

VERIFICATION & CERTIFICATION REPORT

Aqua Clara Foundation

AQUA CLARA WATER FILTRATION PROGRAM IN KENYA

(GS Ref. No. 1078)

Monitoring Period
(28/12/2011 to 21/07/2014)

REPORT No.
GS.14.VER.001 MP01

Date of this issue: 27 09/01/2015		KBS Ref. No.: GS.14.VER. 001.MP01	
Project Title:		Aqua Clara Water Filtration Program in Kenya	
Organization:		KBS Certification Services Pvt. Ltd.	
Client:		Aqua Clara Foundation	
Monitoring Period:		28/12/2011 to 21/07/2014 (including both dates)	
Summary:			
KBS Certification Services Pvt. Ltd. Has performed the 1st verification of the GS project Aqua Clara Water Filtration Program in Kenya and Gold Standard Ref. Number 1078. The verification includes confirming the implementation of the monitoring plan of the registered PDD and the application of the monitoring methodology as per "Technologies and Practices to Displace Decentralized Thermal Energy Consumption". A site visit was conducted to check the implementation of registered monitoring plan and verify the data submitted in the monitoring report. KBS confirms the following has been reviewed; (a) The registered PDD and the monitoring plan, and the corresponding validation opinion; (b) The validation report; (c) The applied monitoring methodology(ies); (d) The monitoring report to verify that it is as per the standardized format; (e) Any other information and references relevant to the project activity's emission reductions (e.g. IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations); (f) CER calculations sheets and all supporting documents; KBS Certification Services Pvt. Ltd. Confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 34,145<u>31,500</u> tCO₂e emission reductions during period 28/12/2011 to 21/07/2014.			
Subject Group:	Sectoral Scope(s):	Methodology:	
GS Verification	01,03&13	Technologies and Practices to Displace Decentralized Thermal Energy Consumption	
Verification Team:		Monitoring report:	
Team Leader	Gagandeep Kakkar	First version	17/08/2014
Local Expert	Edward M. Momnanyi	Final version	08 <u>27</u> /01/2015
Technical Expert (1.1, 3.1,&13.1)	Gagandeep Kakkar		
Independent Technical Reviewer Team		Verification status:	
Date: 10/01/2015			
Technical Reviewer	Sanjay Kandari	☐ Findings not closed.	
Technical Expert	Asim Kumar Jana	☐ Draft verification opinion	
Manager T&C	Sanjay Kandari	☒ Final verification opinion	
Date	28 <u>10</u> /01/2015		
Authorized Signatory:			
Date: 28 <u>10</u> /01/2015			
Managing Director	Kaushal Goyal	☒ No distribution without permission from client	
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Abbreviations

ACF	Aqua Clara Foundation
BE	Baseline Emissions
BSF	Bio Sand Filter
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CL	Clarification Request
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
ERs	Emission Reductions
FAR	Forward Action Request
GHGs	Greenhouse Gas(es)
GIS	Geographic Information System
GS	Gold Standard
ISO	International Organization of Standardization
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
LE	Leakage Emissions
MR	Monitoring Report
MP	Monitoring Plan
PE	Project Emissions
PDD	Project Design Document
QA/QC	Quality Assurance/Quality Control
SAM	Sand and Membrane Filter
SD	Sustainable Development
VCS	Voluntary Carbon Standard
VVS	Validation & Verification Standard

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1. INTRODUCTION

1.1 Objective

KBS has been commissioned by Aqua Clara Foundation to perform an independent verification of its registered CDM project Aqua Clara Water Filtration Program in Kenya, GS: 1078 for the reported GHG emission reductions for the given monitoring period 28/12/2011 to 21/07/2014 (both dates included). The Gold Standard projects must undergo independent third party verification and certification of emission reductions as the basis for issuance of Gold Standard Voluntary Emission Reductions (GS VERs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report and other supporting documents are complete;
- The actual monitoring systems & procedures and monitoring report conforms with the requirements of the approved monitoring plan and the approved monitoring methodology;
- The data is recorded and stored as per the monitoring methodology and approved monitoring plan.

1.2 Scope

The scope of the verification is the independent and objective review and ex post determination of the monitored reductions in GHG emission by the project activity. The verification is based on review of monitoring report, supporting information and

- (a) The registered PDD, including the monitoring plan, GS Passport and the corresponding validation opinion(s);
- (b) Previous verification reports, deviation requests, requests for revision of monitoring plan;
- (c) Monitoring report for the monitoring period under verification including GS VER calculations sheets and all supporting documents;
- (d) The applied monitoring methodology;
- (e) Relevant decisions, clarifications and guidance from the CMP and the Gold Standard Board;
- (f) All information and references relevant to the project activity's resulting in emission reductions

The project is assessed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

KBS has, based on the recommendations in the latest version of Gold Standard Toolkit and CDM Validation and Verification Standard, employed a rule-based approach in the verification, focusing on the identification of significant reporting risks and the reliability of project monitoring.

1.3 Description of the Project Activity

Title of project activity:	Aqua Clara Water Filtration Program in Kenya
Gold Standard Id:	GS 1078
Applied methodology:	Technologies and Practices to Displace Decentralized Thermal Energy Consumption
Start date of crediting period:	28/12/2011
Project Participants:	Aqua Clara Foundation
Location of the project activity:	Kenya, The project activity is spread across 23 Counties.

The project activity aims at GHG reduction through implementation of the ACF Bio Sand Filter (BSF) and the Sand and Membrane (SAM) large-scale filter. These ACF water purifiers displace the use of firewood fuel traditionally used to boil water for domestic consumption and in the alternative offer an affordable, long-term solution for households that typically consume raw water from turbid sources. The project activity seeks to introduce approximately 23,875 BSF purifiers, 4 Large SAM and 4,800 household SAM units with a production capacity of 150 – 300 litres of water per day.

To date the PP has installed a total of 3122 Bio Sand filters used for domestic purpose in two counties in the project boundary. There are no operational SAM filters during this monitoring period and therefore only BSF filters are monitored. The project technologies offer an affordable, clean, efficient and easy-to-use alternative for water purification within the rural area that the project activity seeks to operate in. In addition the project activity will actively reduce CO₂ emissions and diminish the associated risks of Indoor Air pollution.

The emission reductions achieved during the current monitoring period starting from 28/12/2011 to 21/07/2014 (including both days) is 34,14531,500 tCO₂e.

2. METHODOLOGY

KBS follows a rule based verification approach, wherein, as a first step, the contract review is undertaken as per latest version of CDM Accreditation Standard. Subsequently, after the contract is signed, the monitoring report of the project activity is made available at Gold Standard registry as per CDM procedures in accordance with Gold Standard rules. Since the Gold Standard prescribes the application of CDM rules and guidelines which are followed along with the Gold Standard rules.

A desk review of the project documentation is undertaken, which is followed by an onsite visit by the members of verification team in accordance with the latest version of CDM AS. The verification protocol is filled by the verification team that is based on standard auditing practices and latest version of CDM VVS, to capture the assessment of applicable CDM requirements viz., latest version of CDM Project Standard, registered PDD, applied methodology/ies and/or tools and recent decisions. The verification protocol provides transparent means to record the observations and compliances by the verification team members and the nonconformities, if any. The verification protocol is an internal document, and is available on request. Following are the major milestones for the verification under consideration.

