



## **GS886 Sustainable Deployment of the LifeStraw Family in Rural Kenya Verification Report - Verification 2 – December 1, 2011 to October 31, 2012**

**December 27, 2013**

### **Introduction**

This report presents the project proponent, Vestergaard Frandsen's, monitored parameters and Gold Standard Voluntary Emission Reduction (VER) calculations for GS886, "Sustainable Deployment of the LifeStraw Family in Rural Kenya" for the second monitoring period, December 1, 2011 to October 31, 2012.

This report includes five sections:

1. Background on project deployment
2. Forward actions required by the verification DOE, ERM CVS, after MR1
3. Forward actions required by the Gold Standard after MR1
4. Monitored parameters outlined in the approved and registered PDD
5. Resultant VER calculations
6. Monitored parameters outlined in the approved and registered Gold Standard Passport

Additionally, the monitoring report package includes referenced documentation, the survey reports and raw data used, and the VER calculation sheets.

There are three surveys that form the data set used in this monitoring report. They are:

1. Two surveys were conducted between April 11 - May 24, 2012 and between October 15 - 31, 2012 by Vestergaard Frandsen of 14,059 and 7,547 households respectively. The total surveys used for the analysis after outliers were removed was 20,220 (13,308 from April-May and 6,912 from October) households. This dataset includes households from across all 32 districts in the project region. Combined, this survey is the primary data set for several monitoring parameters and is referred to hereafter as "**VF-MR2-Survey**". This data is produced by the Vestergaard Frandsen Project Database and stored in VF-MR2-Survey\_Processed.csv. The April/May and October datasets are combined for processing.

Survey conducted in by EXP Agency of 252 households reported in August, 2012 "Vestergaard Frandsen: Lifestraw Family Monitoring Survey Report Western Province, Kenya 8/4/2012" by

EXP Momentum, Kenya. Out of the 252 households, 213 were used for analysis after removing surveys whose responses could not be verified, and those who reported filtering more than 70 liters per day. The survey was also evaluated for households with less than one member and more than 20 members as outliers, but there were none. The purpose was third party spot check of **VF-MR2-Survey**. This report is referred to as “**EXP-MR2-Survey**”.

This report was prepared in collaboration with Manna Energy Limited under contract to Vestergaard Frandsen, and contains reporting information provided by Vestergaard Frandsen and EXP Agency of Nairobi, Kenya.

## **1. Project Background**

Vestergaard Frandsen is a European-based company specializing in disease control products and operating under a unique Humanitarian Entrepreneurship business model. The company’s strategy is focused on strong support of the MDGs, particularly improving maternal health, reducing child mortality, combating HIV/AIDS, malaria, and reducing the number of people without access to safe drinking water. The company focuses on innovating technologies, building health service delivery models and identifying innovative financing mechanisms to support sustainable and scalable solutions for the developing countries.

The LifeStraw® Family is a point-of-use microbial water treatment system intended for routine use in low-income settings. The system can filter up to 18,000 liters of water, enough to supply a family of five with microbiologically clean drinking water for three years. This removes the need for repeat intervention. The system requires neither electricity nor additional consumables beyond the unit itself. LifeStraw® Family complies with the US Environmental Protection Agency’s “Guide Standard and Protocol for Testing Microbiological Water Purifiers,” and meets WHO testing guidelines to be considered “Highly Protective”, providing treated water that is as good or better than boiling for microbiological contamination.

In April and May, 2011, 877,505 LifeStraw® Family water filters were distributed to approximately 91% of all households in the Western Province of Kenya. The distribution program, called “Carbon for Water,” has provided more than four million residents with quick access to safe drinking water at the household level.

The program was solely funded by Vestergaard Frandsen and implemented in partnership with the Kenyan Ministry of Public Health and Sanitation and through collaborations with the Ministry of Education and the National Environment Management Authority.

In July August, 2011, April/May 2012 and again in October 2012, health education campaigns were implemented providing household level health education and LifeStraw water filter training. Each campaign used approximately 1,900 community health workers and approximately 4,000 local employees total to go door-to-door to nearly 90% of all households that had received a LifeStraw family filter.

Each community health worker that visits a household on behalf of the Carbon for Water program, not only trains household members on proper use of the LifeStraw Family filter, but

also emphasizes the importance of complementary hygiene and sanitation practices as well as safe storage. Our household training curriculum includes a variety of important messages about safe storage and exclusive use including:

- Children should carry drinking water outside of the home to school
- Adults should carry safe drinking water outside of the home to work and to the farm
- Households should have a designated safe storage container that:
  - Is only used for safe, treated water
  - Is never used to collect water from the water source
  - Has a small opening and cover to prevent contaminants
  - Is cleaned at least once per week with safe water
- Households are also encourage not to dip dirty utensils or hands into the safe storage container, and rather to pour water from the container into other vessels so as to avoid contamination

The household level training curriculum also covers hand washing including these messages:

Households should use LifeStraw filtered water and soap to wash their hands. This will be most effective at killing germs and preventing you from getting sick.

