

Project Title	Stove Capital Guatemala Improved Stove and Water Purification Project
ERM CVS Reference	2619.V1
Gold Standard Project Reference Number	GS 1321
Client Name	The Paradigm Project
Client Address	619 N Cascade Ave Suite 110 Colorado Springs 80903 USA

Gold Standard Verification Report

ERM Certification and Verification Services

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Table of Contents

1.	Project information	5
2.	Verification Opinion and Certification Statement	6
3.	Introduction	7
3.1.	Verification Objectives	7
3.2.	Scope and basis of verification work	7
3.3.	Appointment of Team Members and Technical Reviewer	8
3.3.1.	Verification Team Member Profiles	8
3.4.	Verification activities	9
3.4.1.	Desk review	9
3.4.2.	Site Visit	9
3.4.3.	Reporting	10
3.4.4.	Independent technical review	11
4.	Verification Findings	12
4.1.	Status of open issues from validation and previous verification	12
4.	Schools	14
4.2.	Project Implementation in accordance with the PDD	14
4.2.1.	Overview of project design	14
4.3.	Compliance of the monitoring plan with the monitoring methodology	17
4.4.	Compliance of monitoring with the monitoring plan	17
4.4.1.	Overview of monitoring system	17
4.4.2.	Completeness of monitoring parameters	23
4.4.3.	Data and parameters monitored	24
4.4.4.	Management and operational system	35
4.5.	Data and parameters determined at registration and not monitored	35
4.6.	Assessment of data and calculation of GHG emission reductions	36
4.7.	Other observations	38
4.8.	Assessment of sustainability monitoring	38
4.8.1.	Completeness of sustainability monitoring parameters	38
4.8.2.	Sustainability indicators monitored	38
5.	Remediation Requests	42
5.1.	Clarification Requests	42
5.2.	"Outlier Removal	42
5.3.	Corrective Action Requests	43
5.4.	Forward Action Requests	44
5.5.	Minor Issues	44
Annex A:	Reference Documents and Interviews	45

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
EB	Executive Board
CER	Certified Emission Reduction(s)
CL	Clarification Request
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
DOE	Designated Operational Entity
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas
GS	Gold Standard
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention for Climate Change
VVS	CDM Validation and Verification Standard

Project specific abbreviations

BWBT	baseline water boiling test
HH	household
ICS	improved cooking stove
WT	Water Treatment
KPT	kitchen performance test
MKS	monitoring kitchen survey
WCFT	water consumption fuel test
SM	Socorro Maya
KS	Kitchen Survey

US	Usage Survey
MS	Monitoring Survey
CRW	Carbon Rights Waivers
DCD	Detailed Customer Databases
TSR	Total Sales Record
NGO	Non- Governmental Organisation
CBO	Community Based Organizations
WHO	World Health Organization

1. Project information

Project Title	Stove Capital Guatemala Improved Stove and Water Purification Project
Gold Standard Project reference	GS 1321
Project Location	Alta Verapaz, Baja Verapaz, San Marcos, Quetzaltenango, Antigua, Guatemala
Host Party	Guatemala
Annex I Party(s)	n/a
Project Participants	Stove Capital, CEMEX, Ecofiltro, The Paradigm Project
Methodology	Gold Standard Methodology "Technologies and practices to displace decentralized thermal energy consumption (version 1 - 11/04/2011)"
Methodology version number	11/04/2011

Final monitoring report date	16 August 2016
Monitoring Period	April 1st, 2015 to April 30th, 2016
Date(s) of Site Visit	9-13 May 2016

Date/version of Registered PDD and monitoring plan	Version 05; dated 20 September 2013
Date/version of revised PDD (if applicable)	N/A
Date of Initial Gold Standard Approval	13 November 2012
Crediting Period	01 January 2013 – 31 December 2019

Number of emission reductions certified	289,542 tCO ₂ e
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2. Verification Opinion and Certification Statement

ERM Certification and Verification Services (ERM CVS) was commissioned The Paradigm Project to verify and certify the emissions reductions reported for the period April 1st, 2015 to April 30th, 2016 as set out in the monitoring report of the project activity Stove Capital Guatemala Improved Stoves and Water Purification Project, Registration Reference GS 1321.

Basis of verification	ERM CVS based its verification work on: - the approved Gold Standard methodology applied in the project design document (PDD) - the CDM Validation and Verification Standard (VVS) - Gold Standard requirements version 2.2 and guidance	
Responsibilities of ERM CVS	ERM CVS is responsible to provide an independent verification conclusion on the reported greenhouse gas (GHG) emission reductions for the project during the relevant monitoring period. The verification activities included desk review, site visit, close out of open issues, preparation of report and technical review.	
Responsibilities of Project Participants	The Project Participants (PPs) are responsible for the preparation of the information and GHG emissions data and the reported GHG emissions reductions of the project on the basis set out within the applicable monitoring plan.	
ERM CVS Opinion	Based on the verification activities undertaken, ERM CVS concludes that the project activity is implemented and operated as described in the Project Design Document version 05 and Gold Standard Passport version 01 approved by the Gold Standard. The GHG emissions reductions and sustainability indicators set out in the monitoring report dated 16 August 2016 were found to be appropriately measured and calculated in accordance with the applied monitoring methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption' (11/04/2011), the monitoring plan set out in the Project Design Document, Version 05 dated 20 September 2013, and Gold Standard Passport version 01.	
Total GHG emission reductions certified	Emission reductions: 289,542 tCO₂ equivalent	
Report approved by		Signature 
Name: Melanie Eddis		
Date 02 September 2016		

3. Introduction

This report sets out the methodology and conclusions of the verification process and the ERM CVS Certification Statement. ERM CVS assessed and verified whether the implementation of the project activity and the steps taken to report emission reductions comply with the Gold Standard criteria and relevant guidance provided by the Gold Standard, and the CDM Executive Board where relevant.

3.1. Verification Objectives

As set out in the Gold Standard Requirements (version 2.2), verification means the periodic independent review and ex post determination by a Designated Operational Entity of monitored reductions in anthropogenic emissions by sources of greenhouse gases (GHG) that have occurred as a result of a registered project activity during the verification period.

The objective of the verification is to establish whether sufficient evidence exists to confirm, to reasonable assurance:

- Whether the project activity has been implemented and is being operated as per the PDD and the Gold Standard Passport and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project activity are in place.
- Whether the applied monitoring plan is in compliance with the relevant approved Gold Standard monitoring methodology.
- Whether the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the monitoring plan and applicable Gold Standard requirements.
- Whether the emission reductions as set out in the Monitoring Report have been measured, calculated and reported in accordance with the requirements of the carbon monitoring plan and the sustainability monitoring plan in the Gold Standard Passport.
- Whether the reported data meet the key principles of data quality and are complete, reliable, consistent, accurate, valid, transparent and conservative.

3.2. Scope and basis of verification work

The verification is an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the DOE.

Based on the key project information set out on page 2, the verification addresses the implementation and operation of the project activity as set out in the PDD and the Gold Standard Passport, and the information and reported emissions reductions set out in the monitoring report prepared by the project participant (PP) for this monitoring period.

The verification tests the data and assertions set out in the monitoring report prepared for this monitoring period by the PPs and is based on

- the approved methodology applied in the PDD the monitoring plan accepted by Gold Standard
- the Gold Standard Passport and its sustainability monitoring plan
- Gold Standard Requirements version 2.2 and Gold Standard Toolkit version 2.2 and its Annexes
- the CDM Validation and Verification Standard (VVS) except where Gold Standard rules or procedures are different
- Other information and references relevant to the project activity's reported emission reductions - refer to Annex 1 for full set of documents

The verification considers both quantitative and qualitative information on emission reductions. The monitoring report is assessed, using a rules-based approach, against the principles of accuracy, relevance, credibility, reliability, completeness, consistency, and transparency. Conservativeness is applied throughout the process to ensure that emission reductions are not overstated.

ERM CVS conducts all its work under strict rules to safeguard impartiality and ensure the independence of the verification team. The verification does not provide any consulting or recommendations for the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring activities.

3.3. Appointment of Team Members and Technical Reviewer

Based on ERM CVS's review of the project, a verification team was established that takes into account the coverage of the technical area(s), sectoral scope(s) and relevant host country experience for verifying the emission reductions achieved by the project activity in the relevant monitoring period for this verification

Personnel who undertook this verification were:

Verification Team	Role	CDM Knowledge	Gold Standard Knowledge	Technical Area	Participated in site visit?
Jonathan Avis	Lead Verifier	Yes	Yes	Yes	Yes
Sushmita Seelam	Support verifier	Yes	Yes	Partial	No

Technical Review	Role	CDM Knowledge	Gold Standard Knowledge	Technical Area	Participated in site visit?
Neringa Pumpputyte	Technical Reviewer	Yes	Yes	Yes	No

3.3.1. Verification Team Member Profiles

Jonathan Avis is CDM Business Manager for ERM CVS, and a GHG Assessor and Technical Reviewer with over 10 years of experience in the CDM, Gold Standard and VCS. Since joining ERM CVS Jonathan has worked as a Technical Reviewer or GHG Assessor on more than 50 CDM validations in Renewable Energy (scope 1), more than 10 CDM validations in Manufacturing Industries (scope 04), 10 CDM validations in Mining (scope 8), and 10 CDM validations in Waste Handling and Disposal (scope 13). Jonathan's previous work experience involved screening and due diligence of carbon projects, Project Design Document (POA-DD & CPA-DD) development, quality assurance and technical review of CDM and GS project documentation, the development of carbon monitoring plans, and management of carbon projects through the validation, registration and verification stages. Jonathan has completed the ERM CVS CDM training as well as the GHGMI Renewable Energy training and Gold Standard training. Jonathan holds a BA in Geography and an MSc in Environmental Change and Management from the University of Oxford.

Jonathan's Gold Standard experience includes the validation of the Paradigm Sub Saharan Africa Cook Stove Programme, a cooking stove PoA covering Rwanda and Ethiopia, the verification of the Paradigm Healthy Cookstoves and Water Treatment Project, a water purification and cooking stoves GS VER project in Kenya, technical review of the verification of the Sustainable Deployment of the LifeStraw Family in Kenya, a water purification project in rural areas in Kenya, the technical review of the validation of Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project in China, and technical review of the validation of the PoA 'Energy Efficiency Measures in Rural Bangladesh'.

Sushmita Seelam is a validator/verifier based in London and has been with ERM CVS for two years. Sushmita was the support assessor for the validation of the Impact Carbon Global Safe Water Programme of Activities in Uganda and Rwanda, and validation of the Impact Carbon Safe Water and Improved Cookstoves Global Programme of Activities which covers Uganda and Indonesia (which is a retroactive project and uses the TPDDTEC methodology). Prior to ERM CVS, Sushmita had been working in the sustainability consulting service industry for three years. As a CDM consultant, she has been involved in the development of over 25 CDM and VCS projects in various sectors. Her work also involves research and experience in supply chain evaluation, resource footprinting and life cycle assessment of commodities, with a focus on water and GHG footprinting for sectors such as global energy (especially oil & gas), agricultural commodities etc. Sushmita holds a B.E. in Environmental Engineering and an MSc in Environment and Sustainable Development. She has also completed the ERM CVS CDM validation and verification training and the CDM Gold Standard advanced training.