Duration of verification

<i>Verification Contract</i>	11/01/2014
<i>On site verification</i>	05/09/2014 to 08/09/2014
<i>Draft Verification Report</i>	01/10/2014
<i>Final Verification Report</i>	27 09/01/2015

2.1 Review of Documentation

A desk review is undertaken, involving but not limited to,

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

The list of documents reviewed is included in the section 'References'

2.2 Site Visits

A site visit is undertaken by members of verification team, involving but not limited to,

- An assessment of the implementation and operation of the proposed CDM project activity as per the registered PDD;
- A 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 approved monitoring plan;
- A cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources;
- A check of the monitoring equipment, including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;

- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The site visit for this verification assessment was undertaken by Gagandeep Kakkar (Team Leader & Technical Expert) and Edward M. Momnanyi (Local Expert) and details are mentioned below;

Location	Uasin Gishu & Kisii County, Kenya	
Dates	05/09/2014 to 08/09/2014	
Key points discussed	Name of person interviewed	Designation, Organization
Operational data Data collection QA/QC procedures	Douglas Makora Mokong'u	Incharge, Aqua Clara Foundation
	Douglas Makora Mokong'u	Incharge, Aqua Clara Foundation
	Douglas Makora Mokong'u	Incharge, Aqua Clara Foundation
	Douglas Makora Mokong'u	Incharge, Aqua Clara Foundation
Calculation of ERs	Natasha Georgete Kalanda	Consulatnt, Viability Africa
CDM requirements	Natasha Georgete Kalanda	Consulatnt, Viability Africa

2.3 Reporting of Findings

During the course of verification the findings may be raised as under;

CAR is raised if one of the following occurs:

- Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- Issues identified in a FAR during validation to be verified during verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

FAR is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

The verification report contains (section 7) all CARs, CLs and FARs raised during this verification in transparent manner and provides clear information of the issues raised, response received and its resolutions, including the changes in the documents. Additionally, major changes between the webhosted MR and final MR are presented under Section 6 (below the Reference) for easy reference.

2.4 Verification Assessment

Based on the desk review and site visit the team leader follows the verification protocol to identify and record the findings in the context of the project activity. The findings are communicated to the client in the findings document (section 7 of report). The project documentation, including responses to the findings is reviewed by the team leader in consultation with team members, wherever appropriate. The team leader prepares the draft verification report subject to closure or non closure of the findings.

2.5 Internal Quality Control

The draft verification report prepared by team leader is reviewed by an independent technical reviewer (having competence of relevant technical area himself/herself or through an independent technical area expert) to confirm the internal procedures established by KBS are duly followed and

the verification report/opinion is reached in an objective manner and complies with the applicable CDM requirements.

The independent technical reviewer may approve or reject the draft verification report. The findings may be identified even at this stage, which needs to be satisfactorily resolved, before the request for issuance is submitted to Gold Standard. The final decision is taken by the Manager Technical and Certification. The technical reviewer and Manager T&C can be same person.

The final decision is authorized by Managing Director, KBS once the report is approved by the Manager T&C.

3. VERIFICATION FINDINGS

3.1 Remaining Issues (FARs from Previous Validation or Verification)

Discussion:

This is the first verification of the project activity. There are 5 FARs raised during the validation^{/3/} of the project activity. The FARs were noted and converted to CAR#04, CAR#05, CAR#06, CAR#07 and CAR#08 and taken into account during assessment. The FAR#04 raised during the validation is pertaining to 2nd issuance; hence the same has been kept as FAR during this verification also

Findings:

CAR#04, CAR#05, CAR#06, CAR#07 and CAR#08 were raised and CAR#07 was converted to FAR#09 again for next verification. This is discussed in detail in section 7 of this report

3.2 Compliance of project implementation with registered PDD

Discussion:

The project activity consists of implementation of water filters in the households across 23 counties across the host country Kenya. To date the PP has installed a total of 3122 Bio Sand filters^{/11/} used for domestic purpose in two counties in the project boundary. There are no operational SAM filters during this monitoring period and therefore only BSF filters are monitored. The same has been checked from the project sales record^{/11/} and also during site visit^{/24/}.

Batch Number	Implementation		Number of Plants
	From	To	
I	July 2009	June 2010	400
II	July 2010	June 2011	617
III	July 2011	June 2012	1010
IV	July 2012	June 2013	791
V	July 2013	May 2014	304
		TOTAL	3122

The current verification includes monitoring period starting from 28/12/2011 to 21/07/2014^{/5/}. The project started commercial operation in July 2009^{/11/}. The company has its distribution network that involves the use of Community Development Officers (CDOs) and Community Health Promoters (CHPs) who work within the various communities under which Aqua Clara serves. At the time of installations of bio sand filters, households are issued with receipts^{/12/} and each filter is assigned a unique identification number to avoid double counting. The same has been evidenced during the site visit. In order to check the implementation of FAR #1 raised during the validation, it is confirmed during site visit that the Project Proponent used administrative official's namely local chiefs to sign the VER transfer sheets^{/14/} on the behalf of the end users. End users were then called and informed of the carbon claim by the Aqua Clara Foundation and that the chiefs would be signing on their behalf.

Sampling Plan:

As per the sampling approach defined in the registered PDD^{/1/}, Simple Random Sampling method was used to determine the random test subjects from the total sales record. The total sales record outlined the two counties; Uasin Gishu and Kisii with the operational BioSand Filters, which are the only project technologies monitored during the current monitoring period. A total of 137 households were selected for monitoring survey^{/8/}. However it was found that some households were unreachable as the home owner moved, contact information changed, etc. To compensate for the loss of these households within the sample frame, the PP replaced these households in the final frame used. This approach was not accepted by the verification team and GS secretariat. So, Project participant again tried to contact households and It was witnessed by the DoE's Local representative that the phone calls were made to 30 households and out of 30, 17 households said they still currently use the water

filter and reside within the project boundary, 4 households are no longer using the water filter, but still reside in the project boundary and 9 households could not be traced. So a final weighted usage rate is calculated considering all these factors.

The calculation of the sample size for the monitoring surveys for the BSF units was based upon a 0.7 Coefficient of Variation under a 90/10 approach as mentioned in the PDD^{/1/} and also in Table 3 of Annex 4 of the approved Gold Standard baseline and monitoring methodology^{/6/}.

In accordance with the §24(a) of Standard for “Sampling and surveys for CDM project activities and programmes of activities” (version 04.1)^{/15/} and based on verification team’s professional judgment, the verification team has chosen a sample size of 65 (Instead of 61) households. Further, the verification team has confirmed the following sampling approach –

- The sample size is based on the Acceptable Quality Level (AQL) of 1% and Unacceptable Quality Level (UQL) as 10% (as per §24b and §25 of Standard for “Sampling and surveys for CDM project activities and programmes of activities” (version 04.1)).
- The sample size considered appropriate as the Table 1 of Standard for “Sampling and surveys for CDM project activities and programmes of activities” (version 04.1)^{/15/} has already provided the sample size for verifying PP’s data to be 61, for AQL=1% and UQL=10%.
- The maximum errors associated with the determination indicated in §25 of Standard for “Sampling and surveys for CDM project activities and programmes of activities” (version 04.1) is considered as 5% for producer’s risk and 5% for consumer’s risk.

Based on the sampling approach the verification team has selected the household’s located in the Uasin Gishu and Kisii county. The household sampled in the survey during site visit, were cross verified with the sales record^{/11/} as well as with monitoring survey record^{/8/} to confirm the correctness of the data gathered at the time of survey. The result of verification team’s observation based on the chosen sample are found consistent with the sales record. No discrepancy was found during on site visit. Thus, according to the result of verification team’s random sampling as a part of the on site visit, the water filters were found installed and operating as per PP’s sales records.

Opinion:

- In opinion of the assessment team the implementation and operation of the project activity is in compliance with the description in the registered PDD^{/1/}. The project activity has been implemented in only two counties during this monitoring period. However, the filters sold are less than the estimated in the PDD for the corresponding period.
- The project activity consists of 3120 BSF filter installed till May 2014 as verified from the sales records.
- There is no revision in monitoring plan or post registration change for the current monitoring period. However there is temporary deviation observed during this monitoring period. This deviation was already discussed during the course of validation^{/3/} and the same was clarified by Gold Standard Foundation^{/22/}. FAR#3 was raised in this regard during the validation and implementation of the same is confirmed during the current verification.
- In accordance with para. 225 of VVS^{/10/} the verification team reviewed the registered PDD^{/1/}, including the monitoring plan and the corresponding validation report^{/3/} and the applied monitoring methodology^{/6/}, relevant decisions from the CMP and the CDM EB and found that the MR for this monitoring period is line with all the above mentioned documents
- The actual emission reductions for the current monitoring period are ~~34,145~~31,500 tCO₂e which are lower than the estimated ERs (66,054 tCO₂e) for the comparable period. The difference in the actual emission reduction is due to lower sales of the water filter per annum than the estimated in the registered PDD^{/1/}.