- **Remember to wash your hands:**
  - Before preparing food
  - Before eating food
  - After using the toilet
  - After cleaning up a child
  - Before and after caring for someone sick
  - After touching an animal or animal waste
  - Before and after treating a wound

In addition to household level training and education campaigns, the company is operating 32 district-level, maintenance and education facilities, staffed and managed by 46 Kenyans, accessible by each recipient to ensure on-going program success. In addition to offering free replacement and repair services for the LifeStraw filters, the full-time organization focuses on effective community engagement. Extensive social mobilization and community education initiatives are being implemented in schools, in collaboration with the Ministry of Education, among community groups in collaboration with village chiefs, women’s groups, and other opinion leaders, and integrated into health services. Health impact and sustainability studies are being developed to further build the evidence base around this large scale initiative. There are few other water treatment programs that can demonstrate this level of commitment to sustainability and success.

The program has been structured as follows to date:

<b>Milestone</b>	<b>Dates</b>
Initial Distribution, including household level education by	Completed by June 1, 2011

community educators	
Education Campaign 1	August 31 – September 30, 2011
MR1 Survey	August - September, 2011
Education Campaign 2	April 11 – May 24, 2011
MR2 Survey	April 11–May 24, 2012 & October 15-31, 2012
EXP MR2 Survey	August, 2012
Education Campaign 3	October 15 – November 14, 2012

## 2. Forward actions required by the verification DOE, ERM CVS, after MR1

**FAR1:** It appears that several questions in the monitoring surveys conducted were presented in a manner that limits the interviewee’s response options.

Specifically: (a) The EXP-MR1-FAR-Survey asked the question: “Before receiving LifeStraw Family, if the time and money it takes to gather or buy wood and boil your water were not a problem, would you have boiled it to make sure it was safe? Yes or no? If No explain.” It appears that this question limits household responses to yes or no on water boiling as the preferred method as opposed to an open ended question allowing the household to give any response (e.g., Before receiving LifeStraw Family, if time, money, and resources were limitless, how would you make sure your water was safe?).

It should be noted, however, the verification team did ask an open ended question during its household interviews and determined Xboil to be close to 0.8. As such, this value is deemed appropriate by the verification team.

(b) In the VF-MR1-Survey questionnaire, the question to get at Lbl,i,y does not ask about other potential uses of filtered water – e.g., for cooking and making tea. The question appears to limit responses on other uses of treated water.

It should be noted, however, the verification team did ask an open ended question during its household interviews and determined that approximately 50% of respondents use 25% of their water for noncreditable purposes. The Project Proponent addressed this by applying a non-creditable usage discount to the carbon emission reduction calculations leading to a reduction in VERs claimed, which was deemed appropriate by the verification team.

**FAR: Project developers should ensure during the next required surveys that the questions are presented in an open ended manner.**

*PP Response:*

*The questions included in VF-MR2-Survey, as required during the verification period by the Monitoring Plan, were revised to correct for these observations and design questions in an open ended manner to reduce risk of reporting bias or leading respondent answers.*

*The survey included explicit questions about filtered water use for both creditable as well as non-creditable purposes. This was done for the relevant question in VF-MR2-Survey “What do*

*you use the LifeStraw filtered water for?” with the following choices read aloud to survey respondents:*

- *Drinking*
- *Washing hands*
- *Cleaning fruits and vegetables*
- *Feeding livestock*
- *Washing linens*
- *Cooking*
- *Making coffee or tea*
- *Other*

*This was followed by quantification of filtered water used for creditable purposes and quantification of filtered water used for noncreditable purposes.*

*With reference to FAR1.a, Xboil will be similarly revised to avoid a leading question the next time that Xboil will be measured. This parameter is included in the Monitoring Plan to be measured once every two years and thus was not included in the VF-MR2-Survey.*

*This question will be surveyed again before two years have expired from the previous survey. The following questions will be translated and piloted, per guidance provided by the DOE after MRI:*

*“If you did not have the LifeStraw Family now, and time, money, and resources were limitless, how would you choose to make your water safe?”*

*Multiple choice answers will be provided to the enumerator which will NOT be read to the interviewee, including:*

- *Boiling*
- *Filtering*
- *Chlorine*
- *Other (write in)*

*The surveys used in VF-MR2-Survey were reviewed internally as well as externally by members of academic institutions including the University of California at San Francisco. Once finalized, the survey questions were piloted in the communities to ensure that respondents understood the revised questions. Future surveys that include Xboil and other parameters that are measured will undergo a similar review process.*