Neringa Pumpputyte is a lead assessor at ERM CVS, where she conducts validations and verifications of CDM and Gold Standard projects and Programmes of Activities (PoAs), and works on assurance projects. She has over 5 years of experience in climate change and GHG emission reductions, having worked as a consultant and project developer prior to joining ERM CVS. Neringa has successfully completed 7 validations of PoAs in the sectors of renewable energy, energy demand, and manufacturing; 5 Gold Standard verifications in the sector of energy demand; and worked on project validations in the sectors of landfill gas and fugitive emissions (oil and gas), as well as corporate GHG assurances. She has led development of the Gold Standard programme in ERM CVS. Before joining ERM CVS, Neringa worked on hydro, cook stove and animal waste handling projects as a project developer. Neringa has completed the ERM CVS CDM training, Gold Standard training, and GHGMI

renewable energy training. Neringa also has a BSc and MSc in Geography, and an MSc in Environmental Change and Management from the University of Oxford.

3.4. Verification activities

The verification approach is based on the approach depicted in the CDM VVS and Gold Standard rules, procedures and guidance where they are different from CDM. The verification activities are designed to evaluate:

- Whether sufficient evidence is available, both in terms of frequency (time period between evidence) and in covering the full monitoring period;
- The source and nature of the evidence (external or internal, oral or documented, etc);
- Cross-checks with comparable information available from sources other than that used in the monitoring report, where possible.

3.4.1. Desk review

A detailed desk review was undertaken prior to the site visit. This included the PDD and its carbon monitoring plan, the Gold Standard Passport and sustainability monitoring plan, the validation report, the applied monitoring methodology, relevant external data and reports, on-site documents, and relevant decisions, clarifications and guidance from the Gold Standard, and the CDM Executive Board where relevant.

The desk review included

- A review of the data and information presented to verify completeness and consistency in accordance with relevant Gold Standard requirements
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, quality of metering equipment (including calibration requirements) and the quality assurance and quality control (QA/QC) procedures
- An evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of emission reductions.

A complete list of all documents reviewed is contained in Annex 1.

3.4.2. Site Visit

A site visit to the project activity was undertaken to assess implementation and operation of the project activity and to review evidence, and interview key personnel to confirm evidence associated with the data generation, aggregation, calculation and reporting of the monitoring parameters.

The site visit addressed:

- An assessment of the project implementation and operation as per the PDD and the Gold Standard Passport (including visiting households where the project has been implemented);
- Review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan. A list of all interviewees is included in Annex 2.
- A cross-check between information provided in the monitoring report and data from other sources such as log books, reports of monitoring surveys, KPTs, Water Boiling Tests, Water Quality Tests, purchase records or similar data sources to establish the existence of a clear audit trail and records that validate or invalidate the stated data;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- A review of assessment made in determining sustainability indicators;
- Identification of quality control procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters

The site visit included the following:

- Meetings with project's implementation partners, key personnel involved in monitoring and data collection
- Visiting households where project's units are located and used, and interviews with the end users
- Visiting the project's central warehouse and the office of Socorro Maya in San Pedro Carchá – Altaverapaz and Ecofiltro in Ciudad Vieja - Sacatepequez.
- Reviewing electronic sales, monitoring databases and checking against a sample of paper sales receipts

The verification team aimed to visit a number of units that is square root of the number units surveyed by the PP. As the PP used several surveys for the same clusters, the verification team used monitoring and usage surveys as the guiding surveys for selecting a sample for the site visit. For each scenario the following were the interviews developed during the site visit

Project Scenarios	Location	End users interviewed
Household Water Treatment – Scenario 1 20 households	Escuintla	Maria Teresa Chacon Alma Lopez Karla Reyes Isabel Dubon Olga Marina Paz Carmela Coque Mejia Johanna de Castaneda Olga Beatriz Garcia Amanda Catalan Amelia Patricia Sazo Ofelia Salva Tierra Ana Maria Amado Amalis Gamez Lucia Morales Miriam Merida Elsa Salazar Ana Yoj
	Baja Verapaz	Irma Pap Dominga Che Mirna Lopez Sac
Improved Cookstove & Water Treatment, Dual Installation – Scenario 2 17 Households	Baja Verapaz	Estela Maria Moreno Cristina Bolvito Maria Canahui Josefa Gonzalez Maria Cutxum Julia Alcario Maria Jesus Rodriguez Angelica Alcario Olga Marina Santos Heidy Gomez Elsa Alcario
	Alta Verapaz	Yolanda Tun Rosalinda Chocooj Oscar Delgado Helena Cacao Mario Yaxcal

3.4.3. Reporting

After the site visit, a draft report is prepared with the preliminary findings of the verification. Where it is not possible to confirm compliance, the verification team raised findings as follows:

- Clarification Request (CL): where information is insufficient or not clear enough to determine whether the applicable requirements have been met.
- Corrective Action Request (CAR): This is issued where:
 - Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the

evidence provided to prove conformity is insufficient;

- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions;
- Issues identified in a Forward Action Request (FAR) during validation (or previous verification) to be verified have not been resolved by the project participants.

The verification process may be stopped until this information has been made available to the verifiers' satisfaction. Failure to address a CL may result in a CAR. Information or clarification provided as a result of a CL may also lead to a CAR.

Forward Action Requests (FAR) may also be raised for actions if the monitoring and reporting require attention and/or adjustment for the next verification period. These have no impact upon the completion of the current verification activity.

After satisfactory close out of CARs and CLs, the final report presents the verification activities undertaken; the issues raised, and explains how these issues have been closed out to enable the final verification conclusions to be made.

3.4.4. *Independent technical review*

The verification activities and content of the report are subject to a review by an independent technical reviewer. The role of the Technical Reviewer is to provide oversight that all procedures have been followed by the verification team and all conclusions justified and supported by evidence. The Technical Reviewer will either accept or reject the recommendations made by the verification team.

4. Verification Findings

4.1. Status of open issues from validation and previous verification

ERM CVS reviewed the validation report for this project and the Gold Standard reviews of the project registration. The FARs have been addressed as follows:

Forward Action Request	Date and document (Validation or verification)	Verification activities undertaken to close the FAR	Draft OK/ CAR/CL	Final OK/ Not OK
2nd verification, FAR 1 (raised by ERM CVS) During the next verification process the DOE shall review the implementation and full operation the measures proposed by PP. For the next verification the PP shall provide: 1. A register of CRWs from all NGOs/CBOs registered in the TSR and DCD/10/11/12/. PP shall demonstrate that the final users data registration shall be properly requested. 2. An evidence of training of Operation Manual operations to Ecofiltro's staff. 3. The cross-checking revision of a portion of filters sales no less than the 50% of totals sales. 4. The DOE shall visit a sample of rural schools to verify the Ecofiltro School programs.	2nd verification, final report, 28 September 2015	This FAR was raised due to some inconsistencies found during the site visit in terms of the records for sales and carbon rights waivers (CRWs) at EcoFiltro at the last verification. <u>1. Carbon Rights Waivers:</u> At this current verification, ERM CVS has considered the requirements set out in the methodology and the registered PDD concerning carbon rights waiver information, which are as follows: Methodology: 'The project proponents must clearly communicate to all project participants the entity that is claiming ownership rights of and selling the emission reductions resulting from the project activity. This must be communicated to the technology producers and the retailers of the improved technology or the renewable fuel in use in the project situation by contract or clear written assertions in the transaction paperwork. If the claimants are not the project technology end users, the end users should be notified that they cannot claim for emission reductions from the project'. Footnote 6 of the methodology goes on to say 'For example, leaflets distributed with the products alerting end-users to the waiving of their carbon rights in exchange for pricing of the approved technology which discounts its true cost (waiver forms signed by end users are another example). The PDD implemented these requirements as follows: 'Transfer of carbon rights will be explained at local consultations and end-user technology trainings. Stickers containing an explanation that the rights associated with the environmental benefits of the technology belong to Stove Capital LLC will be affixed to technologies. Wherever possible credit waiver agreements that stipulate the transfer of carbon rights from the end-user to Stove Capital LLC will be distributed and agreed upon at the point of distribution. Claimants rights will be explained and agreed upon with the technology producers and retailers of improved technologies through contracts or clear written assertions. Finally, given that the technology end-users are not the claimants they will also be notified through the waivers that they cannot claim for emission reductions from the project'. Validation of CRWs at this verification: For project scenario 1, ERM CVS has reviewed the carbon rights waiver information, which is actually printed on the site of all the EcoFiltro buckets themselves, hence is available to all users. ERM CVS	OK	OK

		confirmed that the wording around carbon rights is appropriate and in line with the PDD/methodology expectations. ERM CVS also confirmed through interviews on site that transfer of carbon rights was explained at local consultations and trainings, albeit in a manner that was understandable to local people (based on ERM CVS's site visit, most households are not familiar with the concept of carbon credits or even greenhouse gas emissions reductions and hence it is explained in terms of environmental benefits that help to support the project. For project scenario 2, Socorro Maya communicates the transfer of carbon rights both verbally at the point of sale, and in writing on each sales contract signed by all the end-users at the point of sale. ERM CVS checked a randomly selected sample of these during the site visit, and CRWs were found to be in place for all sales checked. Since Socorro Maya manufactures and distributes the stoves themselves, no other retailers or manufacturers are involved. ERM CVS also confirmed that carbon rights ownership has been communicated to the technology producers and the retailers of the improved technology (Socorro Maya and EcoFiltro) by reviewing the Emission reduction Purchase Agreement (ERPA) contract /03/. NGO/CBO partners of EcoFiltro who help distribute water filters are also asked to sign a carbon rights waiver, although historically not all have done so. Based on interviews with EcoFiltro staff on site, additional efforts have been made to communicate carbon rights to all of these partners by telephoning all of the NGOs/CBOs. <u>2. Training of EcoFiltro Staff:</u> In response to issues raised during the last verification on the fact that EcoFiltro were not always following all aspects of their Operations Manual in terms of monitoring (e.g. not always requesting CRWs from NGOs/CBOs), the PP committed to training EcoFiltro staff on the monitoring requirements in the Operating Manual and this was included as part of FAR 1 at the last verification. Employees have now been trained, and ERM CVS has validated the list of employees that were part of the training on the operations manual at Ecofiltro /11/. ERM CVS also confirmed, through interviews with EcoFiltro during the site visit, that the training had taken place and focused on the operations manual and correct monitoring processes. <u>3. Cross checking of EcoFiltro sales records</u> During the site visit ERM CVS interviewed Aurora Marisol de Leon, EcoFiltro's monitoring manager, and two monitoring staff from Paradigm, Eddy Melendez and Gabriel Jerez. ERM CVS confirmed that cross checks of the sales records are done by Marisol each time sales records are sent in by the sales agents, and that further completeness and consistency checks of the data are done by Paradigm on a sample basis. In order to test the effectiveness of the improved sales data collection and cross checking by EcoFiltro, the verification team cross checked a random selection of records against the original paper records held at the EcoFiltro offices, and all sales could be confirmed against the paper records.		
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		<u>4. Schools</u> Schools have not been credited during this monitoring period. ERM CVS visited one school to observe the filters being used and interview beneficiaries, even though the filters in schools have not been included in this issuance. FAR 1 can therefore be closed.		
2nd issuance, FAR 2 (raised by GS) During the next verification process, the DOE should check the hygiene program implemented by the PP and evaluate the effectiveness of program on the water quality. In particular, the DOE should confirm: 1. The development of the educational flyer to be distributed with all water filters outlining the health and safety benefits of: a. Washing hands before taking water from the spigot b. Keeping the spigot covered with a clean, plastic bag c. Avoiding the use of rags or other bacteria-forming materials as a cover or cleaning device for the spigot. 2. The distribution of ziplock-style bags with each filter. 3. The training program for the salespeople to educate users on the benefits of washing hands and using the provided bag to cover the spigot.	GS review, 2 nd verification, 2 September 2015	1. ERM CVS has checked the educational flyer be distributed with all water filters outlining the health and safety benefits of: a. Washing hands before taking water from the spigot b. Keeping the spigot covered with a clean, plastic bag c. Avoiding the use of rags or other bacteria-forming materials as a cover or cleaning device for the spigot. /16/ 2. ERM CVS observed during household visits the distribution of ziplock-style bags with each filter. 3. The program to educate users on the benefits of washing hands and using the provided bag to cover the spigot has been rolled out. An instruction leaflet is provided with every new filter explaining the benefits of hand washing and hygienic practices, and of using a bag to cover the spigot. The verification team interviewed a large number of end users during the site visit to confirm effective use of the filters and adoption of hygienic practices. Most end users were well aware of best practices, and newer households had also adopted the plastic bags to cover the spigots (taps) of the filters that have been introduced more recently. FAR 2 can therefore be closed.	OK	OK

4.2. Project Implementation in accordance with the PDD

ERM CVS evaluated the conformity of the project activity and its operation with the PDD. This assessment was undertaken on the basis of the site visit, review of documents and interviews with relevant personnel.