3.3 Compliance of monitoring plan with the monitoring methodology including applicable tool(s)

Discussion:

The monitoring plan mentioned in the monitoring report^{/5/} is in line to the registered PDD^{/1/} and GS Passport and in accordance with the approved methodology applied by the project activity, i.e. Technologies and Practices to Displace Decentralized Thermal Energy Consumption" (V1.0)^{/6/}. All the ex-post monitoring parameters as per the applied methodology^{/6/} are included in the monitoring report^{/5/} and ER sheet^{/7/}. However there is temporary deviation observed during this monitoring period regarding the frequency of Monitoring Survey. This deviation was already discussed during the course of validation and the same was clarified by Gold Standard Foundation. FAR#3 was raised during the validation and implementation of the same is confirmed during the current verification. The project participant has mentioned this as deviation from the monitoring plan in the section B.2.1 of monitoring report as required in the FAR#3 raised by validating DoE.

Findings:

CAR#06 was raised and closed successfully. This is discussed in detail in section 7 of this report.

Opinion:

The monitoring plan mentioned in the registered PDD is in line with the applied methodology i.e. Technologies and Practices to Displace Decentralized Thermal Energy Consumption (V1.0)^{/6/}. The monitoring mechanism is in line with the methodology and is effective and reliable

3.4 Post registration changes, if any

There were no changes; the section is not applicable.

3.5 Compliance of monitoring activities with registered monitoring plan

Discussion:

During the verification all relevant monitoring parameter have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy, and applied QA/QC measures. It is confirmed that the monitoring parameter has been measured / determined without material misstatements. The monitoring parameters involved in the project activity as per registered PDD^{/1/} are analysed in detail in the subsections below:

3.5.1. Data/Parameter, Unit: Qp,y, Litres per person per day

Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day

	Discussion and verification assessment
<i>Purpose of data</i>	Baseline emissions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	Calibrated Buckets for measuring water
<i>Measuring/Reading/Recording frequency</i>	Annual, 3 consecutive days of the monitoring exercise with exception of holidays
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	The Water Consumption Field Test results were collected for three consecutive days in each household included in the sample frame. An average of this was then obtained. The figure was then divided by the average number of people in the household.
<i>Verified value</i>	6.234

<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit. The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the figures mentioned in the survey sheet ^{/13/} and considered for emission reduction are appropriate.
<i>QA/QC procedures applied</i>	The enumerators were provided with calibrated buckets to ensure they took accurate measurements during the WCFT protocol

3.5.2. Data/Parameter, Unit: Qp,y, Litres of safe water produced per day from project technology
Quantity of safe water supplied in the project scenario p using the Large Scale Community SAM Filter

	Discussion and verification assessment
<i>Purpose of data</i>	Baseline emissions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	No SAM filters has been sold during this monitoring period
<i>Measuring/Reading/Recording frequency</i>	No SAM filters has been sold during this monitoring period, So this parameter is not monitored
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	No SAM filters has been sold during this monitoring period, So this parameter is not monitored
<i>Verified value</i>	No SAM filters has been sold during this monitoring period, So this parameter is not monitored
<i>Cross checks</i>	This has been cross checked from the total sales record that No SAM filters has been sold during this monitoring period, So this parameter is not monitored
<i>QA/QC procedures applied</i>	NA

3.5.3. Data/Parameter, Unit: Cj, %

Expressed as a percentage, this is the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it

	Discussion and verification assessment
<i>Purpose of data</i>	Baseline emissions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	No Equipment Used, Calculated from the results of Monitoring survey
<i>Measuring/Reading/Recording frequency</i>	Annually
<i>Data collection (from data generation, aggregation, to</i>	The total number of households who consumed safe water in the baseline scenario was obtained. Based on the feedback from the monitoring surveys, 5 households were already consuming safe water

<i>recording, calculation and reporting)</i>	without boiling. This number was then divided by the total number of households sampled (137) and the percentage is obtained.
<i>Verified value</i>	8%
<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit. The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the figures mentioned in the survey sheet ^{/13/} and considered for emission reduction are appropriate.
<i>QA/QC procedures applied</i>	NA

3.5.4. Data/Parameter, Unit: Qp, clean,boil,y, Litres per person per day

Quantity of safe water boiled in the project scenario p per person per day

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Project emissions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	Calibrated Buckets for measuring water
<i>Measuring/Reading/Recording frequency</i>	Annually
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	The PP Calculated the clean water boiled in the project scenario by extrapolating the volume of water consumed in that household. To do so the PP calculated the percentage of households which boiled clan water (1/137) and then multiplied their total daily water consumption by 365 days. The result, is a ratio which when multiplied against the total number of households in the project boundary will accurately project the total water consumption per year and which when divided by 365, gives an accurate projection of the amount of clean water boiled per household per day.
<i>Verified value</i>	0.0
<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit. The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the figures mentioned in the survey sheet ^{/13/} and considered for emission reduction are appropriate
<i>QA/QC procedures applied</i>	The enumerators were trained how to accurately measure this parameter using calibrated buckets.

3.5.5. Data/Parameter, Unit: Qp, rawboil,y, Litres per person per day

Quantity of raw water boiled in the project scenario p per person per day

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Baseline emissions and Project emissions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency,</i>	Calibrated Buckets for measuring water

<i>date of last calibration, validity)</i>	
<i>Measuring/Reading/Recording frequency</i>	Annually
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	The amount of raw water boiled was obtained for the three consecutive days during the water consumption field test before the water was poured into the boiling pot. An average of this amount was then obtained and divided by the average number of people in the household.
<i>Verified value</i>	0 All the households which boiled raw water had discontinued use of the biosand filters and are as such ineligible to be included in the ER calculations since there are already discounted by virtue of the usage factor.
<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit ^{24/} . The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the figures mentioned in the survey sheet ^{13/} and considered for emission reduction are appropriate
<i>QA/QC procedures applied</i>	The enumerators were trained how to accurately measure this parameter using calibrated buckets.

3.5.6. Data/Parameter, Unit: Np,y, Person.days

Number of persons consuming water supplied by project scenario p through year y

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Baseline emissions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	No Equipment Used, Calculated from the results of Monitoring survey
<i>Measuring/Reading/Recording frequency</i>	Annually
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	Households were asked the number of people living in their household for that particular day in the three consecutive days during the water consumption field test. An average of this number was then obtained for each household and an average of total obtained. The figure was multiplied by 365 days in an year to obtain the figure.
<i>Verified value</i>	2091405
<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit. The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the figures mentioned in the survey sheet ^{13/} and considered for emission reduction are appropriate
<i>QA/QC procedures applied</i>	NA

3.5.7. Data/Parameter, Unit: Up,y, Percentage

Usage rate in project scenario p during year y. This data will be used to account for households which discontinue use of the filters from the monitored sample frame and thereafter be extrapolated across the total sales record.

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Calculation of total emission reductions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	No Equipment Used, Calculated from the results of survey
<i>Measuring/Reading/Recording frequency</i>	Annually
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	The usage parameter for each vintage was calculated by getting the fraction of users in the sample frame for that vintage and getting the percentage in relation to the total in the sample frame. Thereafter, the weighted average per vintage was obtained by extrapolating the usage in the sample per vintage into the entire population of the TSR for that particular vintage. Each of the usage rates for each vintage was then used for calculation of emission reduction
<i>Verified value</i>	<u>2011 = 55.51%</u> <u>2012 = 57.58%</u> <u>2013 = 58.56%</u> <u>2014 = 58.27%</u> 2011 = 60.01% <u>2012 = 62.52%</u> <u>2013 = 63.10%</u> <u>2014 = 62.64%</u>
<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit. The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the figures mentioned in the survey sheet ^{13/} and considered for emission reduction are appropriate
<i>QA/QC procedures applied</i>	The guidance questions in the usage survey clearly determined the operational and non-operational filters in the project scenario.