## **FAR2:**

Electronic copies of records that are crucial for the verification process are not stored in a central data bank which is backed up. Electronic copies are kept on the hard drives of laptops of personnel (e.g., District Co-ordinators) who work for the company but do not have VF laptops. Examples of documents and data that are kept in this way include:

- Scanned copies of Stock Cards
- Distribution Stock Data.xlsx
- Raw data of LifeStraw Family units distributed
- Stock Control cards

**FAR: Project developer should compile a register of all documents related to the monitoring parameters that may be used for verification purposes and capture this on a central databank which is virus protected and backed up.**

*PP Response:*

*All program documents are stored on a shared drive as part of the Project developer central server based in Switzerland and backed up in two additional locations. The Project developer has also integrated a shared file database and intranet software for faster access to shared files both on and offline. The shared files include all program management documents including documents related to the monitoring parameters required for the verification process. The shared drive is accessible to program management in the US, Switzerland, Kenya as well as to on the ground management staff in Western Kenya.*

*The process of stock management has been streamlined and developed into an electronic reporting system. The warehouse managers at the district level use phone based applications to report the balances and any stock movements from the warehouses. The data is consolidated and the reports on stock levels, consumption of spare parts and LifeStraws and re-order levels are made available on a webpage. The Area Coordinators are responsible for conducting audits at the district service centers in addition to physically verifying the stocks at the end of each month. The District Coordinators maintain paper record backup of the balances and consumption of each inventory item. These paper reports are verified by the Area coordinators monthly..*

*The Central Warehouse manager also makes use of the phone applications in addition to paper back up for stock keeping. She is also responsible for conducting impromptu audits at the district warehouses based on the electronic reports. A method of Forced Ordering System is employed for stocking the district Service centers whereby re-order levels are automatically calculated from historical data and all the Service Centers are re-stocked semi-annually.*

*The electronic reporting has been in pilot since July 1, 2012 and has been fully transitioned in September, 2012 along with the re-ordering system.*

**FAR3:**

The monitoring mechanisms that are implemented to conduct internal verification of parameters are the conduct of surveys. The quality assurance and checks for this are the independent surveys that were conducted by EXP. Training records that are available for the MR1 survey were incomplete and did not indicate the date of training as well as the type of training that was conducted. The project proponent did not ensure competency evaluations were conducted for these surveyors based on the fact that it was deemed that researchers were experienced. Training records for the EXP researchers were also not available, although, based on discussions with

EXP, steps were taken (e.g., shadowing researchers) to ensure surveys were being conducted correctly.

**FAR: Project developer should ensure that complete training and competency records are available for surveyors and researchers for any future surveys to be conducted.**

*PP Response:*

*The Project Developer revised the training curriculum and included survey training with comprehension testing as well as roll play to improve QA measures. The Project Developer ensured that all surveyors were recruited and evaluated with at a minimum grade threshold and preference was given to those surveyors with a University and/or Masters degree. Complete training records were kept for all surveyors used to conduct VF-MR2-Surveys. The Project Developer and EXP Agency implemented new, more comprehensive, training guidelines, protocols and improved training curriculum for the VF-MR2-Surveys. Training records were reviewed and competency testing was part of the surveyor training. The Project Developer reviewed all EXP proposed surveyors, observed training and observed the competency testing, done both in the training facility as well as field based competency training.*

### **3. Forward actions required by Gold Standard after MR1**

**FAR 1 – PP shall ensure that the SD indicator Air quality is monitored and provide Kitchen Surveys and relevant academic reports or literature using decreased fuel as a proxy for improved air quality in time for the next issuance.**

*In the accepted response, the PP stated: “Consistent with the approved GS Passport for this parameter, the PP will either provide literature or survey a sample of recipient households and determine if there has been decreased fuel usage, which will be then used as a proxy for improved air quality for the next monitoring period.”*

*In response to this FAR, please refer to the monitored SD indicator Air Quality, wherein the PP has demonstrated that the households in the **EXP-MR2-Surveys** indicated that, conservatively, households have saved approximately 20% of their daily biomass fuel use. Additionally, the survey conducted by the PP in April and May, 2012 asked these two questions:*

<i>Question39</i>	<i>How many pieces of wood did you use every day before LifeStraw?</i>
<i>Question40</i>	<i>How many pieces of wood do you use now?</i>

*On average, across over 12,200 surveys, households reported saving over 3.22 pieces of wood, per family. Overall for the project area there was an average of 24% reduction in fuel use and 34% of households reported some form of wood savings. This data is presented in the Excel file “VF-MR-2-Survey-Processed” on sheet Apr-May in column BK and averaged in sheet “Results (combined), rows 20-22, and the MR.*