During the site visit, ERM CVS assessed whether all features of the project as described in the PDD are in place and that the PP has operated the project in accordance with operational criteria set out in the PDD.

The project covers distribution and sales of the cooking stoves and water purification devices. The volumes of sales are not projected in the PDD.

4.2.1. Overview of project design

The current monitoring period details the implementation of 2 project scenarios:

- Project Scenario 1 (hh-wt): Household Water Treatment - consisting of households using project water treatment technologies that displace the use of biomass for water purification.
- Project Scenario 2 (hh-dual): Household Improved Cookstoves + Water Treatment - consisting of dual implementation of project improved cookstoves and water treatment technologies that displace the use of biomass for water purification and allow for the efficient use of biomass for cooking.

The registered PDD includes an additional scenario (Project Scenario 3 (hh-ics): Household Improved Cookstoves – but this scenario does not apply for the current monitoring period as confirmed during the site visit and document revision/10/11/12/

EcoFiltro has also distributed a number of the household water filters to schools. Although the technology is the same and emission reductions could be calculated in a similar manner, the schools have not been credited during this monitoring period. ERM CVS visited one school to observe the filters being used and interview beneficiaries, even though the filters in schools have not been included in this issuance.

The project targets populations within Guatemala – primarily the rural and peri-urban domestic fuel wood users, the majority of whom use traditional unimproved stoves. It aims to improve the health and incomes of Guatemalans by reducing time and money spent acquiring fuel for cooking and by providing local populations with improved access to clean water. The project provides affordable improved cook stoves to replace inefficient traditional open fires (i.e. 'polloton') in rural and peri-urban areas. It also provides high quality, affordable water purification devices that increase access to safe drinking water and reduce the need for boiling water for drinking/sanitation.

The project is implemented by multiple partners:

- Stove Capital LLC is a company established for the purpose of financing the project and bringing local partners together to scale the project through carbon financing.
- CEMEX is an international cement manufacturing company with operations in Guatemala. CEMEX worked with local partner Socorro Maya, with international improved stove design expert - Peter Scott, and with Burn Design Lab to design the Eko-stove and has established local manufacturing operations for the Eko-stove.
- Ecofiltro S.A. is a Guatemalan business created to manufacture and market the locally designed Ecofiltro water purification devices. Ecofiltro is a company established on the belief that business practices and sustainable markets can more effectively address the lack of access to clean drinking water in Guatemala. It manufactures and distributes the Ecofiltro technology under Project Scenario 1.
- Socorro Maya is a non-profit Guatemalan organization with the goal of serving the humanitarian needs of the poor. It distributes the Eko-stove and Ecofiltro to Guatemalan communities and provides training and follow-up to ensure technologies are used correctly (i.e. Socorro Maya distributes all technologies under Project Scenario 2).
- The Paradigm Project is an international social enterprise specializing in the development of clean cook stove projects and in carbon finance for scale-up and development of sustainable supply chains. The Paradigm Project has partnered with Stove Capital LLC to finance the development of a carbon program in Guatemala and to facilitate processes for tracking and monitoring of the project.

A brief description of the project technologies has been presented below:

- Eko-Stove: As described above, the Eko-stove was designed by engineers at CEMEX with the support of local partner Socorro Maya, an improved stove design expert - Peter Scott, and the Burn Design Lab. The stove is a large metal 'plancha' stove made up of cinder blocks and concrete, as checked during the household inspections on site. The average thermal efficiency of the stove is 15.4% and the stove has a power output of 8.95 kW, with a lifetime of 10 years, as could be cross-checked with the Registered PDD/20/ and with the manufacturing specifications /35/. The stove is locally appropriate for Guatemalan cooking needs, providing beneficiaries ample space to cook daily food, local foods and large meals. Socorro Maya is the local Project partner responsible for the sales and installations of Eko-stoves.
- Ecofiltro Water Filter: The Ecofiltro is manufactured locally by Ecofiltro S.A. This water filter purifies water by a gravity fed porous ceramic filtration element. The ceramic element has a pore size of 0.6 to 0.3 microns and is lined with colloidal silver which helps to remove impurities and disinfect the filtered water. The filter has a flow rate of 1-2 liters per hour and a maximum capacity of 20 liters and has a lifespan of at least 2 years, as could be checked against the manufacturing specifications/35/. Ecofiltro S.A is the local Project partner responsible for the sales and installations of Ecofiltro water filters.

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
What is the Implementation and operation status of the project? Are all physical features of the project activity in place as per	Review of the monitoring report and registered PDD Review of project sales records (TSR) and Detailed Customer	During the site visit, ERM CVS confirmed that the project activity implementation for the monitoring period consists of installation of Ecofilters distributed by Ecofiltro S.A through CBOs/NGO or local distributors in Guatemala (Project Scenario 1), and stoves and filters distributed by Socorro Maya (Project Scenario 2). ERM CVS confirmed that the same type of Eko-Stove and model of Ceramic Water Filter are being disseminated during this monitoring period as described in the registered PDD and in the previous	OK	OK

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
the PDD?	Databases (DCD) Interviews with The Paradigm Project and Project Partners during the site visit listed in A.2. Visits to a sample of households for project scenario 1 and 2	verifications.		
Does the monitoring report correctly state the implementation and operational status of the project activity?	Review of the monitoring report and the registered PDD. Interviews with Paradigm and its partners Review of project sales records (TSR) and Detailed Customer Databases (DCD). Interviews with The Paradigm Project, Ecofiltro and Maya Relief during the site visit listed in A.2. Visits to a sample of households	The MR is fully consistent with the PDD/1/ and includes a clear description of the monitoring campaign and surveys and all physical features of the project activity, as confirmed during the site inspection.	OK	OK
Have provisions been implemented for the transfer of carbon rights to the project developer?	Review of the monitoring report and the registered PDD. Interviews with Paradigm and its partners Review of project sales records (TSR) and Detailed Customer Databases (DCD). Interviews with The Paradigm Project staff and project partners during the site visit listed in A.2. Visits to a sample of households	ERM CVS has confirmed that provisions been implemented for the transfer of carbon rights to the project developer – please see the conclusion to FAR 1 above.	OK	OK

Conclusion

Based on the verifier's site visit, it can be confirmed that all physical features of the project activity have been implemented in accordance with the PDD and the Gold Standard Passport. No specific monitoring equipment had to be installed according to the monitoring plan /5/. ERM CVS confirmed, through the visual inspection that all physical features of the Gold Standard project activity have been implemented in accordance with the PDD. Only one type of stove and one type of ceramic water filter were disseminated during this monitoring period.

The project activity was also confirmed to be fully operational in accordance with the PDD.

4.3. Compliance of the monitoring plan with the monitoring methodology

As per VVS section 11.4.3, ERM CVS evaluated whether the monitoring plan complies with the requirements of the applied methodology.

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring plan in compliance with the applied methodology?	Check of the revised monitoring plan in the PDD against the applied methodology	The application of the monitoring methodology was found to be appropriate and ERM CVS confirms that the monitoring plan is consistent with the requirements of the Gold Standard Methodology "Technologies and practices to displace decentralized thermal energy consumption (version 1 - 11 April 2011).	OK	OK

Conclusion

ERM CVS confirms that the registered monitoring plan is in accordance with the methodology applied for the project activity.

4.4. Compliance of monitoring with the monitoring plan

4.4.1. Overview of monitoring system

As of this monitoring period, The Paradigm Project has implemented a new 'continuous monitoring' process to monitor continuously throughout the year rather than in a concentrated period of weeks each year. Paradigm received clarification from Gold Standard that this is in line with the methodology (email dated 2/11/15 and subsequently in a face to face meeting between Vikash Talyan and Neil Bellefeuille on Friday, June 5th in Minneapolis, Minnesota). Continuous Monitoring aims to capture data that is more representative of actual usage patterns over the course of the monitoring period, reducing reliance on the ability of participants to recall practices that may have happened months ago and improving how seasonal variations can be captured. For this monitoring period, Paradigm had a team of two full time monitoring staff, who conducted the surveys and tests such as KPTs and WCFTs over the course of several months.

During this monitoring period, continuous monitoring was conducted for a period of six months (the time between approval of the continuous monitoring concept and the end of the monitoring period did not allow for a full year of continuous monitoring), led by two full time Paradigm staff in Guatemala. Hence surveys and tests were mainly conducted during the winter (dry) season during this monitoring period because the continuous monitoring concept was not approved until after the start of the monitoring period and thereafter it took time to mobilise a continuous monitoring team.

Paradigm monitoring employees were hired specifically for the task of conducting monitoring and for cross-training other field staff within the organization to conduct monitoring as part of their overall role. The staff were trained to conduct usage surveys and KPTs. Randomized selection of households for surveys and KPTs was done and data was collected in real time via smart phones, allowing for monthly review to address any operating issues. Based on interviews on site with the monitoring personnel and comparison with previous monitoring periods, the hiring of permanent monitoring staff has improved the speed and efficiency with which the PP was able to carry out monitoring.

The monitoring system, as set out in the registered PDD, includes the monitoring of the following aspects:

Sales and customer data:

Scenario 1 (filters only): The Total Sales Record (TSR) for filters was recorded from sales invoices from bulk sales. Due to Ecofiltro's distribution model of distributing filters in batches to NGOs/CBOs and communities, and the difficulties of collecting sales information at the end-user level, the PP elected to track bulk sales as per the methodology. The TSR includes distributors (or end-users' if sold directly) names, number of technology units in the batch, date of sale, and contact information when

available. The technology model was not included as all filter technologies distributed were of the same model. The Detailed Customer Database (DCD) for project scenario 1 is compiled from registrations completed by resale partners and includes individual product serial numbers, end-user information and specific dates of delivery/sale to end users. Not all of the partners are successful at obtaining the detailed customer data, but as stipulated by the methodology, detailed data has been obtained for more than ten times the minimum sample size for monitoring surveys and field tests. Based on the site visit discussions with EcoFiltro, ERM CVS does not consider there to be a significant risk that the customer base of the poorly reporting partner organisations is significantly different to the ones that did report detailed customer data, as all organisations are operating in similar areas and with the same target population.

In order to ensure filters are only credited from the date they are actually delivered to end users, EcoFiltro tracks the date of Delivery Notes (available for all bulk sales), which correspond to sales invoices and indicate the date the filters were delivered to end users. Individual registrations in the DCD and Delivery Notes are used to conduct a lag analysis by Paradigm to determine the time differential between the date of sale and the receipt of the filters by end users.