3.5.8. Data/Parameter, Unit: Quality of the treated water, NA

Performance of the BSF Filter and SAM filters. Household SAM filters shall be examined at the household level while water quality tests for the community SAM units shall be investigated at the point of sale in accordance with the Quality Standards for Sources of Domestic Water of The Environmental Management And Co-Ordination (Water Quality) Regulations, 2006.

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Sustainable development Monitoring; Methodological Requirement
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	Field Laboratory Tests
<i>Measuring/Reading/Recording frequency</i>	Annually

<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	The water quality tests were conducted using 3M Petrifilm Plate instructions ^{/19/} . Water samples were collected from raw water and water filtered using the project technologies to determine coliform levels in both water samples.
<i>Verified value</i>	The complete data set is provided in Monitoring Summary Sheet ^{/8/}
<i>Cross checks</i>	This has been cross checked from the laboratory test results ^{/18/} of the surveyed household and found correct.
<i>QA/QC procedures applied</i>	NA

3.5.9. Data/Parameter, Unit: Water Treatment Practices in the baseline scenario, Treatment Descriptions

Water Treatment Practices in the baseline scenario

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Calculation of baseline emissions
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	Monitoring Survey
<i>Measuring/Reading/Recording frequency</i>	Annually
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	Households were asked their baseline water treatment before they obtained the water filter. Appropriate answers were then put in the survey sheet ^{/13/} .
<i>Verified value</i>	N/A
<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit. The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the response of households mentioned in the survey sheet ^{/13/} and considered for emission reduction are appropriate
<i>QA/QC procedures applied</i>	Multiple options in an open ended questionnaire were used, so as to eliminate any possibility of bias.

3.5.10. Data/Parameter, Unit: LE_{p,y}, t_CO₂e per year

Leakage in project scenario p during year y

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	<i>Leakage Emission</i>
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	NA

Measuring/Reading/Recording frequency	Biennially
Data collection (from data generation, aggregation, to recording, calculation and reporting)	Literature Review
Verified value	0
Cross checks	There are no perceived monitoring requirements for leakage emissions for this project . The same has been cross checked from the registered PDD ^{1/} also..
QA/QC procedures applied	NA

Gold Standard Sustainable Development Indicators

3.5.11. Data/Parameter, Unit: Water quality and quantity: + Positive score, %

	<i>Discussion and verification assessment</i>
Purpose of data	Sustainability Indicator
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	3M Petrifilm
Measuring/Reading/Recording frequency	Annually
Data collection (from data generation, aggregation, to recording, calculation and reporting)	The enumerators were provided with cooling jars which were collected from the field within six hours of collection of the samples and then tested with the 3M plates to ensure quality results. The total samples showing reduction/increment/no change in coliform levels divided by the total number of samples in the sample frame, multiplied by 100. The results were then recorded in the monitoring survey sheet.
Verified value	<u>35 samples have been discounted due to poor results in water quality testing results. These households have E.coli reduction levels in filtered water of less than 90% reduction.</u> <u>82 samples have E.coli reduction levels greater than 90% and have been counted as safe water supply.</u> <u>In summary, 29.91% of the samples had <90% E.coli reduction, while 70.09% of samples show >90% reduction of E.coli. 25 households had E. coli reduction of less than 90%.</u> <u>82 households showed E. coli reduction greater than 90%</u> <u>10 households had erroneous test results due to contamination of samples while out in the field which led to an increase in E. coli in sampled raw water versus sample of filtered water from the respective filter. As a result, these 10 have been discounted for the analysis of water quality testing</u>

	Summary, 23.36% of samples had <90% E. coli reduction, while 76.64% of samples show >90% E. coli reduction.
Cross checks	This has been cross checked from the laboratory test results ^{/18/} of the surveyed household and found correct
QA/QC procedures applied	NA

3.5.12. Data/Parameter, Unit: Quality of Employment+ Positive score, NA

Improvement in the skill level of the community members within the project boundary

	<i>Discussion and verification assessment</i>
Purpose of data	Sustainability Indicator
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Training certificates ^{/17/}
Measuring/Reading/Recording frequency	Monitored biennially for the first monitoring period, and annually in subsequent monitoring periods.
Data collection (from data generation, aggregation, to recording, calculation and reporting)	The trainees from the community are trained by highly skilled personally on various aspects of the project e.g. sales, assembly of the project technology, etc.
Verified value	NA
Cross checks	This has been cross checked by interviewing the enumerators during site visit and training certificates issued ^{/17/}
QA/QC procedures applied	NA

3.5.13. Data/Parameter, Unit: Livelihood of the poor + Positive score, Percentage

The parameter refers to the number of people in the project activity whose livelihoods had improved in terms of savings of money used to get fuel and the time used to collect firewood. Households in the sample frame were asked these questions to attesting the same.

	<i>Discussion and verification assessment</i>
Purpose of data	Sustainability Indicator
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	NA, Calculated
Measuring/Reading/Recording frequency	Monitored biennially for the first monitoring period, and annually in subsequent monitoring periods.
Data collection (from data generation, aggregation, to	Households were asked if there was reduction of time and money used to acquire fuel in the project scenario. The answers were recorded in the monitoring survey sheet. Percentages were obtained from the answers

<i>recording, calculation and reporting)</i>	provided..
<i>Verified value</i>	100% of the households interviewed reported reduction in the amount of money used to acquire fuel in the project scenario. 100% of the households interviewed reported reduction in time used to get fuel in the project scenario.
<i>Cross checks</i>	This has been cross checked by surveying the households during the verification site visit. The household surveyed during the monitoring survey by project participant were interviewed by the verification team and It has been confirmed that the response of households mentioned in the survey sheet ^{/13/} are appropriate.
<i>QA/QC procedures applied</i>	NA

3.5.14. Data/Parameter, Access to affordable and clean energy services + Positive score

This parameter refers to the number of people who have had access to affordable and clean energy services in the project scenario.

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Sustainability Indicator
<i>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</i>	N/A
<i>Measuring/Reading/Recording frequency</i>	Monitored biennially for the first monitoring period, and annually in subsequent monitoring periods ^{/4/} .
<i>Data collection (from data generation, aggregation, to recording, calculation and reporting)</i>	The PP tracks the number of filters sold in the project boundary. This data is kept in form of hard copies which are then transferred into an electronic sheet. The PP then submits these data sheets to the carbon asset development consultant, who verifies the information to make sure the data meets the carbon asset standards.
<i>Verified value</i>	3122 households
<i>Cross checks</i>	The value has been cross checked from the sales record ^{/11/} and found correct.
<i>QA/QC procedures applied</i>	NA

Opinion:

The adequacy and compliance of the monitoring plan in the Monitoring report ^{/5/} was found as per the requirements laid by the GS Passport, monitoring methodology ^{/6/} and the registered PDD ^{/1/}. The information flow (from data generation, aggregation, to recording, calculation and reporting) is already included under respective parameter above. The verification team has verified all the data and collected evidence as per the required monitoring frequency and found to be correct and appropriate meeting the requirements of the GS Passport, applied methodology and registered PDD. The sustainability parameters were also reviewed and the assessment team is of the opinion that the project elevates the living standard of the rural population and aids in better health by reducing the exposure to water borne diseases.

3.6 Compliance with the calibration frequency requirements for measuring instruments

The monitoring for the project activity is done through the surveys conducted for the sample population. The data from the survey sheets is transferred to the excel sheet which is further used for calculation of emission reductions. Therefore there are no instruments involved in monitoring.

