRB,y} \times (EF_{wf,CO2} + EF_{wf,non\ CO2}) \times N_{y,i,j} \times 0.95 \qquad \text{Equation (2)}$$

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per improved cookstove of type *i* and batch *j* during year *y*
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})[6]
$NCV_{wood\ fuel}$	=	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)[7]
$EF_{wf,CO2}$	=	CO_2 emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO_2/TJ)[8]
$EF_{wf,non\ CO2}$	=	Non-CO_2 emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO_2/TJ)[9]
$N_{y,i,j}$	=	Number of improved cookstoves of type *i* and batch *j* operating during year *y*
0.95	=	Discount factor to account for leakage

To calculate $B_{y,savings}$, we use Option 1 of the applied methodology[10]

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

Where:

B_{old}	Quantity of wood fuel used in the absence of the project activity in tonnes
n_{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.
$n_{new,I,j}$	Efficiency of the system being deployed as part of the project activity (fraction), as

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

[7] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction

[8] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

[9] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

[10] Equation 3 of methodology VMR 0006

determined using the Water Boiling Test (WBT) protocol.

As some of the project households continue to use baseline cookstoves along with improved cookstoves, B_{old} has been adjusted *ex-post* based on the percentage of project households found to continue such practice according to the Equation 6 of applied methodology as follows:

$$B_{old,adjusted} = B_{old} \times (1 - \mu_y)$$

Where:

$B_{old,adjusted}$	=	Adjusted B_{old} to account the ex-post usage of firewood in baseline cookstove(s) by project households in addition to improved cookstove (in tonnes per device)
μ_y	=	Baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves.

The final ERs achieved during the current monitoring period was found to be 15,897 tCO2e

- The monitoring of reductions in GHG emissions resulting from the proposed VCS project activity were implemented in accordance with the monitoring plan contained in the revised VCS-PD, CDM-SSC-PoA-DD and CDM-SSC-CPA-DD.
- The monitoring plan and the applied methodologies had been properly implemented and followed by the project participants.
- All parameters stated in the monitoring plan, the applied methodologies and relevant CDM EB decisions had been sufficiently monitored and updated.
- The responsibilities and authorities for monitoring and reporting were in accordance with the responsibilities and authorities stated in the monitoring plan.

The data transfer from the monthly generation sheets to final emission reduction calculation sheet/3/ has been transparently described and followed. The final values are reproducible, and all the calculation are linked and clearly presented in the emission reduction calculation sheet/3/.

The assessment team is in a position to conclude that the monitoring for the concerned period has been done in accordance with the procedures laid in the registered documents and the resulting emission reductions are measurable and conservative.

Parameters available at the time of Validation:

The tables given below describe how each parameter, which is to be measured according to the monitoring plan, has been verified to confirm that the actual monitoring complies with the monitoring plan, monitoring data has been thoroughly assessed and that the sampling requirement are met.

Ex-Ante Parameter	Assessment
B_{old} Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices	PP has applied the value of 6.64 Tonnes/year as per the baseline surveys. 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. The value is consistent with the PD/1/, MR/2/ and the ER sheet/3/.
L Net to gross adjustment factor to account for leakage	PP has applied the value of 0.95 as per the VMR0006 methodology, version 1/5/. The value applied was found to be consistent with the PD/1/ and MR/2/.

η_{old} Efficiency of the system being replaced	PP has applied the value of 0.10 as per the VMR0006 methodology, version 1/5/. The value was found to be consistent with the PD/1/, ER/3/ and MR/2/
$f_{NRB,y}$ Fraction of non-renewable biomass saved by the project activity	PP has applied the value of 0.913 National value obtained from local study. The value applied was found to be consistent with the PD/1/, ER/3/ and MR/2/.
$NCV_{biomass}$ Net calorific value of non-renewable biomass that is substituted	PP has applied the value of 0.0156 TJ/tonne as per IPCC default value for fuel wood. The value applied was found to be consistent with the PD/1/, ER/3/ and MR/2/.
$EF_{wf,CO2}$ CO2 emission factor for the use of wood fuel in baseline scenario	PP has applied the value of 112 tCO_2/TJ as per IPCC default value for wood fuel and also the default ex-ante value as stated in the applied methodology. The value applied was found to be consistent with the PD/1/, ER/3/ and MR/2/.
$EF_{wf,non\ CO2}$ Non-CO_2 emission factor for the use of wood fuel in baseline scenario	PP has applied the value of 26.23 tCO_2/TJ as per IPCC default value for wood fuel and also the default ex-ante value as stated in the applied methodology. The value applied was found to be consistent with the PD/1/, ER/3/ and MR/2/.