The filters distributed in scenario 2 are also manufactured by EcoFiltro, but all sales of filters by EcoFiltro to Socorro Maya are recorded in the TSR, but removed from crediting under Project Scenario 1 as these filters are credited under Project Scenario 2.

EcoFiltro communicates carbon rights via a CRW printed clearly on the side of the bucket of the filter itself.

Scenario 2 (stoves and filters): The TSR is collected from sales invoices, and includes each individual unit sold. The database includes the date of installation, end-user's name and contact information (when possible), serial number, and the geographic location (community and department). Since all stoves/filters distributed were of the same model, the model was not recorded. An integral part of Socorro Maya's sales and customer care process is the filling out a registration form that serves to collect end user contact information. These records are also used for Socorro Maya's internal follow-up processes for warranties and servicing. Because Socorro Maya distributes the technologies directly (indeed, they build the stoves inside the households), they are able to get detailed data for all end users. Hence, for project scenario 2, the TSR = the DCD. The stove TSR/DCD is used for customer follow-up and sampling for project monitoring. All sales data for Socorro Maya is currently collected in paper form then entered manually into the excel database (although the project plans to transition to an electronic data collection system for the next monitoring period).

Socorro Maya communicates the transfer of carbon rights and the need to dismantle traditional stoves on each sales contract signed by the end-users. A component of warranty registration informs the consumer that enrolling in the warranty program also waives rights to carbon credits associated with the use of the devices. Warranties are invalid if the end-user continues to use their baseline stove.

Surveys and tests:

Usage surveys: Usage surveys are designed to estimate the percentage of project technologies still in use within the sales population, i.e. to account for drop off rates as project technologies age and are replaced. The usage survey provides a single usage parameter that is weighted based on drop off rates that are representative of the distribution of stove vintages in the total sales record. All usage surveys are done by means of visual inspection/face-to-face assessments.

Monitoring surveys: The monitoring surveys are used to investigate changes over time in a project scenario, providing information on year-to-year trends in end user characteristics such as technology use, fuel consumption and seasonal variations. For Project Surveys (PS) and Water Quality (WQ), the sampling frame is drawn from the Project Database as defined by sales date, appliance type, serial number, and end-user information. The sampling frame for the Leakage Assessment (LA) is determined according to leakage type.

Baseline and project performance field tests: The baseline and project performance field tests (BFT and PFT) measure real, observed technology performance in the field.

Baseline Water Boiling Tests (BWBT): these are conducted for water treatment project scenarios to measure the performance of baseline stoves used for boiling water. The test results are used to determine the quantity of fuel required to purify by boiling one litre of water for 10 minutes using technologies and fuels representative of the baseline scenario. Baseline water boiling tests only need to be updated if the monitoring surveys show that water boiling technologies change over time.

Water Quality Tests: The water quality tests (WQT) were conducted to ensure that the water filters disseminated during the operation of project activity are treating water effectively. Water quality testing was conducted by sending samples taken in the field to third party laboratories. The tests were undertaken by Biomed and Contro-Lab, independent laboratories in Guatemala, based on the number of e-coli present in 100ml of water, following the Standard Methods (SM) for the Examination of Water and Wastewater by the American Public Health Association (APHA) /17/. As per Guatemalan and World Health Organization Standards, and as consistent with the methodology and PDD, any filter samples exceeding 1 CFU of Ecoli per 100 ml were considered to have failed the test.

Kitchen Performance Tests (KPTs) and Water Consumption Field Tests (WCFTs): KPTs and WCFTs are

undertaken biennially by trained Paradigm monitoring staff. KPTs and WCFTs require 4 days in a single location to complete the tests. Where possible, US, MS, KPTs, WCFTs and WQTs were conducted in tandem on the same households for consistency and validation of data. Where the questions in the KPT or WCFT overlapped with the MS/US, they were not repeated because the PP used the more comprehensive MS/US survey questions.

The KPT is a subsumed KPT and measures wood consumed from all stoves present and in use in the home during the test period. Enumerators measured the quantity of fuel consumed in kilograms (kg) and determined the average fuel consumption per day. Equipment used for the KPTs (i.e. scales, moisture meters) is checked annually for accuracy and calibrated as needed.

WCFTs are designed to assess filtered water consumption for hygienic purposes (Qp,y), continued boiling of filtered water (Qp, cleanboil) and baseline treatment methods. WCFTs were carried out in line with good practice and hygienic purposes were defined correctly. Households were asked to quantify the number of people using treated water over the previous 24 hours and to list the various uses for treated water. Each respondent was then asked pour the amount of water utilized over the previous 24 hours for drinking, washing hands and washing fruits and vegetables (hygienic purposes) into a measuring container to ascertain the amount of treated water used for hygienic purposes, and the same was done for the amount of treated water used for other (non-hygeinic) purposes. The enumerators could then measure the quantity of water. WCFTs were carried out between November 2015 and April 2016, mainly during the winter (dry) season (19 respondents, when asked, reported that it was currently the wet season, and 120 responded that it was currently the dry season). However this is considered likely to have a conservative impact since households are likely to consume more water during the rainy season when it is plentiful, and conserve water (use it more sparingly) in the dry season. Only 2 of 139 households said that the number of people using the water filter changed from the wet to dry seasons.

NRB fraction: The non-renewable biomass fraction is fixed based on the results of the NRB assessment. Over the course of a project activity the PP may at any time choose to re-examine renewability by conducting a new NRB assessment. In case of a renewal of the crediting period the NRB fraction will be reassessed as any other baseline parameters and updated in line with most recent data available. The NRB fraction was not reassessed during this monitoring period.

Leakage: this is assessed biennially based on an assessment of each of the leakage sources identified by the methodology. An assessment of leakage was carried out for this monitoring period.

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Was the Total Sales Record collected accurately and in accordance with the methodology and registered monitoring plan?	Review of the Total Sales Records & Detailed Customer Databases spreadsheets Review of sales invoices records for each project scenario Interviews with Paradigm and project Partners such as Socorro Maya and Ecofiltro S.A. Interviews with NGO's partners Review of the Operation Manuals for Ecofiltro and Socorro Maya	<u>Scenario 1:</u> the verification team reviewed the database and cross checked a sample of records against original paper records on site, as well as interviewed the monitoring manager of Ecofiltro. All sales records that were checked were backed up by paper records and hence could be confirmed. Minor inconsistencies in the date of sale were identified in several cases. This had no impact on the conservativeness of emission reductions since the date of sale in the electronic database (ER calculation spreadsheet) used for crediting was in all cases later than the date of sale on the paper records by between 2 and 5 days (hence conservative). Nevertheless these inconsistencies highlighted a need for further QA/QC of the database and more rigorous management of data entry going forward. CAR 1 (a) was raised. The project proponents have proposed additional steps to improve the QA/QC of sales data collection and recording. CAR 1 was closed. Please see the remediation form (section 5) below for details. <u>Scenario 2:</u> The verification team reviewed the database and cross checked a sample of records against original paper records on site, as well as interviewed the monitoring/accounting manager of Socorro Maya. All sales records that were checked were backed up by paper records and hence could be confirmed. However serial numbers were missing in the electronic database for some records. The explanation of this was that some sales were entered as soon as they were made but	CAR 1	OK

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
		before the paperwork had actually been sent back to the Socorro Maya offices. The monitoring manager was meant to go back later and add the serial numbers in once the paperwork had been received, but either did not do so, or did not receive the correct paperwork for all entries. Please see CAR 1 (b). The project proponents have proposed additional steps to improve the QA/QC of sales data collection and recording. CAR 1 was closed. Please see the remediation form (section 5) below for details. In addition, the date of sale in the electronic database (ER calculation spreadsheet) did not match the paper records in several cases. In all but one case the impact on emission reductions was conservative, nevertheless these inconsistencies highlighted a need for further QA/QC of the database and more rigorous management of data entry going forward. As reported by the monitoring manager, some data cleaning has already taken place, however no evidence trail for this exists in the database – if data cleaning or changes are made these should all be recorded/tracked in future – QA/QC routines require further improvement. Please see CAR 1 (b).		
Was detailed customer data collected appropriately and is it representative of the sales record?	Review of the Total Sales Records & Detailed Customer Databases spreadsheets Review of sales invoices/records for each project scenario Interviews with Paradigm and project Partners such as Socorro Maya and Ecofiltro S.A.	Scenario 1: the verification team reviewed the database and cross checked a sample of detailed customer records against original paper records, as well as interviewed the monitoring manager of EcoFiltro. All records that were checked were backed up by paper records and hence could be confirmed. As noted above, not all of the partners are successful at obtaining detailed customer data, but as stipulated by the methodology, detailed data has been obtained for more than ten times the minimum sample size for monitoring surveys and field tests. Based on the site visit discussions with EcoFiltro, ERM CVS does not consider there to be a significant risk that the customer base of the poorly reporting partner organisations is significantly different to the ones that did report detailed customer data, as all organisations are operating in similar areas and with the same target population. Therefore the DCD is considered representative. Scenario 2: The database for Improved Cookstove & Water Treatment sales through Socorro Maya is appropriate and fully traceable. Since detailed customer data is collected for all sales under scenario 2, the TSR=DCD. The verification team reviewed the database and cross checked a sample of records against original paper records on site, as well as interviewed the monitoring/accounting manager of Socorro Maya. All detailed sales records that were checked were backed up by paper records and hence could be confirmed. However there were some inconsistencies in the dates, and some records lacked serial numbers. Please see reference to CAR 1 (b) above. The project proponents have proposed additional steps to improve the QA/QC of sales data collection and recording. CAR 1 was closed. Please see the remediation form (section 5) below for details.	CAR 1	OK
Were surveys implemented and data	Review of monitoring and usage survey	During the site visit, ERM CVS confirmed that the Water Quality, KPT, BWBTs, Usage Surveys, and Monitoring Surveys have been conducted in line with the monitoring plan.	FAR 1	OK

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
collected in a way that minimises errors and bias and ensures conservative estimate of emission reductions?	results and reports, cross checks against filled in paper questionnaires Interviews with the staff of The Paradigm project, implementing partners, and CO2 Management enumerators	The Verification team visited a sample of households where the above surveys and tests have been done and confirmed by interviewing the users that Paradigm's monitoring staff conducted the activities described in the survey and test reports in their kitchens, asked questions and took physical measurements before, during and after activities. <u>Sampling method:</u> The PP used a simple random sampling approach for all monitoring conducted during this monitoring period. All of the records in the DCD were assigned a random number and then sorted numerically which has the effect of randomizing the data. The first 1,000 entries from the randomised list were then selected, sorted by date of sale and reviewed to confirm that it includes at least 60 registrations (double the required number) for each age of the applicable technology. More random households were selected from the Sampling Database until the sample selection includes at least 60 of each age of the monitored technology. The PP then sorted the results by Community, randomly clustering households by location to allow for monitoring multiple households simultaneously as KPTs and WCFTs require 4 days in a single location to complete the tests. Communities were visited and the randomly selected households within them surveyed, until sufficient households had been surveyed overall. The M&E Team travelled to a location and stayed for 4 consecutive days allowing for KPT and WCFT tests to be completed, as well as the monitoring surveys / usage surveys (MS/US). The sampling method of clustering the simple random sample by community was considered appropriate given the dispersed nature of communities across Guatemala and the difficulty of reaching households if they are selected in a totally random order (not sorting and clustering by community). <u>Sample size and sampling frame:</u> Since there are more than 1000 technologies in the field the PP thus elected to monitor at the highest minimum sample size requirements outlined by the methodology. The usage survey contained at least 30 samples of each technology age. For water quality tests, the 90/10 confidence/precision rule was followed to determine sample size. For KPTs and WCFTs a minimum sample size of 30 was applied. The actual sample size exceeded the minimum, even after removing outliers. For stoves, the Total Sales Record was used as the sampling frame and stoves younger than 6 months at the time of monitoring were excluded from consideration. For filters, the Detailed Customer Database was used as the sampling frame and filters younger than 6 months and older than 24 months at the time of monitoring were excluded from consideration. ERM CVS confirmed that PP clarified in the Monitoring Report/5/ the sample frame, sample size calculation, and sample selection. Survey/test results from the previous		