3.7 Data not monitored (ex ante or external parameters)

3.7.1. Data/Parameter, Unit: Wb,y, Tonnes/litre

Quantity of fuel in tons required to treat 1 litre of water using technologies representative of baseline scenario b

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Calculation of Baseline Emissions
<i>Verified value</i>	0.000417848
<i>Source of value</i>	Baseline water Boiling test
<i>Justification</i>	<i>The value applied is consistent with the Registered PDD^{21/}</i>

3.7.2. Data/Parameter, Unit: EF_{b,fuel},CO₂, tCO₂/TJ

CO₂ emission factor of the wood fuel

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	<i>Baseline and Project emissions</i>
<i>Verified value</i>	112
<i>Source of value</i>	IPCC Default emission factor
<i>Justification</i>	<i>The value is conservative as IPCC values are prescribed by the applied methodology^{21/}.</i>

3.7.3. Data/Parameter, Unit: NCV_b, TJ/ton

Net calorific value of wood fuel used in the baseline

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	<i>Baseline and Project emissions</i>
<i>Verified value</i>	0.015
<i>Source of value</i>	IPCC default value
<i>Justification</i>	<i>The value is conservative as IPCC values are prescribed by the applied methodology^{21/}.</i>

3.7.4. Data/Parameter, Unit: EF_{b,fuel},CH₄, tCH₄/TJ

CH₄ emission factor of the wood fuel

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Calculation of baseline missions
<i>Verified value</i>	0.300
<i>Source of value</i>	IPCC Default value
<i>Justification</i>	<i>The value is conservative as IPCC values are prescribed by the applied methodology^{21/}.</i>

3.7.5. Data/Parameter, Unit: EF_{b,fuel}, N₂O

N₂O emission factor of the wood fuel

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Calculation of baseline missions
<i>Verified value</i>	0.004
<i>Source of value</i>	IPCC Default value
<i>Justification</i>	The value is conservative as IPCC values are prescribed by the applied methodology ^{21/} .

3.7.6. Data/Parameter, Unit: GWP, Fraction
Global Warming Potential of CH₄

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Calculation of baseline missions
<i>Verified value</i>	21 & 25
<i>Source of value</i>	IPCC Fourth Assessment Report: Climate Change 2007 ^{21/}
<i>Justification</i>	The PP has used the value 21 for CH ₄ GWP for the monitoring period before 1 st January 2013 and 25 for the period after 1 st January 2013. This is in accordance to Gold Standard rule on GWP for project activities.

3.7.7. Data/Parameter, Unit: GWP, Fraction
Global Warming Potential of N₂O

	<i>Discussion and verification assessment</i>
<i>Purpose of data</i>	Calculation of baseline missions
<i>Verified value</i>	310 & 298
<i>Source of value</i>	IPCC Fourth Assessment Report: Climate Change 2007 ^{21/}
<i>Justification</i>	The PP has used the value 310 for N ₂ O GWP for the monitoring period before 1 st January 2013 and 298 for the period after 1 st January 2013. This is in accordance to Gold Standard rule on GWP for project activities

Finding:

CAR#03 was raised and closed successfully in this regard. Please refer section 7 for details.

Opinion:

The default values applied were found to be consistent with the registered PDD^{1/} and the source. All the values fixed at the time of validation were either default values or from IPCC report^{21/}.

3.8 Assessment of Data & calculation of GHG Emission Reductions

Discussion:

The emission reductions for the project activity are calculated based on the data from the survey sheets. The formulae used for the calculations are in line to the registered PDD and in accordance to the applied methodology as checked by the assessment team. The data from the sheets is transferred to the excel sheet and emission reductions are obtained. A brief description on the calculation of emission reductions is as follows:

Baseline emissions

As described in section A3.1 of the Gold Standard methodology, the baseline scenario wood fuel consumption is back calculated by multiplying the safe water consumption of end users observed in the project scenario by the amount of fuel required to boil a specific quantity of water. The equation below therefore draws on this premise to calculate baseline emissions.

$$BE_{b,y} = B_{b,y} * ((f_{NRB,b,y} * EF_{b,fuel, CO2}) + EF_{b,fuel, nonCO2}) * NCV_{b, fuel}$$

Vintage Year 2011

Vintage Year 2011

$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO2}) + (EF_{b,fuel,CH4} + EF_{b,fuel,N2O}) * NCV_{bfuel}$$

$$f_{NRB, b, y} = 0.92$$

$$EF_{b, fuel, CO2} = 112$$

$$EF_{b, fuel, CH4} = 6.3(0.3*21)$$

$$EF_{b, fuel, N2O} = 1.24 (0.004*310)$$

$$NCV_{b, fuel} = 0.015$$

$$= 8.308 \text{ tCO}_2\text{e (per filter, per year)}$$

Vintage Year 2012

$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO2}) + (EF_{b,fuel,CH4} + EF_{b,fuel,N2O}) * NCV_{bfuel}$$

$$f_{NRB, b, y} = 0.92$$

$$EF_{b, fuel, CO2} = 112$$

$$EF_{b, fuel, CH4} = 6.3(0.3*21)$$

$$EF_{b, fuel, N2O} = 1.24 (0.004*310)$$

$$NCV_{b, fuel} = 0.015$$

$$= 8.308 \text{ tCO}_2\text{e (per filter, per year)}$$

Vintage year 2013

$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO2}) + (EF_{b,fuel,CH4} + EF_{b,fuel,N2O}) * NCV_{bfuel}$$

$$f_{NRB, b, y} = 0.92$$

$$EF_{b, fuel, CO2} = 112$$

$$EF_{b, fuel, CH4} = 7.5(0.3*25)$$

$$EF_{b, fuel, N2O} = 1.192 (0.004*298)$$

$$NCV_{b, fuel} = 0.015$$

$$= 8.395 \text{ tCO}_2\text{e (per filter, per year)}$$

Vintage year 2014

$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO2}) + (EF_{b,fuel,CH4} + EF_{b,fuel,N2O}) * NCV_{bfuel}$$

$$f_{NRB, b, y} = 0.92$$

$$EF_{b, fuel, CO2} = 112$$

$$EF_{b, fuel, CH4} = 7.5(0.3*25)$$

$$EF_{b, fuel, N2O} = 1.192 (0.004*298)$$

$$NCV_{b, fuel} = 0.015$$

$$= 8.395 \text{ tCO}_2\text{e (per filter, per year)}$$

~~$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO2}) + (EF_{b,fuel,CH4} + EF_{b,fuel,N2O}) * NCV_{bfuel}$$~~

~~$$f_{NRB, b, y} = 0.92$$~~

~~$$EF_{b, fuel, CO2} = 112$$~~

~~$$EF_{b, fuel, CH4} = 6.3(0.3*21)$$~~

~~$$EF_{b, fuel, N2O} = 1.24 (0.004*310)$$~~

~~$$NCV_{b, fuel} = 0.015$$~~

~~$$= 8.37 \text{ tCO}_2\text{e (per filter, per year)}$$~~

Vintage Year 2012

$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO_2}) + (EF_{b,fuel,CH_4} + EF_{b,fuel,N_2O}) * NCV_{bfuel}$$

$$f_{NRB,b,y} = 0.92$$

$$EF_{b,fuel,CO_2} = 112$$

$$EF_{b,fuel,CH_4} = 6.3(0.3*21)$$

$$EF_{b,fuel,N_2O} = 1.24(0.004*310)$$

$$NCV_{bfuel} = 0.015$$

$$= 8.37 \text{ tCO}_2\text{e (per filter, per year)}$$

Vintage year 2013

$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO_2}) + (EF_{b,fuel,CH_4} + EF_{b,fuel,N_2O}) * NCV_{bfuel}$$

$$f_{NRB,b,y} = 0.92$$

$$EF_{b,fuel,CO_2} = 112$$

$$EF_{b,fuel,CH_4} = 7.5(0.3*25)$$

$$EF_{b,fuel,N_2O} = 1.192(0.004*298)$$

$$NCV_{bfuel} = 0.015$$

$$= 8.46 \text{ tCO}_2\text{e (per filter, per year)}$$

Vintage year 2014

$$BE_y = B_{by} * (f_{NRB,b,y} * EF_{b,fuel,CO_2}) + (EF_{b,fuel,CH_4} + EF_{b,fuel,N_2O}) * NCV_{bfuel}$$

$$f_{NRB,b,y} = 0.92$$

$$EF_{b,fuel,CO_2} = 112$$

$$EF_{b,fuel,CH_4} = 7.5(0.3*25)$$

$$EF_{b,fuel,N_2O} = 1.192(0.004*298)$$

$$NCV_{bfuel} = 0.015$$

$$= 8.46 \text{ tCO}_2\text{e (per filter, per year)}$$

Project emissions

Project Emissions are calculated as follows:

$$PE_{p,y} = B_{p,y} * ((f_{NRB,p,y} * EF_{p,fuel,CO_2}) + EF_{p,fuel,nonCO_2}) * NCV_{p,fuel}$$

$$B_{p,y} = (1 - C_j) * N_{p,y} * W_{b,y} * (Q_{p,rawboil,y} + Q_{p,cleanboil,y})$$