<table>
<tr><td colspan="2">Monitored Parameter(s)</td></tr>
<tr><td>Parameter</td><td>$N_{y,i,j}$

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 project activity .</td></tr>
<tr><td>Means of Verification</td><td>
<table>
<tr><th>Criteria/Requirements</th><th>Assessment/Observation</th></tr>
<tr><td>Measuring/Reading/Recording Frequency</td><td>Data from Registration Cards was uploaded to database continuously to come up with the overall number of stoves installed under the project . Monitoring surveys captured the fraction of operational ONIL stoves. The measuring frequency was found to be continuous as mentioned in the MR/2/ and the revised VCS PD/1/.</td></tr>
<tr><td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes/ No)</td><td>Yes.</td></tr>
<tr><td>Monitoring Equipment</td><td>Not applicable. Monitoring surveys and registration card records loaded into project database.</td></tr>
<tr><td>Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer’s specification?</td><td>Not applicable since the parameter was not monitored using any equipment as mentioned above.</td></tr>
<tr><td>Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?</td><td>Not applicable for the parameter.</td></tr>
</table>
</td></tr>
</table>

Calibration frequency/interval:	Not applicable for the parameter.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, pending until the findings are closed or as per the manufacturer's specifications?	Not applicable for the parameter as already stated.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable for the parameter as already stated.
Is(are) calibration(s) valid for the whole reporting period?	Not applicable for the parameter as already stated.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable for the parameter as already stated.
How were the values in the monitoring report verified?	Total number of stoves was previously determined as 10,868 and it was calculated as: 10,868 = 0.9763 multiplied by 11,132 stoves eligible in the database. It was also confirmed from the project-database in the ER sheet/3/ that there have been no duplicate entries of the UID and one user has received just one stove. The sampling plan has been applied to the total number of stoves installed in project database/1/. Simple random sampling was applied by the CME for selection of the monitoring samples with 95/10 confidence/precision level which is in accordance

			with the PD. Total number of cookstoves found in operation, after applying the result of sample, are 11,132 which means that 97.63% of ICS are still in operation in the current monitoring period. This number of ICS in operation (11.132) was verified from sampling results for parameters/18/. However, internal investigations by PP management revealed new information regarding the monitoring surveys which indicated issues with the monitoring practices which could potentially result in the monitoring survey showing higher operationality rate than actual in target sampled population. Due to the unreliability of the monitoring survey data, the resulting 97.63% operationality rate has now been discarded. As an alternative for this parameter, results of a follow up sampling, which was conducted by PP in 2024 following Verra's findings, were used to determining this parameter value. The suitability of using this data has been further discussed below. A. The operational stove percentage was determined by using the results from usage survey in 2024 and applying annual deration to previous years, thus basing the calculation on linear loss rate. The value has been compared with other approaches and has been confirmed as the most conservative among, as discussed in points below. B. For this project and monitoring period, the new data collected was presented to VVB in the form of videos and photographs of devices in households surveyed. The photographs were time stamped and confirmed the geo-coordinates of the location where the photograph was clicked. The survey recorded information regarding operationality of the stoves and it reflected that 5 out of 11 stoves surveyed were operational in 2024 when this survey was conducted- thus indicating an operational rate of 45.45% in 2024 (yr 15). Based on this, calculations in the excel file "20241203 VERRA 6.1 _1720 , 1721_Survey results_deration rate_V1.0"/30/ were reviewed and ERs for following vintage was found to be consistently reported: Yr 2020 : 60.00% * 11,132 = 6,679 stoves, where 11,132 is the number of stoves distributed and the percentage indicates the operationality rate calculated based on linear deration rate. The value obtained from these surveys was further cross-checked against the similar projects in the host country Guatemala across different registries and the average stove operationality rate is found to be 91.3% /31/. Based on the principle of conservativeness, the lowest value of the parameter obtained from sources discussed above has been determined as for year	