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
		Issuance were used to inform the expected mean and variance for calculating the sample sizes for this monitoring period. The use of means and standard deviation from the previous issuance is acceptable because the areas and households have the same characteristics as under the previous issuance. The sample frames were confirmed to be appropriate. Further details can be found below. WCFTs & KPTs: ERM CVS interviewed the monitoring staff from Paradigm to confirm whether tests had been carried out appropriately. The Paradigm monitoring staff (Eddie and Gabriel) were previously employed by CO2 management, and conducted the tests in previous years. They are therefore confirmed to be fully trained and experienced on conducting these tests. ERM CVS interviews with end users confirmed that the main benefits of the Eko-stoves are the significant portion of wood savings (i.e. more than 70% of previous practice). Six outliers were removed from the KPT results. One outlier was removed from the analysis for WCFTs. ERM CVS confirmed that the PP removed outliers if the respondent was an institutional or commercial user, or if one or more of the following occurred: - Households refused to participate in the survey or were not able to provide access or responses for one or more days in a multi-day test. - Survey was incomplete/missing data for a significant number of questions. - Information was inconsistent or did not make sense (negative data values, for example). - Data value(s) was outside of two standard deviations above or below the mean. Cookstoves & Water filters US/MS Survey: ERM CVS conducted household visits to a subset of end users that were surveyed by Paradigm. ERM CVS confirmed that US and MS were appropriately conducted by Paradigm. A total of 118 US&MS for Project Scenario 1 and 144 US&MS for Project Scenario 2 (5 of which were removed as outliers) were developed. Thus meeting the sample size requirements. The surveys were carried out by the Paradigm monitoring staff, the same people who carried the previous survey, who have been trained and are experienced in conducting the surveys for this project. The results registered in the data base /06/ are consistent with the information checked by the DOE in the site inspections. The verification used the same survey as carried out by Paradigm, but also asked different questions related to the level of satisfaction, demographic issues, maintenance process, seasonal cooking differences and daily cooking practices in order to ensure that end users had a good understanding of the project's survey questions and check for any potential survey bias in the way questions are asked. The differences between data collected in the site inspection with the data records were minimal, therefore the survey results are fully consistent with the context of the project activity and ERM CVS's observations.		

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
		<u>Survey design and survey questions:</u> The survey design was based on the survey that was carried out in the previous two monitoring periods, with modifications to some questions based on the findings of the previous verifications and learning from experience on the monitoring staff. The usage survey questions for water technologies were cross checked against the Gold Standard “Guidelines for carrying out usage survey for projects implementing household water filtration technologies” and broadly align with the guidelines. The introductory questions were slightly different from the GS guidelines partly because the water questions were asked at the end of the survey, after the stove related questions. Instead of asking if the respondent does anything to treat their water, the surveyor instead asks to be served a glass of water, and then observes whether the water was obtained from the filter or not. This is considered more empirical than relying on self-reported behavior, and is reasonable given that the survey takes place inside the kitchen and hence it can be observed whether a filter is in place or not. The survey also does not specifically ask if the person being interviewed is the primary user of the water treatment unit, although the survey does ask if they are the main cook, which is likely to be the same person. The survey does ask surveyors to observe to see if the filter shows signs of usage, includes demonstration of usage, and functionality. During the site visit, whilst observing the monitoring team carrying out usage and monitoring surveys, ERM CVS observed some questions being asked in a slightly non-neutral manner. Whilst it is unlikely, in the opinion of the verifier, that this would have actually influenced the results of the surveys observed (which were in any case used for the DOE's cross check and where not the source of the results used for crediting), nevertheless it is important that surveyors ask questions in as neutral and unbiased way as possible, whilst still ensuring that the respondent understands the question. For example, more than one user was asked if they use the filter ‘every day’ (rather than simply asking them how often they use the filter). Another user was asked ‘do you use wood to cook’ (rather than ‘what fuel do you use to cook’). Please see FAR 1 Water Quality: During the site visit, ERM CVS confirmed that Paradigm monitoring staff collected samples of water from end users to be conducted to the lab for quality testing. The results were provided and explained and ERM CVS has reviewed the 3rd party lab test reports /17/.		

4.4.2. Completeness of monitoring parameters

The verification team evaluated the monitoring of each parameter stated in the monitoring plan. The parameters included in the monitoring plan are listed below and a full description of each parameter and the verification activities associated with monitoring of each one is included in Section 4.4.3.

Monitored parameter in monitoring plan

Parameter	Description	Included in the Monitoring Report?	Draft OK/ CAR/CL	Final OK/ Not OK
Data and parameters to be monitored for the crediting of households improved cookstove over the crediting period (Project Scenario 2):				
Np,y,ics-nb	Cumulative number of project technology-days included in the project database for Project Scenario 2 for technology against baseline scenario in year y	Yes. ERM CVS confirmed that all parameters in the monitoring report /5/, ER calculation /1/ and PDD /2/ are consistent and traceable.	OK	OK
P, p,b,y,ics-nb	Specific fuel savings for an individual technology of Project Scenario 2 against an individual technology of baseline scenario in year y, in tons/technology-day, as derived from the statistical analysis of the data collected from the field tests			
Up,y,ics-nb	Cumulative usage rate in Project Scenario 2, for technology improved cookstove, during year y			
f NRB,y,ics-nb	Fraction of biomass used in year y as non-renewable of woody biomass fuel in scenario 2			
LEp,y,	Leakage in Project Scenario 2 during year y			
Data and parameters to be monitored for the crediting of water treatment technologies (Scenario 1 & 2) over the crediting period:				
Np,y,wt	Number of persons-days of water consumed by project scenario 1 and 2 through year y	Yes. ERM CVS confirmed that all parameters in the monitoring report /5/, ER calculations /1/ and PDD /2/ are consistent and traceable.	OK	OK
Up,y,wt	Cumulative usage rate in project scenario 1 and 2, for technology water filters during year y, based on cumulative installation rate and drop off rate.			
Qp,y	Quantity of raw water treated with water treatment technology and used for hygienic purposes in the project scenario 1 and 2, during year y, capped at 6 L/p/d			
Qp,cleanboil,y	Quantity of treated water still boiled in the project scenario 1 and 2, after installation of project technology			
Quality of the treated water	Performance of the treatment technology			

4.4.3. Data and parameters monitored

The verification findings for the monitoring of each parameter are set out below

Data / Parameter:	Np,y,ics-nb	
Data unit:	technology-days	
Description:	Cumulative number of days of technology use for project scenario p against baseline scenario b, in year y	
Measured/calculated/	Calculated	

default			
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	ERM CVS confirmed during the site visit and document cross-checking that the parameter is recorded according to the monitoring plan and the QA/QC procedures. The parameter is calculated based on the sales data recorded in the Socorro Maya TSR data base and EcoFiltro database (applying the time lag) (as contained in the ER calculation spreadsheet) /03/. Sales from the start of the project to the end of this monitoring period recorded in the TSR are used. The operational time does not include the day of installation. Inventory lag time is calculated for scenario 1 (filters only), since for this scenario the technologies are sold through NGOs/retailers rather than directly to end users as under scenario 2. ERM CVS conducted cross checks on the sales data as described above. The Verifier selected randomly a considerable number of sales records to check their consistency with the TSR data /03/, and CAR 1 was raised. The project proponents have proposed additional steps to improve the QA/QC of sales data collection and recording. CAR 1 was closed. Please see the remediation form (section 5) below for details. The Verifier confirms that the spreadsheet does not include technology-days corresponding to the previous monitoring period through reliable calculation of number of days since the stove installation.	CAR 1	OK
Conclusion	ERM CVS confirmed that - The parameter has been calculated appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	P,p,b,y,ics-nb		
Data unit:	tons/technology-day		
Description:	Specific fuel savings for an individual technology in the Project Scenario against an individual technology in baseline scenario in year y		
Measured/calculated/default	Measured / Calculated (from the statistical analysis of the data collected from the field tests)		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and	P_{p,b,y,ics-nb} is the difference in the specific fuel consumption for an individual technology in baseline scenario b (P_{b,y, ics-nb}) and the specific fuel consumption for an individual technology in project scenario p (P_{p,y, ics-nb}). The Verifier confirmed that the value of the parameter is the result of the combination of fuel wood saved per meal identified based on KPT tests /06/ and the total number of meals per day per stove unit installed in the project scenario determined from the US&MS/06/. The calculation is reliable and consistent with the values checked during the site visit and the results of the	OK	OK

data relating to the monitoring of parameters during the monitoring period?	KPTs reviewed by ERM CVS /06/.		
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	Up,y,ics-nb		
Data unit:	Percentage		
Description:	Cumulative, weighted usage rate in project scenario, for technology during year y		
Measured/calculated/default	Calculated (based on usage survey)		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied?	ERM CVS confirmed that the parameter is determined according to the monitoring plan and the QA/QC procedures.	OK	OK
Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	According to the site inspection, ERM CVS confirmed that the PP conducted combined MS / US surveys on the same samples in the project activity target population. Sampling methodology & sample size: the total sample size for usage surveys was 118 for scenario 1 and 144 for scenario 2. The number of monitoring surveys was the same, because all households in the usage survey were found to be using the stoves. For stoves, devices younger than 6 months at the time of monitoring were excluded from consideration. At least 30 devices of each age bracket were surveyed /06/. The cumulative usage rate was appropriately weighted according to installation ages. During the site visit it was also possible to confirm that the target population in different departments where the technology installed is homogeneous. There are no significant differences in terms of cooking practices, domestic customs or wood consumption behavior within the same regions and communities. <u>Cross check of survey results:</u> ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys. In terms of <u>QA/QC procedures</u>, ERM CVS checked that Paradigm oversee intervention to minimize sampling errors and internally check the consistency of data. All surveys were conducted by Paradigm full time monitoring staff and Paradigm cleaned the data to ensure consistency. These procedures could be checked by the verification team during the site visit, document review and interviews with the persons responsible for monitoring. In summary, ERM CVS considered that the sampling process applied are consistent with CDM sampling and GS rules, and is reliable and consistent with the operating manuals /11/15/.		

Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.
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Data / Parameter:	LEp,y,ics-nb		
Data unit:	tCO2e/year		
Description:	Leakage in Project Scenario for technology in year y		
Measured/calculated/default	Calculated / Measured		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	ERM CVS confirmed that the leakage assessment was included in the MR. Leakage for cookstoves has been validated as follows: LEAKAGE SOURCE 1: The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project. It is considered reasonable that this is assessed as zero for the following reasons: - Households in both scenarios predominantly use three-stone fires in the baseline. This technology is unlikely to be transferred to other households as it consists of three rocks which can be obtained anywhere and has no monetary value LEAKAGE SOURCE 2: The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources. It is considered reasonable that this is assessed as zero for the following reasons: - The project does not involve a switch from higher emitting to lower emitting fuels, hence is unlikely to lead to a displacement of such use outside the boundary - Wood fuel remains a valuable and declining resource in Guatemala - On the basis of the observations during the site visit, ERM CVS considers it unlikely that the project will have an impact of sufficient scale on aspects like wood prices to influence areas outside the project boundary LEAKAGE SOURCE 3: The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario. It is considered reasonable that this is assessed as zero for the following reasons: - The Project Proponent has determined that total number of people reached by all activities of GS1321 is less than 1.4% of the total Guatemalan population, and thus its effects on the national NRB value is likely to be negligible - Even with all gold standard projects in Guatemala, the impact of improved stoves on NRB consumption is likely to be offset by ongoing population growth in Guatemala /18/	OK	OK

	- The project will reassess the NRB fraction at the next renewal of crediting period anyway, and if new information is available, the NRB fraction can be updated at any monitoring period. LEAKAGE SOURCE 4: The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology. It is considered reasonable that this is assessed as zero for the following reasons: - MS/US monitoring determined that more than 80% of stove users use the EkoEstufa to heat their home. However, the overwhelming majority of these households indicated that they achieve heating by letting the fire from cooking die out (i.e. they do not specifically light a fire in the stove for this purpose) /03/ - During the household visits by ERM CVS, the verification were able to confirm that almost all households who reported using the stove for heating did so by letting the fire from cooking die out. Furthermore, none of the households visited had retained their old technology, and ERM CVS also did not observe any household that had adopted another technology to heat the home. - ERM CVS also considered the possibility of seasonal effects. The KPTs for this monitoring period were done during the winter (dry) season, hence stove use for heating could be properly accounted for during the surveys (heating is unlikely to be needed during the hotter summer (wet) season in Guatemala. LEAKAGE SOURCE 5: By virtue of promotion and marketing of a new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline. It is considered reasonable that this is assessed as zero for the following reasons: - MS/US monitoring shows that a small percentage (<5%) of users have switched from using fuels and technologies considered higher efficiency in the baseline to only using firewood after receiving the EkoEstufa /03/.		
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	Np,y,wt		
Data unit:	Person-days		
Description:	Cumulative number of person-days of water consumed in project scenario p through year y.		
Measured/calculated/default	Calculated (from Monitoring Survey) [Person-days = sum of ((recorded sale date of each technology – closing date of the monitoring period – lag adjustment factor), in days * number of persons utilizing the filter per HH).		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan	From the review of the water filter Monitoring Survey data /06/ and project database /03/, ERM CVS confirmed that the water filter databases record the date of water filter supply for bulk water suppliers. The average time lag from	OK	OK

and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	the bulk sales to the day that filters reach the end users was estimated using inventory analysis. The Verifier checked that the time lag for bulk sales in the database is consistent and credible. For filters, devices younger than 6 months and older than 24 months at the time of monitoring were excluded from consideration. The number of people using the water filter was measured through the monitoring survey. <u>Cross check of survey results:</u> ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys. In terms of <u>QA/QC procedures</u>, ERM CVS checked that Paradigm oversee intervention to minimize sampling errors and internally check the consistency of data. All surveys were conducted by Paradigm full time monitoring staff and Paradigm cleaned the data to ensure consistency. These procedures could be checked by the Verification team during the site visit, document review and interviews with the persons responsible for monitoring. In summary, ERM CVS considered that the sampling process applied are consistent with CDM sampling and GS rules, and is reliable and consistent with the Operation manuals /11/15/.		
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	Up,y,wt		
Data unit:	Percentage		
Description:	Cumulative, weighted usage rate in project scenario, for technology during year y		
Measured/calculated/default	Measured based on usage survey		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring	Household Water treatment Monitoring Survey (MS)/Usage Survey (US): According to the site inspections in Alta Verapaz, Baja Verapaz, San Marcos and Quetzaltenango areas, ERM CVS confirmed that Water Filter US and MS were conducted in the project activity target population for the two scenarios by Paradigm. According to the US/MS data set /06/, the team found that the sampling and monitoring procedure was done in accordance with the monitoring plan and methodology and the results are in line with the findings of the site inspections. ERM CVS is able to confirm that the assumptions and method applied for the sampling frame and sample size is consistent with the methodology and the monitoring requirements. The PP has justified the	OK	OK

period?	sampling frame and sample size definition. Please see section 4.4.1 for further details on how the sampling and surveys were validated. The usage rate for filters was further discounted to take into account the results of the water quality test (please see verification of water quality parameter below). <u>Cross check of survey results:</u> ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys. In terms of <u>QA/QC procedures</u>, ERM CVS checked that Paradigm oversee intervention to minimise sampling errors and internally check the consistency of data. All surveys were conducted by Paradigm full time monitoring staff and Paradigm cleaned the data to ensure consistency. These procedures were checked by the Verification team during the site visit, document review and interviews with the persons responsible for monitoring. In summary, ERM CVS considered that the sampling and monitoring process applied is consistent with the CDM sampling and GS rules, and is reliable and consistent with the operation manuals /11/15/.		
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	Qp,y		
Data unit:	Litres per person per day (L/p/d)		
Description:	Quantity of raw water treated with water treatment technology and used for hygienic purposes in the project scenario 1 and 2, during year y, capped at 6 L/p/d		
Measured/calculated/default	Measured		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied?	The parameter is based on data from the WCFTs. Qp,y is calculated from the average hygienic water consumption per day per hh — average non- hygienic water consumption per day per hh / average persons consuming treated water per day per hh Based on the site inspections, ERM CVS confirmed that WCFTs were conducted in the project activity target population for the two scenarios by Paradigm. Please refer to section 4.4.1 above for further details of how the WCFTs and MS/US were verified. ERM CVS found that the sampling and monitoring procedure was done according to the monitoring plan and Methodology, and the results are in line with the findings of the site inspections. ERM CVS is able to confirm that the assumptions and method applied for sample framework and sample size is consistent with the methodology and the monitoring requirements. The PP has justified the sampling frame and sample size definition. Please see section 4.4.1 for further details on how the sampling and surveys were	OK	OK
Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?			

	validated. The verification team checked the data processing and calculations, and confirmed that they are correct. The results met confidence and precision requirements. The cap of 6L/person/day has been correctly applied in the calculations. <u>Cross check of survey results:</u> ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys. In terms of <u>QA/QC procedures</u>, ERM CVS checked that Paradigm oversee intervention to minimise sampling errors and internally check the consistency of data. All surveys were conducted by Paradigm full time monitoring staff and Paradigm cleaned the data to ensure consistency. These procedures were checked by the verification team during the site visit, document review and interviews with the persons responsible for monitoring. In summary, ERM CVS considered that the sampling process applied are consistent with CDM sampling and GS rules, and is reliable and consistent with the Operation manuals /11/15/.		
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	Qp,cleanboil,y		
Data unit:	Litres per person per day (L/p/d)		
Description:	Quantity of treated water still boiled in the project scenario 1 and 2, after installation of project technology		
Measured/calculated/default	Measured		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	The parameter is determined by the Water Consumption Field Tests, where respondents were asked whether (other than for the purposes of cooking already quantified) they had boiled any treated water over the previous 24 hours, and if so, for what purposes. Based on the site inspections, ERM CVS confirmed that WCFTs were conducted in the project activity target population for the two scenarios by Paradigm monitoring staff. Please see section 4.4.1 above for further details of how the WCFTs were verified. According to the data set /06/, the team found that the sampling and monitoring procedures were done in accordance with the monitoring plan and methodology, and that the results are in line with the results of the site inspections. ERM CVS is able to confirm that the assumptions and method applied for the sample framework and sample size are consistent with the methodology and the monitoring requirements. The PP has justified the sampling frame and sample size definition. Please see section 4.4.1 for further details on how the sampling and surveys were validated. The verification team checked the data processing and calculations, and confirmed that they are correct. The results met confidence and precision	OK	OK

	requirements. <u>Cross check of survey results:</u> ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys. In terms of <u>QA/QC procedures</u>, ERM CVS checked that Paradigm oversee intervention to minimise sampling errors and internally check the consistency of data. All surveys were conducted by Paradigm full time monitoring staff and Paradigm cleaned the data to ensure consistency. These procedures could be checked by the Verification team during the site visit, document review and interviews with the persons responsible for monitoring. In summary, ERM CVS considered that the sampling and monitoring processes applied are consistent with the CDM sampling and GS rules, and are reliable and consistent with the operation manuals /11/15/.		
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	LEp,i,y		
Data unit:	tCO2e/year		
Description:	Leakage in Project Scenario 2 during year y		
Measured/calculated/default	Calculated / Measured		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	ERM CVS confirmed that the leakage assessment was included in the MR. Leakage for water filters has been validated as follows: LEAKAGE SOURCE 1: The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project. It is considered reasonable that this is assessed as zero for the following reasons: - Households in scenario 2 (who receive a stove as well as a filter) are required to remove their old stove under the terms of the sales agreement/warranty, as managed by Socorro Maya. During the site visit all households in scenario 2 visited by ERM CVS had all removed their three stone fires LEAKAGE SOURCE 2: The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources. It is considered reasonable that this is assessed as zero for the following reasons: - The project does not involve a switch from higher emitting to lower emitting fuels, hence is unlikely to lead to a displacement of such use outside the boundary	OK	OK

	- Wood fuel remains a valuable and declining resource in Guatemala - On the basis of the observations during the site visit, ERM CVS considers it unlikely that the project will have an impact of sufficient scale on aspects like wood prices to influence areas outside the project boundary LEAKAGE SOURCE 3: The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario. It is considered reasonable that this is assessed as zero for the following reasons: - The Project Proponent has determined that total number of people reached by all activities of GS1321 is less than 1.4% of the total Guatemalan population, and thus its effects on the national NRB value is likely to be negligible - Even with all gold standard projects in Guatemala, the impact of improved stoves on NRB consumption is likely to be offset by ongoing population growth in Guatemala /18/ - The project will reassess the NRB fraction at the next renewal of crediting period anyway, and if new information is available, the NRB fraction can be updated at any monitoring period. LEAKAGE SOURCE 4: The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology. It is considered reasonable that this is assessed as zero for the following reasons: - Households only using a water filter still use their baseline stoves for cooking, and hence there is unlikely to be any adoption of other technologies for heating. LEAKAGE SOURCE 5: By virtue of promotion and marketing of a new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline. It is considered reasonable that this is assessed as zero for the following reasons: - Not applicable, since the households used inefficient stoves in the baseline, as determined through the baseline surveys, assessed by the DOE at validation.		
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	Water Quality		
Data unit:	Percent		
Description:	Performance of the treatment technology		
Measured/calculated/default	Measured Laboratory testing procedure and the effectiveness through proxies		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of	Draft OK/	Final OK/

	information, data and evidence)	CAR/CL	Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied? Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	Water quality tests were carried out to determine the effectiveness of the project technologies as they age. The manufacturer's specifications for Ecofiltro filters state that the filter has a minimum lifespan of 2 years, and the technology has been shown to last for more than 4 years when used and maintained correctly. For the sake of conservatism, the PP has elected to include only filters 2 years of age or younger for crediting, and thus testing. As per Guatemalan and World Health Organization Standards, and as consistent with the methodology and PDD, any filter samples exceeding 1 CFU of Ecoli per 100 ml were considered to have failed the test. The last 5 to 7 households monitored in each region from the randomly selected monitoring list were used for water quality testing, ensuring the selection of households was unbiased and representative of the population and ensuring that filters of both ages (0-1 And 1-2 years old) were tested. Samples of water collected from the field were transported to the laboratory and tested there. ERM CVS has reviewed the results of the water quality tests /17/ including the lab test reports, to confirm that the water quality tests were properly carried out by a suitable third party. ERM CVS interviewed the Paradigm monitoring staff responsible for collecting the water samples during the site visit. Based on review of the technology on site, ERM CVS confirms that the monitoring results are credible, given the filters' technical performance in terms of removing bacteria. ERM CVS confirms that the parameter has been correctly determined and applied in the emission reduction calculations. The Verifier also confirmed that the Water Filter Monitoring Surveys included a relevant question about whether the end-users received training on maintenance and cleaning of the filters, which it was possible to check directly during household inspections by ERM CVS. All interviewed end-users responded consistently to questions about the cleaning and maintenance process.	OK	OK
Conclusion	ERM CVS confirmed that - The parameter has been monitored appropriately, in accordance with the monitoring plan and methodology. - The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.		