Vintage Year 2011

$$PE_{y,y} = B_{p,y} * (f_{NRB,b,y} * EF_{b,fuel,CO_2}) + (EF_{b,fuel,CH_4} + EF_{b,fuel,N_2O}) * NCV_{bfuel}$$

$$f_{NRB,b,y} = 0.92$$

$$EF_{b,fuel,CO_2} = 112$$

$$EF_{b,fuel,CH_4} = 6.3(0.3*21)$$

$$EF_{b,fuel,N_2O} = 1.24(0.004*310)$$

$$NCV_{bfuel} = 0.015$$

$$= 0.103 \text{ tCO}_2\text{e (per filter, per year)}$$

Vintage Year 2012

$$PE_{y,y} = B_{p,y} * (f_{NRB,b,y} * EF_{b,fuel,CO_2}) + (EF_{b,fuel,CH_4} + EF_{b,fuel,N_2O}) * NCV_{bfuel}$$

$$f_{NRB,b,y} = 0.92$$

EFb, fuel, CO2=112
EFb, fuel, CH4=6.3(0.3*21)
EFb, fuel, N2O=1.24 (0.004*310)
NCVbfuel=0.015

=0.103 tCO₂e (per filter, per year)

Vintage Year 2013

PE_y = B_{p,y} * (fNRB_{b,y} * EFb, fuel, CO2) + (EFb, fuel, CH4 + Efb, fuel, N2O) * NCVbfuel

fNRB_{b,y} = 0.92
EFb, fuel, CO2=112
EFb, fuel, CH4= 7.5(0.3*25)
EFb, fuel, N2O= 1.192(0.004*298)
NCVbfuel=0.015

=0.104 tCO₂e (per filter, per year)

Vintage year 2014

PE_y = B_{p,y} * (fNRB_{b,y} * EFb, fuel, CO2) + (EFb, fuel, CH4 + Efb, fuel, N2O) * NCVbfuel

fNRB_{b,y} = 0.92
EFb, fuel, CO2=112
EFb, fuel, CH4= 7.5(0.3*25)
EFb, fuel, N2O= 1.192(0.004*298)
NCVbfuel=0.015

=0.104 tCO₂e (per filter, per year)

Leakage:

There are no leakage emissions from the project activity.

Emission Reductions:

The overall GHG reductions are calculated as follows:

ER_y = (Σ BE_{b,y} - Σ PE_{p,y}) * Up_y - Σ LE_{p,y}

Period	Emission Reduction (tCO ₂ e)
28/12/2011-31/12/2011	67.74
1/1/2012-31/12/2012	9,373.10 306
1/1/2013-31/12/2013	13,809.14 824
1/1/2014-21/07/2014	8,251.89 41
Total	34,145 31,500

Opinion:

The verification team confirms that

- The complete data set for the monitoring parameters was available as mentioned in the monitoring plan in the registered PDD for the duration of 28/12/2011 to 21/07/2014
- The cross checks were undertaken for all the parameters indicated in the respective sections and were found complying with the requirements of the monitoring plan of the registered PDD;

- c) Appropriate methods and formulae for calculating baseline emission, project emissions and leakage have been followed ;
- d) The claimed emission reductions are free from material errors, omissions or misstatements, with a reasonable level of assurance.

3.9 Quality of Evidence to Determine Emission Reductions

The evidences (Documents/interview/site visit) referred for verification of individual monitoring parameter and fixed parameters are defined section 3.5 and section 3.7 respectively. It can be confirmed by the assessment team that the reported emission reductions have been conservatively calculated. A list of referred documents for verification is also included in section 6 of this report.

3.10 Management System and Quality Assurance

Aqua Clara Foundation has developed a GHG emission reduction management system for management of the project. The procedures cover the quality assurance of the monitoring systems for the project activities. The monitoring is in the purview of The Carbon Asset Development Consultant, Viability Africa^{/16/}.

Out of the total installed filters, the verification team has chosen a sample size of 65 filters. The household sampled in the survey during site visit, were cross verified with the sales record as well as with monitoring survey record to confirm the correctness of the data gathered at the time of survey. The result of verification team's observation based on the chosen sample are found consistent with the sales record. No discrepancy was found during on site visit. Thus, according to the result of verification team's random sampling as a part of the on site visit, the water filters were found installed and operating as per PP's sales records

4. RECOMMEDATIONS / FORWARD ACTION REQUEST

A FAR was raised during validation regarding post registration baseline survey/water boiling tests prior to 2nd issuance considering in a representative way the target population in the project boundary and considering households prior to adopting the project technology. The same has been kept as FAR#09 in this monitoring period as it is pertinent to 2nd issuance. Please refer section 7 for details.

In addition to this three FARs are raised during GS review and same has been included as FAR#10 FAR#11, and FAR#12 in section 7 of this report.

5. VERIFICATION & CERTIFICATION STATEMENT

KBS Certification Services Pvt. Ltd. has been contracted by Aqua Clara Foundation to undertake independent verification and certification for the greenhouse gas (GHG) emission reductions reported from the Aqua Clara Water Filtration Program in Kenya, GS Id. 1078 for the monitoring period 28/12/2011 up to 21/07/2014 in the Monitoring Report Version 01 (first version) dated 17/08/2014.

The verification is based on the registered PDD, GS Passport and the monitoring report for this project. Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the Gold Standard Board.

The management of the Aqua Clara Foundation is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Final Monitoring Report Version 065 dated 2708/01/2015. The calculation and determination of GHG emission reductions from the project is the responsibility of the management of the Aqua Clara Foundation. The development and maintenance of records and reporting procedures are in accordance with the Monitoring Report Version 065 dated 2708/01/2015

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the monitoring period 28/12/2011 up to 21/07/2014 based on the reported emission reductions in the Final Monitoring Report Version 065 dated 2708/01/2015 for the same period.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, KBS planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

KBS confirms the following;

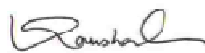
Reporting period: From 28/12/2011 up to 21/07/2014

Verified and certified emission in the above reporting period:

	Amount	Unit
Gold Standard Voluntary emission reductions (GS VERs)	34,14531,500	tCO2e

Location: Faridabad

Date: 2810/01/2015



Kaushal Goyal

Managing Director

KBS Certification Services Pvt. Ltd.