		2020 as 60%. The verification team confirms based on the follow up surveys and their evidence provided (in the form of videos and/ or photographs), that the revised operationality rate is appropriately calculated for relevant vintages based on deration rate of 3.64% each year (with assumption of 100% operationality in the base year or the year of distribution (year 0) and actual operationality rate of 45.45% in year 15 i.e. 2024). The value calculated for the ICS in operation has been correctly reported in the monitoring report/2/ and ER sheet/3/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, it was noted by the verification team that the staff was trained to obtain unbiased and reliable survey data. Monitoring database was checked for errors.
Findings	No findings.	
Conclusion	The parameter has been monitored appropriately, following a conservative approach. The monitoring results were recorded as per the approved frequency in the monitoring plan and follow up surveys were conducted to re-establish the value of this parameter.	

Parameter	$t_{y,j}$

	Fraction of project's monitoring period the stove is in operation (weeks in operation/total weeks in monitoring period)
Means of Verification	

Criteria/Requirements	Assessment/Observation
Measuring/Reading/Recording Frequency	The data is calculated. Registration Cards or surveys have date of installation of ONIL stoves. These dates are input in project database.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes/ No)	Yes
Monitoring Equipment	Not applicable for the parameter as per the PD/1/
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Not applicable for the parameter concerned.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable
Calibration frequency/interval:	Not applicable.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in	Not applicable.

	accordance with the local/national standards, pending until the findings are closed or as per the manufacturer's specifications?	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable.
	Is(are) calibration(s) valid for the whole reporting period?	Not applicable.
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable.
	How were the values in the monitoring report verified?	The value of the parameter is 1. Days in operation during monitoring period divided by total number of days in monitoring period. This calculation is applied to every ONIL stove in the database/3/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, Cross checks and spot checks in the database have been done to ensure installation/registration dates are correctly captured
Findings	No findings.	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. The verification team is able to confirm that the project is implemented as per the registered PD and there is no discrepancy observed between the actual monitoring system and the monitoring plan set out in the project description and the applied methodology outlined in the revised VCS PD/1/.	

<table>
<tr><td>Parameter</td><td colspan="2">$\square_{new,i,j}$

Efficiency of the ICS</td></tr>
<tr><td>Means of Verification</td><td colspan="2">
<table>
<tr><th>Criteria/Requirements</th><th>Assessment/Observation</th></tr>
<tr><td>Measuring/Reading/Recording Frequency</td><td>Annual as mentioned in the VCS-PD /1/ and MR/2/</td></tr>
<tr><td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes/ No)</td><td>Yes</td></tr>
<tr><td>Monitoring Equipment</td><td>The following equipment are used:
• Digital scales
• Firewood moisture meters
• Digital thermometers
• Thermocouples
Following are the details of the respective equipment:
<table>
<tr><td>Equipment</td><td>Sr. No.</td></tr>
<tr><td>Digital scales</td><td>#267871-06
#267834-06</td></tr>
<tr><td>Firewood moisture meters</td><td>23207
23209</td></tr>
<tr><td>Digital thermometers</td><td>Fluke 51 II
TRACEABLE</td></tr>
<tr><td>Thermocouples</td><td>N/A</td></tr>
</table>
The Water Boiling Test (WBT) protocol used was the WBT version 4.2.4 published by the Global Alliance for Clean Cook stoves.</td></tr>
<tr><td>Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify</td><td>Yes</td></tr>
</table>
</td></tr>
</table>

	the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?		
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes	
	Calibration frequency/interval:	The equipment involved in the monitoring of the parameters were found to be in-calibration at the time of monitoring survey as confirmed from the calibration certificates/24,25,26/	
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, pending until the findings are closed or as per the manufacturer's specifications?	Yes	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes	
	Is(are) calibration(s) valid for the whole reporting period?	Yes	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes	