Data / Parameter:	$f_{NRB,y,ics-nb}$	N.B. this parameter is established ex-ante, but reviewed and updated if necessary.	
Data unit:	Fraction		
Description:	Fraction of biomass used in year y as non-renewable of woody biomass fuel in scenario 2		
Measured/calculated/default	Default		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Is the parameter monitored in accordance with the monitoring plan and are the QA/QC procedures appropriately applied?	The PP used the same value as that set out in the PDD, which was calculated based on NRB assessment and has been validated and approved by Gold Standard. The assumption is valid considering that the PDD states that the value will be fixed based on the baseline study for a given crediting period and updated if necessary as specified in Methodology section III.1 ERM CVS confirmed that the parameter value is fixed for the crediting period,	OK	OK

Does the monitoring report correctly state all relevant information and data relating to the monitoring of parameters during the monitoring period?	consistent with the monitoring plan, and that there is no new relevant data that the PP should take into account to update the value. The PP did not therefore have to update the value.		
Conclusion	ERM CVS confirmed that the parameter did not have to be updated in this monitoring period, in accordance with the monitoring plan		

4.4.4. Management and operational system

ERM CVS evaluated the management systems in place to implement the monitoring of the project activity. This included the organisational structure, roles and responsibilities, data collection, transfer and aggregation procedures, training of personnel, data storage and archiving and emergency procedures for the monitoring system.

Compliance question	Verification activities undertaken	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Has an appropriate management and operational system for monitoring and reporting, including responsibilities and authorities, been established in accordance with the monitoring plan?	Interviews with the staff of The Paradigm project, implementing partners, and CO2 Management	The project in this monitoring period consists of 2 project scenarios, each of which has differences in the operational and management setup for monitoring as ERM CVS could confirm during the site visit and check with the Usage and Monitoring Survey Report. The Monitoring Report /5/ provides a relevant summary of management and operational system including responsibilities and authorities. Monitoring staff and enumerators have received proper monitoring training /11/15/19/	OK	OK

Conclusion

ERM CVS confirmed that the monitoring of all relevant parameters has been carried out in accordance with the monitoring plan. It is confirmed that data acquisition process, data transferring process, archiving process and reporting process occur as required by the monitoring plan. The final monitoring report provides an accurate description of the monitoring for all parameters throughout the monitoring period.

4.5. Data and parameters determined at registration and not monitored

The verification team evaluated the status of data and parameters that were determined at registration and not monitored during the monitoring period, including default values and factors, and confirmed whether they were correctly presented in Section D.2 of the monitoring report and applied correctly in the emission reduction calculations.

Data and parameters that were determined at registration and not monitored during the monitoring period

Parameter	Description	Presented correctly in section the Monitoring Report and applied correctly in the emission reduction calculations?	Draft OK/ CAR/CL	Final OK/ Not OK
EFb,wood,CO2	CO ₂ emission factor arising from use of fuels in baseline scenario	ERM CVS checked that the ex-ante parameter values are consistent with the values in the registered PDD and, where applicable, previous issuances.	OK	OK
EFb,wood,CH4	CH ₄ emission factor arising from use of fuels in baseline scenario		OK	OK
EFb,wood,N2O	N ₂ O emission factor arising from use of fuels in baseline scenario		OK	OK
EFp,fuel,CO2	CO ₂ emission factor arising from use of fuels in project scenario		OK	OK
EFp,fuel,CH4	CH ₄ emission factor arising from use of fuels in project scenario		OK	OK
EFp,fuel,N2O	N ₂ O emission factor arising from use of fuels in project scenario		OK	OK
NCVb,wood	Net calorific value of the fuel used in the baseline		OK	OK
NCVp,fuel	Net calorific value of the fuel used in the project scenario p		OK	OK
Wb,y	Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representative of baseline scenario b during project year y		OK	OK
Wp,unimproved stove,y	Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technology i representative of the project scenario p during project year y		OK	OK
C _j	Portion of users of project safe water supply who were already in baseline using a non-boiling safe water supply		OK	OK

4.6. Assessment of data and calculation of GHG emission reductions

ERM CVS evaluated the calculations applied to determine the emission reductions during the monitoring period resulting from implementation of the project activity. In conducting this evaluation, the verification team evaluated whether:

- A complete set of data for the monitoring period was available, and whether the most conservative assumption has been applied in any case where only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the monitoring plan unless a deviation has been approved (see section 5).
- Information provided in the monitoring report has been cross checked with other sources such as log books, inventories, purchase records, laboratory analysis (see section 5)
- Calculations of baseline, project and leakage emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology.
- Any assumptions used in the emission calculations have been justified
- Appropriate emission factors, IPCC default factors and other reference values have been correctly applied.

Compliance question	Verification findings (including justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Were data available throughout the monitoring period in accordance with the monitoring plan and methodology?	Only sales data is collected continuously. Other parameters are monitored by surveys and tests conducted once in a certain period of time. There was no period when data was not collected.	OK	OK
Has the project participant used appropriate methods and formulae for calculating baseline, project and leakage emissions?	ERM CVS checked the methodological options for emission reduction calculation and found methods and formulae are correct and according to Project Scenario 1 & 2, in Section 10 of the MR, and in accordance with the PDD and methodology. The PP included the algorithms and parameter definitions which facilitate the comprehension of the ER calculations. ERM CVS confirmed that the PP used appropriate methods and formulae for baseline and project emissions calculations. Also the leakage assessment is consistent with the MP/5/ and methodology requirements, and the parameters and their description are consistent.	OK	OK
Has the project participant justified all assumptions, emission factors and default values that have been applied?	ERM CVS confirmed that all assumptions are consistent with the PDD and Methodology	OK	OK
Do the monitoring report and associated emission reduction spreadsheet correctly present the data and formulae used to calculate the reported emission reductions?	The ER spreadsheet /03/ presents clear, traceable and consistent data, formulas and methods to calculate emission reduction calculations. From the review of the monitoring report and ER spread sheet ERM CVS confirmed that the ER calculations are consistent with the monitoring and usage surveys and other monitored results.	OK	OK

Conclusion

Emission reductions have been calculated in accordance with the monitoring plan and the applied methodology, and it was determined that the data processing and emission reductions calculations resulted in real and measurable emission reductions. Where there was any unavailability of data, conservative assumptions have been made. All assumptions, emission factors and default values have been justified and the information has been cross checked with other sources.

4.7. Other observations

No other observations.

4.8. Assessment of sustainability monitoring

4.8.1. *Completeness of sustainability monitoring parameters*

The verification team evaluated the monitoring of each sustainability indicator stated in the Gold Standard passport and compared with the description in the MR how the indicators were monitored, their results, and scoring.

The parameters included in the Gold Standard passport are listed below and a full description of each parameter and the verification activities associated with monitoring of each one is included in Section 4.9.3.

Monitored sustainability indicators				
Number	Description	Included in Monitoring Report?	Draft OK/ CAR/CL	Final OK/ Not OK
1	Air quality	Yes	OK	OK
2	Water quality and quantity	Yes	OK	OK
3	Livelihood of the poor	Yes	OK	OK
4	Access to affordable and clean energy services	Yes	OK	OK

4.8.2. *Sustainability indicators monitored*

The verification findings for the monitoring of each sustainability parameter are set out below. Note that only those sustainability parameters monitored for this verification period are presented (see table above).

Number:	1	Air quality		
Chosen parameter:	Measurement of user perceptions between old stove and new stove: smoke levels, incidence of coughing, incidence of respiratory illness, and incidence of itchy eyes			
Target:	Households will report reduced smoke levels, reduced incidence of coughing, reduced incidence of respiratory illness, reduced incidence of itchy eyes			
Means of monitoring (as per GS Passport):	Baseline and project household surveys regarding sustainability issues will be conducted. Household monitoring surveys will be given to a sample of all purchasers of improved cookstoves.			
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)		Draft OK/ CAR/CL	Final OK/ Not OK
Has the monitoring procedure been followed appropriately? Has the trend of the indicator been appropriately assessed and presented in the MR?	By reviewing the monitoring report, ERM CVS checked that the Sustainable Development Indicators have been correctly developed consistent with the Monitoring Plan in the GS Passport. The monitoring survey results for stoves show that user perceptions of the project are highly positive. This parameter was properly monitored in the Monitoring Survey asking relevant questions about perceptions of air quality, and frequency of eye irritation and coughing. The surveys show that the vast majority (93%) of stove users feel that there has been a decrease in smoke levels, with none reporting that it had got worse. 96% of users also reported a reduction in eye irritation and 83%		OK	OK

	reported a reduction in coughing. Please see section 4.4.1 for details of how the sampling and survey was verified. ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys.		
Conclusion	ERM CVS confirmed that - The indicator has been monitored appropriately in accordance with the monitoring plan - The scoring of the indicator presented in the MR is appropriate		

Number:	2	Water quality and quantity		
Chosen parameter:	Measurement of user perceptions of filtered water compared to boiled or untreated water and incidence of diarrheal disease			
Target:	Avoidance of boiling water for purification and increased levels of water treatment by filters for drinking and cooking; households will report on reduced incidence of diarrheal disease			
Means of monitoring (as per GS Passport):	Household surveys will be given to beneficiaries of water filter technologies.			
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK	
Has the monitoring procedure been followed appropriately? Has the trend of the indicator been appropriately assessed and presented in the MR?	The monitoring surveys for water filters/18/ show that user perceptions of the project are highly positive. This parameter was properly monitored in the Monitoring Survey asking relevant questions about frequency of water-borne illnesses, water taste, and perception of water quality. The surveys show that the vast majority (93%) of water filter users feel that the taste of water has improved, and 7% feel it is the same, with none reporting that it had got worse. 75% of users also reported a reduction in stomach illnesses. 100% of surveyed users reported that access to water had improved as a result of the project. Please see section 4.4.1 for details of how the sampling and survey was verified. ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys.	OK	OK	
Conclusion	ERM CVS confirmed that - The indicator has been monitored appropriately in accordance with the monitoring plan - The scoring of the indicator presented in the MR is appropriate			