6. REFERENCES

/1/	Registered Project Design Document dated 19/05/2014
/2/	Emission Reduction sheet (corresponding to registered PDD)
/3/	Validation Report dated 12/06/2014 issued by Carbon Check (Pty) Ltd.
/4/	Gold Standard passport dated 18/02/2014
/5/	Monitoring report version 01 dated 17/08/2014 Monitoring report version 02 dated 11/09/2014 Monitoring report version 03 dated 24/11/2014 Monitoring report version 04 dated 10/12/2014 Monitoring report version 05 dated 08/01/2015 <u>Monitoring report version 06 dated 27/01/2015</u> -(Final)
/6/	GS methodology: Technologies and Practices to Displace Decentralized Thermal Energy Consumption (Version 1.0; Dated 11/04/2011)
/7/	Emission Reduction (ER) Sheets
/7.1/	ER Sheets corresponding to version 01
/7.2/	ER Sheets corresponding to final version
/8/	Monitoring Survey and Usage Survey Records
/9/	The Gold standard Toolkit Version 2.2
/10/	CDM Validation and Verification Standard version 7.0
/11/	Aqua Clara Foundation: Total Sales Record for the filters sold till May 2014
/12/	Sale Receipts issued to the households by Aqua Clara Foundation
/13/	ACF: Monitoring Survey Template and filled forms
/14/	VER transfer sheets signed by Local chiefs on behalf of End users
/15/	Sampling and surveys for CDM project activities and programmes of activities" (version 04.1)
/16/	Viability Africa: Contract for Professional Services (Dated 23/03/2011) signed between Aqua Clara Foundation and Viability Africa, LLC
/17/	Certificates of Appointment and Training issued by Aqua Clara Foundation
/18/	Laboratory test results for the water samples collected from the surveyed household
/19/	3M Petri film Instructions manual.
/20/	Default values of fraction of non-renewable biomass http://cdm.unfccc.int/DNA/fNRB/index.html
/21/	IPCC Fourth Assessment Report: Climate Change 2007 http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html
/22/	Gold Standard Foundation: http://www.cdmgoldstandard.org
/23/	Markit Environmental Registry: 1. http://www.markit.com/sites/en/products/environmental/markit-environmental-registry-public-view.page 2. https://products.markit.com/home/index.jsp#REGISTRY.ProjectIssuance.ProjectIssuance

/24/	Details of site visit conducted on 5 th Sep to 8 th Sep 2014
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7. FINDINGS DOCUMENT

Summary of findings	CAR	CL	FAR
	08	Nil	04

Date	Type & Number	Raised by	Reference
08/09/2014	CAR#01	Assessment Team	D-30

Non conformities raised

1. The section A.1 of MR is not filled as per the guidelines to fill MR. The Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.) are not included.
2. The start date of crediting period is indicated as 01/02/2012 in the registered PDD; however the crediting period start indicated in the monitoring report is 13/06/2012. Please Clarify.

Project Participant's response

Date: 11/09/2014

1. The PP has amended section A.1 of the Monitoring report to reflect the relevant date of the project activity as prescribed in the guidelines to fill the MR.

2. The project activity was registered on 14th June 2014. The PP therefore set the start date of the crediting period as per the GS guidelines for retroactive crediting, which states that:

"Retroactive crediting in all conditions is limited to a maximum of 2 years prior to GS registration¹".

The crediting period for the project activity goes back 2 years prior to the registration date, which is 13/06/2012, as provided in the Monitoring report. The difference between the start of the crediting period in the registered PDD and the monitoring report arose because at the time of registration of the PDD, the PP had conducted the monitoring exercise in February 2014, which was later disqualified as registration had not taken place. The PP went on to have a new monitoring exercise on 22 July 2014. For this new monitoring, the project's crediting period was based on the date of registration.

Documentation Provided as Evidence by Project Participant

Revised Monitoring Report version 2.0

Information Verified by Team Leader

Date of review: 16/09/2014

Revised Monitoring Report version 2.0

Reasoning for not acceptance or close out

1. The relevant dates has been included in section A.1 of MR and the section is now in line with the guidelines to fill MR. Hence issue is closed.
2. The justification has been provided for the change in start date of crediting period. The same is in line with the GS guidelines; hence issue is closed.

Date of acceptance or non- acceptance

Date: 16/09/2014

Status: Closed

Date	Type & Number	Raised by	Reference
08/09/2014	CAR#02	Assessment Team	D-30

Non conformities raised

¹ http://www.goldstandard.org/wp-content/uploads/2011/11/New-micro-scale-scheme-rules_Final.pdf

1. The unique identification no. of the entire households is not provided in the total sale Record spread Sheet and Monitoring Survey Summary Sheet.
2. There is also repetition of Unique Identification no for the installed filter; for instance cell D87 and D92 of July 2012 to June 2013 Sheet. Please check the complete database for the same.
3. Monitoring Survey Summary - The values in the result analysis sheet are not correctly transferred from the data sheet; for instance the "Average Number of people per household" is indicated 0. Please check.

Project Participant's response	Date: 11/09/2014
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1. The filter numbers have been assigned to their respective filters in both the Total Sales Record and monitoring survey summary sheet.
2. The Total sales Record has been amended pursuant to the DOE's comment.
3. The PP has amended the results tab of the monitoring survey summary sheet to reflect the correct values.

Documentation Provided as Evidence by Project Participant

1. Total Sales Record
2. Monitoring Survey Summary sheet

Information Verified by Team Leader	Date of review: 16/09/2014
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1. Total Sales Record
2. Monitoring Survey Summary sheet

Reasoning for not acceptance or close out

1. The Unique Identification no. for all the filters sold has been included in the revised sales record. The same has been cross checked from the sale receipts and found correct
2. The correction has been made in the revised sheet; hence issue is closed
3. The corection has been made and now values in result sheet are linked with the data analysis sheet ; hence issue is closed.

Date of acceptance or non- acceptance	Date: 16/09/2014	Status: Closed
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Date	Type & Number	Raised by	Reference
08/09/2014	CAR#03	Assessment Team	D-30

Non conformities raised

1. In the emission reduction spread sheet round down function is not applied on the emission reduction values.
2. The Global warming potential of CH₄ and N₂O is taken as 25 and 298 respectively for the whole monitoring period; however the monitoring period also includes the Year 2012.

Project Participant's response	Date: 11/09/2014
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1. The PP has amended the emission reduction spread sheet to show rounded down figures.
2. The PP has modified the ER calculations such that the monitoring period between June 2012 and December 2012 use the GWP values for CH₄ and N₂O from the IPCC's 2nd assessment report.

Documentation Provided as Evidence by Project Participant

Emission Reduction Calculation Spread sheet version 2.0

Information Verified by Team Leader	Date of review: 16/09/2014
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Emission Reduction Calculation Spread sheet version 2.0

Reasoning for not acceptance or close out

1. The round down function has been applied on the emission reduction value in the revised spread sheet; hence issue is closed
2. The global warming potential of CH₄ and N₂O has been reivsded for the part of monitoring period unde 1st commitment period and a value of 21 and 310 is applied respectively. Hence issue is closed.

Date of acceptance or non- acceptance	Date: 16/09/2014	Status: closed
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Date	Type & Number	Raised by	Reference
08/09/2014	CAR#04	Assessment Team	FAR #1 of validation report
Non conformities raised			
1. PP is requested to clarify How the VER transfer (waiver of carbon rights by end users of the technology) involving indirect communication mechanism i.e., through county representatives and village chiefs. 2. How the end users of the technology were informed about waiving off their carbon rights by county representatives and village chiefs.			
Project Participant's response		Date: 11/09/2014	
1. The method on indirect communication between the project developer and the final filter end user was used for filters installed prior to registration. The PP used phone calls as well as door-to-door end-used education on the concept of VER transfers. Thereafter, the PP solicited VER transfer letter from village chiefs as evidence of the transfer. 2. The end users were informed on the transfer of carbon credits through the PP via personal phone calls and via the chiefs/ county representatives.			
Documentation Provided as Evidence by Project Participant			
VER transfer letters			
Information Verified by Team Leader		Date of review: 16/09/2014	
VER transfer letters			
Reasoning for not acceptance or close out			
1. The VER transfer letters are checked and the same has also been confirmed during the site visit by interviewing the end users. It is found that the end user were aware of the waiver of VER transfer; hence the issue is closed 2. It is confirmed that the end users were informed about the transfer of carbon credits individually and through village chief as well; hence issue is closed.			
Date of acceptance or non- acceptance		Date: 16/09/2014	Status: closed