<table>
<tr><td></td><td>
<table>
<tr><td>How were the values in the monitoring report verified?</td><td>
<table>
<tr><td>Vintage</td><td>Efficiency</td></tr>
<tr><td>4</td><td>0.2805</td></tr>
<tr><td>5</td><td>0.2794</td></tr>
<tr><td>6</td><td>0.2777</td></tr>
<tr><td>7</td><td>0.2789</td></tr>
<tr><td>8</td><td>0.2830</td></tr>
<tr><td>9</td><td>0.2817</td></tr>
<tr><td>10</td><td>0.2865</td></tr>
<tr><td>11</td><td>0.2849</td></tr>
</table>
The values were verified from the WBT survey sheet/13/. The value mentioned in the WBT sheet was found to be consistently mentioned in the MR/2/ and ER sheet /3/.</td></tr>
<tr><td>Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</td><td>WBT version 4.2.4 was used.
A check was performed for outliers, but none were found (defined as those thermal efficiency values 3 standard deviations above or below the vintage sample mean, as per the CDM PoA-DD section I.7.2). The team which performed the WBT test were trained as verified from the training records/27/.</td></tr>
</table>
</td></tr>
<tr><td>Findings</td><td>No findings.</td></tr>
<tr><td>Conclusion</td><td>The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.

The verification team is able to confirm that the project is implemented as per the registered PD and there is no discrepancy observed between the actual monitoring system and the monitoring plan set out in the project description and the applied methodology outlined in the revised VCS PD/1/.</td></tr>
</table>

Parameter	μ_y Adjustment to account for any continued use of pre-project devices during the year y

Means of Verification

Criteria/Requirements	Assessment/Observation
Measuring/Reading/Recording Frequency	The parameter is monitored at least once every two years. The value is as per the ONIL Stove Registration data and data from monitoring surveys.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes/ No)	Yes, the frequency for monitoring is in accordance with the monitoring plan.
Monitoring Equipment	
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Not applicable.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable.
Calibration frequency/interval:	Not applicable.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring	Not applicable.

	plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, pending until the findings are closed or as per the manufacturer's specifications?		
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable.	
	Is(are) calibration(s) valid for the whole reporting period?	Not applicable.	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable.	
	How were the values in the monitoring report verified?	The value of the parameter is 2.37%. The number of households with operational ONIL stoves and continuing to use baseline stoves divided by the total number of surveyed households. It was confirmed if the traditional stove was used once in a week by the surveyor to take into account the continued usage of baseline stove during the monitoring survey/18/ The applied value was checked from the monitoring survey sheet in the Sample size calculation sheet/18/ and was found to be consistently	

		mentioned in the MR/2/ and the ER sheet/3/.	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes	
Findings	No findings.		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. The verification team is able to confirm that the project is implemented as per the registered PD and there is no discrepancy observed between the actual monitoring system and the monitoring plan set out in the project description and the applied methodology outlined in the revised VCS PD/1/.		

Parameter	$B_{old\ adjusted}$ If baseline stoves continue to be used, adjustment ensures that fuel wood consumption of those stoves is excluded from Bold.

Means of Verification

Criteria/Requirements	Assessment/Observation
Measuring/Reading/Recording Frequency	Atleast once every two years.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes/ No)	Yes
Monitoring Equipment	Not applicable.
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Yes.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes.
Calibration frequency/interval:	Not applicable since no monitoring equipment used
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards,	Not applicable since no monitoring equipment used

	pending until the findings are closed or as per the manufacturer's specifications?	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable since no monitoring equipment used
	Is(are) calibration(s) valid for the whole reporting period?	Not applicable since no monitoring equipment used
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable since no monitoring equipment used
	How were the values in the monitoring report verified?	The value of the parameter is 6.4826 It is calculated using the formula: $B_{old\_adjusted} = B_{old} \times (1 - \mu_y)$ $= 6.64 \times (1 - 0.0237)$ $= 6.4826$ The applied value was calculated and found to be consistently mentioned in the ER sheet/3/ and MR/2/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
Findings	No findings	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

	The verification team is able to confirm that the project is implemented as per the registered PD and there is no discrepancy observed between the actual monitoring system and the monitoring plan set out in the project description and the applied methodology outlined in the revised VCS PD/1/.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

Sampling approach followed by PP:

For the purpose of sampling PP has followed the CDM guidelines for Sampling and surveys for CDM project activities and programmes of activities version 4.0/11/ which is in-line to the revised PD/1/.

The PP has applied simple random sampling at project level for different monitoring parameters as per validated revised PD/1/.

Simple Random Sampling was applied, and samples was randomly selected from the primary sampling units. To ensure a random selection of ICS, random number generators was applied.