Number:	7	Livelihood of the poor
Chosen parameter:	Time and/or money savings due to reduced fuel consumption	
Target:	For families that purchase fuel wood, access to efficient cookstoves will likely reduce fuel expenditures, resulting in more disposable income. For families and institutions that gather	

	biomass, efficient cookstoves will reduce the time spent collecting fuel		
Means of monitoring (as per GS Passport):	Kitchen Performance Tests will be conducted at regular intervals according to the Gold Standard Methodology. This, or related survey method, will provide information on the percentage of fuel saved that will be combined with data regarding the price and time required to collect fuel. Surveys will also assess how time and price savings (if any) are used.		
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)	Draft OK/ CAR/CL	Final OK/ Not OK
Has the monitoring procedure been followed appropriately? Has the trend of the indicator been appropriately assessed and presented in the MR?	The KPTs were conducted to determine the fuel consumption savings associated with the use of the Eko-stove and ERM CVS checked the KPT data /06/ to verify the significant fuel savings on a per meal basis. For the water filter users, 76% of users surveyed reported buying fuel in the baseline, and the average money saving reported by users as a result of the project was 43%. 18% collected wood in the baseline, and the average time saving reported by users as a result of the project was 26% (this is likely to include time savings whilst cooking as well as time savings from fuel collection). For efficient stove users, 59% reported buying fuel in the baseline, and the average money saving reported was 51%. 30% reported collecting wood and the average time saving reported was 77%. These are self-reported estimates by users, but nevertheless give an indication of the positive perception of the impact of the project. Approximately 99% of users also reported satisfaction with the devices disseminated by the project. Please see section 4.4.1 for details of how the sampling and survey was verified. ERM CVS visited a sample of households previously surveyed by the PP (as listed in section 3.4.2) to cross check the survey results, and found that the data from the DOE surveys was consistent with that from the PP surveys.	OK	OK
Conclusion	ERM CVS confirmed that - The indicator has been monitored appropriately in accordance with the monitoring plan - The scoring of the indicator presented in the MR is appropriate		

Number:	8	Access to affordable and clean energy services		
Chosen parameter:	Time and money savings due to reduced fuel consumption.			
Target:	Families will adopt efficient cookstoves and water filters. For families and institutions that purchase fuel wood, access to efficient cookstoves and water filters will reduce fuel expenditures, resulting in more disposable income. For families that gather biomass, efficient cookstoves and water filters will reduce the time spent collecting fuel			
Means of monitoring (as per GS Passport):	Evaluation of household fuel consumption will be evaluated according to Gold Standard methodology. The evaluation will provide information on the percentage or estimated amount of fuel saved that will be combined with data regarding the price and time required to collect fuel. Surveys will assess how time and price savings (if any) are used			
Compliance question	Verification findings (including verification activities undertaken and justification/substantiation of information, data and evidence)		Draft OK/ CAR/CL	Final OK/ Not OK
Has the monitoring procedure been followed	This indicator is monitored in the same way as the Livelihood of the poor parameter. ERM CVS confirmed that the reporting of this Sustainable		OK	OK

appropriately? Has the trend of the indicator been appropriately assessed and presented in the MR?	Development Indicator in the MR has been corrected and is consistent with the MP.		
Conclusion	ERM CVS confirmed that • The indicator has been monitored appropriately in accordance with the monitoring plan • The scoring of the indicator presented in the MR is appropriate		

5. Remediation Requests

5.1. Clarification Requests

Where information was insufficient or not clear enough to determine whether the applicable requirements have been met ERM CVS raised a Clarification Request (CL). The CLs raised, and a description of how each was resolved are set out below.

CL 1	
Comment:	The monitoring report mentions where outliers have been removed from the data, but does not explain the reasons for identifying the values as outliers in each case.
Clarification Request:	Please clarify in the monitoring report why certain results were considered to be outliers.
PP Response On page 20 of the monitoring report, the PP states that: 5.2. “Outlier Removal During the detailed data review, the PP removed surveys as outliers if one or more of the following occurred: • Households refused to participate in the survey or were not able to provide access or responses for one or more days in a multi-day test. • Survey was incomplete/missing data for a significant number of questions. • Information was inconsistent or did not make sense (negative data values, for example). • Data value(s) was outside of two standard deviations above or below the mean.” In addition, all outliers removed from analysis are included in the spread sheet MS_US_WCFT_KPT_WQT Data GS1321 Iss3 [DATE] below the raw data to allow for review of the removed data by the DOE and GS.	
Documentation provided	Monitoring report Emission reduction spreadsheet

Verification activity

ERM CVS has reviewed the latest version of the monitoring report. The PP removed surveys as outliers if the respondent was a commercial or institutional user, or if one or more of the following occurred:

- Households refused to participate in the survey or were not able to provide access or responses for one or more days in a multi-day test.
- Survey was incomplete/missing data for a significant number of questions.
- Information was inconsistent or did not make sense (negative data values, for example).
- Data value(s) was outside of two standard deviations above or below the mean

ERM CVS has confirmed this by review of the data spreadsheet /06/.

Conclusion

CL closed

5.3. Corrective Action Requests

ERM CVS raised a Corrective Action Request (CAR) where:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions;
- a Forward Action Request (FAR) during validation (or previous verification) to be verified have not been resolved by the project participants

CAR 1	
Comment:	Inconsistencies between the sales databases and the paper records were identified. Although these inconsistencies had a minor or no impact on emission reductions, they highlight a need for further QA/QC of the database and more rigorous management of data entry going forward
Corrective Action Request:	(a) Inconsistencies were identified in the sales database for EcoFiltro, specifically errors in the date of sale. Please revise the database and clarify how quality will be ensured going forward. (b) Inconsistencies were identified in the sales database for Socorro Maya, specifically inconsistencies in the date of sale, and entries without serial numbers. Please revise the database and clarify how quality will be ensured going forward.
PP Response The PP recognizes and agrees with the assessment of sales data inconsistencies, both in terms of the need for solutions and the minimal severity of the issue. As the project partners are small-scale businesses/NGOs working in the developing world, they do not currently have the ability to implement a full-scale Enterprise Resource Management (ERM) system that would track sales in the field via the cloud and tie them directly to the accounting function. Currently both partners use a system of collecting data in the field via paper then recording that data in an Excel document at a later date in the home office. Due to the variety of field locations (often remote), delivery of paperwork can sometimes be delayed by 60 or more days between the point of sale and the receipt of data in the office. Transferring that data from paper into Xcel also creates an additional opportunity for the data to be recorded incorrectly (in addition to the potential for sales agent error in the field). In discussing these issues with ERM during the audit visit, the PP elected to take the following actions immediately: 1. Remove any sales in the database that have missing information. This has been completed. 2. Pilot a sales data collection system based on Open Data Kit. The new system was implemented during the first two weeks of June, 2016 shortly after the site visit. This new system will eliminate paper data entry in the field entirely, instead allowing sales agents to record pertinent data on smart phones and to photograph customer IDs and contract documents as needed. All data is automatically uploaded to the cloud. 3. The project partners, in agreeing to implement this pilot, also shifted their internal processes for reviewing data and incentivizing employees to collect accurate data. As of the start of the pilot, sales commissions are no longer paid on the sale of a product, but rather on the submission of completed customer data. All data is reviewed weekly by the accounting staff of the partner organization, who then record the total number of completed household data sets and pay the sales agent a commission on the completed data. For incomplete data entries, the sales agent is informed of the error and given up to 4 weeks to contact the household, clarify the data and re-submit for approval and commission payment. The approved data is sent to the local M&E team monthly for review and storage. Only complete data sets are included in the final data set sent to the M&E team.	

Documentation provided
Updated database
Verification activity
ERM CVS has reviewed the updated database (emission reduction spreadsheet) /03/ and confirmed that all inconsistencies between the sales databases and the paper records have been corrected. Any sales in the database that have missing information have also been removed. This is conservative. The project proponents have proposed additional steps to improve the QA/QC of sales data collection and recording, including electronic data collection via Open Data Kit and a revised incentive structure for salespeople. ERM CVS confirmed that these measures will be implemented during discussions with the project partners on site. The effectiveness of the measures will be assessed at the next verification.
Conclusion
The database has been corrected of all errors and additional QA/QC measures will be used going forward. CAR closed.

5.4. Forward Action Requests

FAR 1	
Comment:	During the site visit, whilst observing the monitoring team carrying out usage and monitoring surveys, ERM CVS observed some questions being asked in a slightly non-neutral manner. Whilst it is unlikely, in the opinion of the verifier, that this would have actually influenced the results of the surveys observed (which were in any case used for the DOE's cross check and where not the source of the results used for crediting), nevertheless it is important that surveyors ask questions in as neutral and unbiased way as possible, whilst still ensuring that the respondent understands the question.
Forward Action Request:	Further training, and further elaboration of the 'hints' contained in the survey form should be carried out to ensure that questions are asked in as neutral a manner as possible.
Response by PP	The PP conducted additional training with the monitoring team via skype on Tuesday, May 17 th and has reinforced the importance of asking questions exactly as written within the surveys. The team has been instructed to contact the PP if they find any questions which are causing confusion when asked as written during surveying so that such questions can be revised properly to retain an unbiased format.

5.5. Minor Issues

Minor issues were communicated by email and directly during the site visit

Annex A: Reference Documents and Interviews**A.1: Documents**

Reference	Title and version	Date
1	Monitoring report	16 August 2016
2	PDD	Version 05; dated 20 September 2013
3	Emission reduction calculation spreadsheet	17 May 2016
4	Paradigm sampling plan	Undated
5	Emission reduction purchase agreement	10 Feb 2012
6	Monitoring / survey results spreadsheet MS_US_WCFT_KPT_WQT Data Spreadsheet	5 May 2016
7	Paradigm: Continuous monitoring concept note	Undated
8	Approval from Gold Standard of continuous monitoring concept: email correspondence between Neil Bellefeuille and Vikash Tayan, Gold Standard	22 March 2016
9	KPT Data spreadsheet	For KPTs conducted in Feb 2014
10	EcoFiltro: 'Ecofiltro School Programme Explained'	Undated
11	EcoFiltro operations manual	18 May 2015
12	Eko Stove Manual	Undated
13	Gold Standard: Issuance Review for 2 nd issuance	23 Sep 2015
14	NRB Leakage analysis spreadsheet	Undated
15	Socorro Maya Operations Manual	18 May 2015
16	Educational flyer distributed with all water filters outlining the health and safety benefits of hygienic practices	Undated
17	Water quality testing lab reports: Biomed Contro-Lab	30 Mar 16 30 Dec 15, 4 Mar 16, 4 May 16, 4 June 16
18	World Population Data Sheet 2011 – Guatemala http://www.prb.org/Publications/Datasheets/2011/world-population-data-sheet/guatemala.aspx	2011
19	List of employees that were part of the training on the operations manual at Ecofiltro	May 2016
20		

A.2: Persons interviewed

Reference	Name	Title & Organisation	Main Topics Discussed
IV 1	Leon Reinhart	Socorro Maya CEO	Project description Project implementation
IV 2	Neil Bellefeuille	The Paradigm Project CEO	Project implementation Monitoring process Monitoring Report
IV 3	Robert Reinhart	Socorro Maya Managing Director	Project description Project implementation Monitoring process Data bases
IV 4	Gabriel Jerez	Paradigm in-country monitoring staff	Monitoring process Monitoring Training Field work
IV 5	Eddy Melendez	Paradigm in-country monitoring staff	Monitoring process Monitoring Training Field work
IV 4	Marisol de Leon	Monitoring manager, EcoFiltro	Monitoring process Monitoring Training
IV 6	Philip Wilson	Founder, EcoFiltro	Programme design Technology specifications
IV 7	Sylvia Josephina Gomez	Community entrepreneur, La Gomea, Esquintla department	EcoFiltro programme
IV 8	Mayor Rayes	EcoFiltro Field Representative, Esquintla department	EcoFiltro programme
IV 9	Luz Velasquez de Leon	School director, Esquintla department	EcoFiltro schools programme
IV 10	Elsa Marina Salazar Gomez de Castaneda	Community leader, Esquintla department	EcoFiltro schools programme
IV 11	Eduard	Technical staff, Socorro Maya	Socorro Maya programme
IV 12	Hugo Daniel Pop	Accounting manager, Socorro Maya	Database records

In addition, ERM CVS visited and interviewed 37 household end users – please see section 3.4.2 for details.