Date	Type & Number	Raised by	Reference
08/09/2014	CAR#05	Assessment Team	FAR #2 of validation report
Non conformities raised			
1. Please explain, how the monitoring of SD indicators for the retroactive crediting period has been done in accordance with sustainability monitoring plan stated in section G of the Gold Standard Passport?			
Project Participant's response		Date: 11/09/2014	
For retroactive crediting in the 2 years prior to registration of the project activity, the PP adhered to biennial monitoring of the Sustainable Development indicators as per section G of the GS passport. All the parameters have been monitored once in the 2 years prior to registration of the project activity. In the subsequent monitoring periods, SD indicators will be monitored annually as indicated in the registered PDD.			
Documentation Provided as Evidence by Project Participant			
N/A			
Information Verified by Team Leader		Date of review: 16/09/2014	
N/A			
Reasoning for not acceptance or close out			
This has been confirmed from the monitoring report that all the Sustainable Development indicators has been monitored biennially for the current monitoring period as stated in the footnote in section G of the Gold standard passport. The same will be monitored annually for the subsequent monitoring period; hence issue is closed.			
Date of acceptance or non- acceptance		Date: 16/09/2014	Status: Closed

Date	Type & Number	Raised by	Reference
08/09/2014	CAR#06	Assessment Team	FAR #3 of validation report

Non conformities raised		
1. PP is requested to submit the usage surveys and monitoring surveys and also confirm that the same has been mentioned as deviation from the monitoring plan in the monitoring report.		
Project Participant's response	Date: 11/09/2014	
The PP has provided scanned copies of the usage surveys and monitoring surveys as supporting documents. Deviation from the monitoring plan with regards to frequency of monitoring of the Sustainable Development indicators has been mentioned in section B.2.1 of the monitoring report.		
Documentation Provided as Evidence by Project Participant		
Scanned copies of the monitoring surveys		
Information Verified by Team Leader	Date of review: 16/09/2014	
Copies of Monitoring Survey		
Reasoning for not acceptance or close out		
The survey sheet for monitoring and Usage survey has been submitted and checked by the verification team. This has also been indicated as deviation from the monitoring plan in the revised monitoring report. Hence issue is closed.		
Date of acceptance or non- acceptance	Date: 16/09/2014	Status: Closed

Date	Type & Number	Raised by	Reference
08/09/2014	CAR#07	Assessment Team	FAR #4 of validation report
Non conformities raised			
The PP shall conduct a post registration baseline survey/water boiling tests prior to 2nd issuance considering in a representative way the target population in the project boundary and considering households prior to adopting the project technology. Please clarify?			
Project Participant's response		Date: 11/09/2014	
The PP has scheduled this exercise to occur prior to the second issuance.			
Documentation Provided as Evidence by Project Participant			
N/A			
Information Verified by Team Leader		Date of review: 16/09/2014	
N/A			
Reasoning for not acceptance or close out			
Since this is the first issuance request for the project activity; the project particiapnt will address this issue before the 2nd issuance. Hence the same is kept as FAR for the next verification.			
Date of acceptance or non- acceptance		Date: 16/09/2014	Status: Converted to FAR#09

Date	Type & Number	Raised by	Reference
08/09/2014	CAR#08	Assessment Team	FAR #5 of validation report
Non conformities raised			
How it is ensured that monitoring surveys clearly account for the suppressed demand situation. That means, the PP shall structure the surveys in such a way that it is possible to identify the fraction of households, which do not boil water even though they would have sufficient resources for boiling.			
Project Participant's response		Date: 11/09/2014	
To account for suppressed demand situation, the PP included in the Monitoring Survey the following questions:			
a) Do you currently treat your water before drinking?			
b) If No, give a reason why (distance too far, expensive, lack of awareness)			
c) What would be your likely treatment option should the barrier be removed (boiling, treatment chemicals, other)			
In so doing, the PP was able to find out those who consumed raw water, but would have consumed boiled water should the barrier impeding such action be removed. This information was summarized in the Monitoring survey summary excel sheet provided as a supporting document to the DOE.			

Documentation Provided as Evidence by Project Participant		
N/A		
Information Verified by Team Leader	Date of review: 16/09/2014	
N/A		
Reasoning for not acceptance or close out		
The questionnaire for the monotoring survey included the question to address the situation of Suppressed Demand. The responses of the end user have also been cross chekced from the monitoring summary sheet and found to be corect. Hence the issue is closed.		
Date of acceptance or non- acceptance	Date: 16/09/2014	Status: Closed

Date	Type & Number	Raised by	Reference
16/09/2014	FAR#09	Assessment Team	CAR#07
Non conformities raised			
The PP shall conduct a post registration baseline survey/water boiling tests prior to 2nd issuance considering in a representative way the target population in the project boundary and considering households prior to adopting the project technology.			

Date	Type & Number	Raised by	Reference
11/12/2014	FAR#10	Assessment Team	GS Review FAR#1
Non conformities raised			
The PP shall ensure that a proper question related to the last water filtration and to check if tap/external parts of the filter are in a good working order will be added to the monitoring survey for the next verification. This question shall be responded by the enumerator with either Yes or No.			

Date	Type & Number	Raised by	Reference
11/12/2014	FAR#11	Assessment Team	GS Review FAR#2
Non conformities raised			
The PP shall ensure that all vintages will be considered in future samples. If the usage survey reveals an underestimated drop-out rate, the difference related to the 1 st verification period would be compensated by reducing the amount of credits issued in the 2 nd verification period accordingly.			

Date	Type & Number	Raised by	Reference
09/01/2015	FAR#12	Assessment Team	GS Review
Non conformities raised			
This FAR is raised to include the timings and volumetric assessments per session in the next monitoring survey exercise.			

8. CERTIFICATE OF COMPETENCE

Personnel Name:		Gagandeep Kakkar	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☐
Technical Reviewer	☐	Local Expert (India)	☒
Area(s) of Technical Expertise			
Sectoral Scope	Technical Area		
Energy Industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar		
Energy demand	TA 3.1. Energy Demand		
Chemical industry	TA 5.1. Chemical Industry		
Waste Handling and Disposal	TA 13.1 Waste Handling and Disposal		
Approved by (Manager C & T)	Sanjay Kandari		
Approval date:	04/03/2014		

Personnel Name:		Edward M. Momnaye	
Qualified to work as:			
Team Leader	☐	Technical Expert	☐
Validator/Verifier	☐	Financial Expert	☐
Technical Reviewer	☐	Local Expert (Kenya)	☒
Area(s) of Technical Expertise			
Sectoral Scope	Technical Area		
NA	NA		
Approved by (Manager C & T)	Gagandeep Kakkar		
Approval date:	30/08/2014		

Personnel Name:		Sanjay Kandari	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☐
Technical Reviewer	☒	Local Expert (India)	☒
Area(s) of Technical Expertise			
Sectoral Scope	Technical Area		
Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources		
Approved by (Manager C & T)	Mayank Kumar Jain		
Approval date:	09/08/2012		

Personnel Name:		Asim Kumar Jana	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☐
Technical Reviewer	☒	Local Expert (India)	☒

Area(s) of Technical Expertise	
Sectoral Scope	Technical Area
Energy industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar TA 1.2: Energy generation from renewable energy sources
Energy Demand	TA 3.1: Energy Demand
Chemical Industry	TA 5.1: Chemical process industries
Solvents use	TA 12.1: Chemical process industries
Waste handling and disposal	TA 13.1: Waste handling and disposal
Approved by (Manager C & T)	Mayank Kumar Jain
Approval date:	13/04/2012

History of the document

Version	Date	Nature of revision	Reviewed by	Approved by
4.0	14/12/2013	Guidance included/improved	Manager CDM Quality 23/12/2013	Managing Director 23/12/2013
3.1	29/10/2012	Updated for EB69 Annex6	Manager CDM Quality 29/10/2012	Managing Director 29/10/2012
3.0	31/08/2012	Revised for VVS Track	Manager CDM Quality 08/09/2012	Managing Director 10/09/2012
2.0	21/12/2011	Comprehensively revised	Manager CDM Quality 21/12/2011	Managing Director 21/12/2011