To determine the parameters, sampling will involve the following approaches (outcome in brackets): $n_{y,j}$:

Visual inspection of the premises to see if ICS is operational and in use. Interview with end

user if required to verify that ICS is still in use (Yes/No)

$\mu_y y$: Interview with end user and visual inspection to determine if a baseline (replaced) stove is still

being used in addition to ICS (Yes/No)

n_{new}:ICS will be tested using WBTs (ICS thermal efficiency)

95/10 confidence precision was mainly applied by PP in the sampling, which is appropriate since they follow annual monitoring frequency for surveys and field tests. For ICS monitoring parameter $\square_{new}$, the monitoring frequency as per methodology and revised accepted/registered PoA DD is biennial, PP has followed the annual frequency and applied a confidence precision level of 95/10 in sampling. This was accepted by assessment team since this does not lead to overestimation of CERs and also permitted by the standards, guidelines and applied methodology/5/.

For parameter ny,j, a follow up survey was conducted in year 2024 to re-evaluate the parameter value which was believed to be compromised during the initial monitoring survey. The survey recorded information regarding operationality of the stoves and it reflected that 5 out of 11 stoves were operational in 2024 when this survey was conducted.

PP has adjusted the sample size upwards to account for non-responses and this rate was determined bases on previous experience.

Date of survey:

CPA-1	Third monitoring survey	Second monitoring survey
Survey dates for parameters ny and SSy	01/10/2020 – 31/10/2020	08/06/2018- 11/06/2018
Dates of WBT for parameter ηnew,y,i	29/09/2020 – 02/11/2020	15/06/2018 – 28/06/2018

As the prescribed frequency for all the parameter is at least biennial (once in 2 years) which is being met in the current situation.

Following reliability calculation performed by PP has been reviewed by the assessment team and found correct. Sample estimates of all three parameters are within the required reliability precision. It is also confirmed that reliability and precision check is carried out and lower/upper bound limit is applied conservatively, wherever the required precision is not achieved.

Parameter	Responded Samples	Value of parameter obtained	Precision achieved
$N_{y,j}$	253	Initial monitoring survey: 97.63% Follow up survey: Yr 2020 : 60.00%	Initial monitoring survey: 1.91% Follow up survey: NA
u_y	253	2.37%	1.91%
$n_{new,5}$	18	28.05%	1.65%
$n_{new,5}$	18	27.94%	2.18%
$n_{new,6}$	18	27.77%	1.68%
$n_{new,7}$	18	27.89%	1.70%
$n_{new,8}$	18	28.30%	1.83%
$n_{new,9}$	18	28.17%	1.63%
$n_{new,10}$	18	28.65%	1.97%
$n_{new,11}$	18	28.49%	2.18%

The verification team has verified the sample size calculation sheet /11/ with the monitored data, where the actual achieved precision is calculated against the Guidelines outlined under “Standard for sampling and surveys for CDM project activities and programme of activities”/17/ and can confirm that the calculation of achieved reliability was done correctly.

ESPL was able to confirm that the calculations are based on authentic data. The spreadsheets used to calculate the VCUs calculations, and all figures were tracked, checked and found to be consistent.

The quality of supporting evidences submitted to the VVB for verification is adequate and found to be verifiable. The transfer of carbon rights and other supporting documents related to quality and maintenance were checked by the verification team during the site visit to confirm the authenticity of the documents and to check the correctness of the calculation.

The verification team can confirm that sufficient evidence is available for the whole monitoring period and the same is verifiable and that the data collection system meets the requirements of the monitoring plan and the applied methodology according to the assessment carried out on site and in the document review.

Verification team confirms that the quality of evidence to determine the GHG reductions and removals produced was found satisfactory. The detailed information flow with the roles and responsibilities of the individuals and the monitoring system have been provided in the VCS-MR.

4.6 Non-Permanence Risk Analysis

As the project activity is a non-AFOLU project activity no risk related to non-permanence has been identified for the project activity.

5 VERIFICATION CONCLUSION

Earthood Services Private Limited (ESPL), contracted by C-Quest Capital LLC, has performed the independent verification of the emission reductions for the VCS project activity (VCS ID- 1721) ONIL Stoves —Guatemala – Uspantán in Guatemala for the monitoring 01/09/2020 – 19/12/2020 as reported in the Monitoring Report Version 2.2 dated 09/12/2024/2/. C-Quest Capital LLC is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity. It is our responsibility to express

ESPL commenced the verification based on the baseline and monitoring methodology VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1, the monitoring plan contained in the VCS PD Version 2 dated 12/04/2021/1/ and VCS Standard version 4.1/4/, Monitoring Report Version 2.2 dated 09/12/2024 as per the process described under Section 2 of this report.

ESPL verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. ESPL planned and performed the verification by obtaining evidence and other information and explanations that ESPL considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 01/09/2020 – 19/12/2020 are fairly stated in the Monitoring Report Version 2.2 dated 09/12/2024.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1, and the VCS standard/4/.

Verification period: From 01/09/2020 – 19/12/2020 (including both days)

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01/09/2020 – 19/12/2020	15,897	0	0	15,897
Total	15,897	0	0	15,897

Approved by

Dr. Kaviraj Singh

Managing Director
Earthood Services Private Limited

Date: 18-12-2024
Place: Gurugram, Haryana

APPENDIX 1: ABBREVIATIONS

Abbreviations	Full texts
BAU	Business As Usual
CA	Corrective Action/Clarification Action
CER	Certified Emission Reduction
CAR	Corrective Action Request
ESPL	Earthood Services Pvt. Ltd.
CDM	Clean Development Mechanism
CL	Clarification Request
CO2	Carbon Dioxide
CO2	Carbon Dioxide Equivalent
DOE	Designated Operational Entity
EB	CDM Executive Board
EF	Emission Factor
FAR	Forward Action Request
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
RSV	Remote Site Visit
QC/QA	Quality Control/Quality Assurance
TA	Technical Area
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VVB	Validation/Verification Body

APPENDIX 2: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

Competence Statement			
Name	N Premjit Singh		
Education	B.Tech in Mechanical Engineering M.Tech in Energy Technology		
Experience	9+ Years		
Field	Climate Change, Energy		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS I.D		
Local expert	YES		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	YES (TA 1.2)		
Reviewed by	Deepika Mahala (Quality Manager)	**Date**	19/08/2021
Approved by	Ashok Gautam (Technical Manager)	**Date**	25/08/2021

Competence Statement	
Name	Vaishali Vatsa

Education	M.Sc. (Environmental Studies and Resource Management), TERI University		
Experience	4 months		
Field	Climate Change		
Approved Roles			
Team Leader	NO		
Validator	Yes		
Verifier	Yes		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee	NO		
Reviewed by	Shreya Garg	**Date**	30/12/2019
Approved by	Anshika Gupta	**Date**	02/01/2020

Competence Statement	
Name	Shreya Garg
Country	India
Education	M.Sc. (Climate Science & Policy), TERI University
Experience	6 Years +
Field	Climate Change
Approved Roles	
Team Leader	YES
Validator	YES
Verifier	YES

Methodology Expert	AMS.I.A., AMS.I.C., AMS.I.D., AMS.I.F., AMS.II.D., AMS.II.G., AMS.II.J., AMS.III.AV., ACM0002, ACM0012		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (TA 1.2, TA 3.1)		
Reviewed by	Abhishek Mahawar	**Date**	01/03/2018
Approved by	Ashok Gautam	**Date**	01/03/2018

Competence Statement			
Name	Alejandra Castillo		
Education	Title Of Executive Bilingual Secretary English – Spanish Graduate		
Experience	10+ years		
Field	Communication, Marketing		
Approved Roles			
Team Leader	No		
Validator	No		
Verifier	No		
Methodology Expert	No		
Local expert	Yes (Guatemala)		
Financial Expert	No		
Technical Reviewer	No		
TA Expert	No		
Reviewed by	Shreya Garg	**Date**	17/09/2019
Approved by	Anshika Gupta	**Date**	17/09/2019

Competence Statement			
Name	Shifali Guleria		
Education	M.Sc. (Environmental Studies and Resource Management), TERI University		
Experience	3+ year		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	YES (AMS-I.A., AMS-II.G., AMS-II.E., AMS-III.A.V., AMS-I.D, ACM0002)		
Local expert	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (1.2, 3.1)		
Reviewed by	Deepika Mahala	**Date**	18/02/2022
Approved by	Ashok Gautam	**Date**	18/02/2022

Competence Statement			
Name	Akanksha Sengupta		
Education	M.Sc Environmental Studies, University of Delhi B.Sc Zoology, Hans Raj College, DU		
Experience	4 months		
Field	Environment Science and Policy		
Approved Roles			
Team Leader	NO		
Validator	NO		
Verifier	NO		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee	YES		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	12/07/2023
Approved by	Deepika Mahala (Technical Manager)	**Date**	12/07/2023

APPENDIX 3: DOCUMENTS REVIEWED OR REFERENCED (VERIFICATION)

S.No	Title of Document	Version	Date
1.	Revised VCS PD	2.0	12/04/2021
2.	VCS Monitoring Report (Final)	2.2	09/12/2024
3.	ER spread sheet	Corresponding to current monitoring period	-
4	VCS Standard	4.1	-
5.	Methodology: VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1	1.0	-
6.	VERRA Registry	Link: https://registry.verra.org/	-
7.	VCS Verification Report (3rd MP)	03	16/12/2024
8.	Validation Report	01	26/09/2017
9.	Geographical co-ordinate for project activity from	Northern most point: https://www.gps-coordinates.net/satellite/@18.000000,-89.750000,14 Southernmost point: https://www.gps-coordinates.net/satellite/@13.468992,-88.834734,14	-

		Westernmost point: https://www.gps-coordinates.net/satellite/@14.535659,-92.224734,14 Easternmost point: https://www.gps-coordinates.net/satellite/@9.046888,-69.015716,14	
10.	Times of India	https://timesofindia.indiatimes.com/india/with-3-8-lakh-new-infections-active-cases-cross-30-lakh/articleshow/82301108.cms	-
11.	Guideline for Sampling and surveys for CDM project activities and programmes of activities,	4.0	-
12.	CDM-SSC-CPA-DD	08	20/06/2019
13.	Water boiling test records	-	01/08/2018-31/12/2020
14.	CDM PoA 8480 : https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/NQIZR3S1J58FLTHUKMB2X6PY07CE49/viewCPAs/	-	-
15.	First stove installation invoice	-	11/01/2010
16.	https://registry.verra.org/app/projectDetail/VCS/1721	-	-
17.	Sampling and Survey Standard	Version 8.0	-
18.	Monitoring Survey sheet & Sample size calculation sheet	-	-
19.	Manufacturer specification	-	-
20.	LSC Report	-	15/12/2009

21.	Evaluation of Forest Resources, National Report, 2010, Guatemala	www.fao.org/forestry/20262 -1-174.pdf/	-
22.	Deforestation	http://rainforests.mongabay.com/deforestation.html/	-
23.	The Water Boiling Test (WBT) protocol	Version 4.2.4	-
24.	Calibration certificates of Weigh Balance	-	Dated: 01/10/2020-02/11/2020
25.	Calibration certificate of Thermometer	-	Dated: 26/05/2020
26.	Calibration certificate of Moisture Meter	-	Dated: 01/10/2020-02/11/2020
27.	Training record for WBT and Monitoring Survey	-	September,2020
28.	Follow up surveys - Sample selection video	-	Submitted on 06/12/2024
29.	Follow up survey results- Survey record, photographs and/or videos of operational devices, signatures of the end-users	-	Submitted on 06/12/2024
30.	Deration rate calculation: *"20241202 VERRA 6.1 Survey 2024 _VCS 1721 _ Operational stove rate"*	-	02/12/2024
31	Secondary data: other projects in the host country: *"44.03.05 Stoves in Operation - Verified Secondary Data (2024-08-05)"*	-	05/08/2024

APPENDIX 4: CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS (CAR/CL/FAR)

Table 1. FAR from the previous verification

FARID	01	**Section no.**	3.3	**Date :** 06/09/2021
Description of FAR				
The VVB involved in next verification shall provide a material verification of the improvements made to the cookstoves and confirm how the project proponent can ensure an efficiency of 31.67% even for the older stoves. In doing so, the VVB is requested to verify the project deviations in line with all the VCS Standard requirements and submit the revised project description document, if deemed necessary.				
Project participant response				**Date :** 22/12/2021
Field coordinator has demonstrated the process of the replacement of the stove part to the auditor through video call. CQC has also provided the detailed information document to explain the change in performance & efficiency of the stove after the change in the stove parts.				
Documentation provided by project participant				
Technical details related to replacement parts of ICS and video demonstration.				
DOE assessment				**Date:** 23/12/2021
Due to the current COVID-19 pandemic. VVB team is unable to travel and visit the site in person. As an alternative method, the verification team through video interview with the implementer witnessed about the changes made in the ICS. PP has demonstrated step wise approach for the replacement of parts for the ICS. The demonstration has taken place in the old stove. Further, the verification team has checked the manuscript prepared based on the sample test such as WBT, CCT, KPT and it is evident that old stove can achieve efficiency of 31.67%. Hence, with the above-mentioned assessments, VVB team has concluded that the FAR can stands closed.				

Table 2. CL from this verification

CL ID	01	**Section no.**		**Date :** 21/12/2021
Description of CL				
As per section 1.1 of monitoring report, PP shall provide declaration for no double counting claim to any GHG program for the same monitoring period.				

Documentation provided by project participant	Date : 22/12/2021
Declaration has been provided to VVB for further review.	
DOE assessment	**Date:** 23/12/2021
The declaration provided by the PP is checked and verified and found to be OK. CL 01 stands closed	

CL ID	02	Section no.		Date : 21/12/2021
Description of CL				
As per the VCS Standard V4.1, Section 3.16.3, the project proponent shall establish mechanisms for ongoing communication with local stakeholders to allow stakeholders to raise concerns about potential negative impacts during project implementation. PP is requested to clarify how the section 2.2 of monitoring report complies with VCS standard V4.1 requirements pertaining to the ongoing communication with local stakeholders.				
Project participant response				**Date :** 22/12/2021
Ground staff from PP is in regular contact with the stove users and checks the performance of the stoves and take the feedback with the stakeholders. As a result of ongoing communication with the stakeholders, PP modified the combustion chamber to improve the performance and efficiency of the stoves.				
Documentation provided by project participant				
DOE assessment				**Date:** 23/12/2021
It is evident from the changes made by the PP in the stove design and interview with end users. PP has maintained a regular contacts with the stakeholders, taking their feedbacks and status of the ICS. Hence, justification made by PP is acceptable and CL 02 stands closed.				

CL ID	03	Section no.		Date : 21/12/2021
Description of CL				
In section 4.2 of monitoring report, PP is requested to submit the following documents: • Survey forms and survey result spreadsheets for parameters $n_{y,i}$, μ_y , $n_{new,i}$ • Technical specifications and calibration/testing of equipments.				
Project participant response				**Date :** 22/12/2021
• Scanned copies of the survey forms and survey results spreadsheet for the parameters $n_{y,i}$, μ_y , $n_{new,I}$ have been submitted to VVB for further review. • Technical specification and calibration records for the equipment used for WBT have been provided to VVB.				
Documentation provided by project participant				
Scanned copies of the survey forms, user manuals and calibration certificates				

DOE assessment	Date: 23/12/2021
The documents provided by the PP like the scanned copies of the survey forms, user manuals and calibration certificates are checked and found OK. Thus, CL 03 stands closed.	

CL ID	04	Section no.		Date : 21/12/2021
Description of CL				
In section 4.3 of monitoring report, PP is requested to submit the following documents: • Sampling analysis sheet or related for the parameters mentioned. • Evidence on the precision achievements for the given monitored parameters.				
Project participant response				Date : 22/12/2021
Sampling analysis sheet depicting the achievement of precision for the sampling parameters has been submitted to VVB.				
Documentation provided by project participant				
Sampling analysis sheet and the documents related to the precision of the achievements of the monitored parameters.				
DOE assessment				Date: 23/12/2021
The sampling analysis sheet by the PP are checked and found OK. Thus, CL 04 stands closed				

Table 1. CAR from this verification

~~CAR ID~~		~~Section no.~~		~~Date :~~
~~Description of CAR~~				
~~Project participant response~~				~~Date :~~
~~Documentation provided by project participant~~				
~~DOE assessment~~				~~Date:~~

Table 2. FAR from this verification

~~FAR ID~~		~~Section No.~~		~~Date : DD/MM/YYYY~~
~~Description of FAR~~				
~~Project participant response~~				~~Date : DD/MM/YYYY~~
~~Documentation provided by project participant~~				
~~DOE assessment~~				~~Date: DD/MM/YYYY~~