*Therefore, the project proponent assigns a positive (+) score for this project on this indicator.*

**FAR 2- PP shall demonstrate how the water filters were safely disposed in time for the next issuance.**

*The PP has instituted a repair and replacement program, where all collected water filters are logged in the electronic inventory tracking system. Reusable parts are refurbished and redistributed. To date, all broken or unusable parts are stored by the PP at the Central Warehouse for research and tracking purposes.*

#### **4. Monitored parameters in PDD**

The sections below present the monitoring parameter tables from the PDD, as revised and updated to reflect the resultant data values, sources, and justifications.

#### **Additional Quality Assurance Steps to Improve the Robustness of $U_y$**

During the issuance review for the current verification period, the Gold Standard received comments from NGOs related to the usage rate that was reported in the monitoring and verification reports. In order to respond to questions from the NGO community, the Gold Standard commissioned an independent expert group to review Vestergaard's survey data and methodologies in order to assess the robustness of the data presented as usage  $U_y$ . Vestergaard agreed it would be beneficial to have feedback from reviewers, and the Gold Standard proceeded to contract an independent group comprised of members from Berkeley Air Monitoring Group and George Washington University.

Their study methodology included:

- Review of all Vestergaard survey, training and verification materials
- Repeat of calculations and processing steps
- Comparison of Vestergaard survey questions to the WHO HWTS Toolkit
- Literature review of water filtration studies and characterization of usage indicators used in studies in comparison to Vestergaard's survey
- In-depth interviews with seven HWTS experts about ideal usage questions, and four experts also completed surveys to characterize strength of VF questions
- Interviews with Vestergaard enumerators and auditor to determine how questions were asked in the field and understand the context
- The group then provided a summary of best practice usage questions and analyzed Vestergaard survey questions using that context
- Recommendations were then made about the usage rate for the current verification period, and future recommendations were made with regards to establishing a compendium of indicators to be used in future surveys.

Results: Based on the methods and analysis performed by the expert review team, the recommended compendium of indicators that was used for this verification period included (the actual processing steps are provided in greater detail below):

- What do you use to make your water safe now?
- How frequently do you filter water?
- Quantity of water filtered per day
- Ability to demonstrate filtering

- Ability to demonstrate backwashing
- Users reporting cleaning of pre-filter and backwashing
- Ability to identify the correct tap used for safe water
- Presence of LifeStraw filtered water in a storage container.
- Filters did not need a replacement part

The use of these indicators resulted in a recommended rate for  $U_y$  of 74.98%. These questions were based on what was available from previous Vestergaard surveys. The reviewers also issued recommendations for future assessments of usage.

These included:

- Use of a question about the filter hanging properly in the home and an additional question that asks why filters were not hanging correctly.
- Use of a question about whether the filter is broken or not functioning at the time of the visit to clear up ambiguity about replacement parts
- Those who do not report cleaning the pre-filter or backwashing should not be included as users
- Questions about ability to identify the safe water tap should be used (this will be included in the ability to properly demonstrate filtering)
- Households should be able to properly demonstrate how to use the filter?
- Households should be able to demonstrate how to backwash the filter
- Questions should be directed towards primary users to ensure accuracy of responses
- Presence of LSF filtered water in the safe storage container should be used
- Questions about the presence of a designated safe storage container should be used to report on health related outcomes, but not in the calculation of  $U_y$
- Sensors should be used in a sub-set of households to confirm usage

Based on the recommendations from the report, Vestergaard has validated a new compendium of questions with the independent group and with the Gold Standard to be used in future surveys to establish the rate of  $U_y$ . These will be piloted and used for the next verification period. Vestergaard will also look into obtaining sensors for a subset of households, although given the next verification period has already passed, they will not be employed immediately. Finally, an additional recommendation was that Vestergaard ensure that the primary users of the LifeStraw are the ones being interviewed to ensure that the assessments of demonstration and other indicators are as accurate as possible.

## **Processing Steps for current MR2 Survey**

### **Addressing Outliers:**

The first step of the processing was to remove any outliers with households containing fewer than 1 person and greater than 20 persons. Prior to applying this step, the raw data for the period of April 11- May 24, 2012 showed 14,059 entries, and from October 15-31, 2012 showed 7,547 entries. After this step was applied, 37 were removed from the April-May survey and 0 were

removed from the October survey. This resulted in a total of 14,022 after step 1 for the April-May dataset and 7,547 after step 1 for the October dataset.

Step 2 was also implemented to address outliers, by eliminating households that claimed to be filtering more than 70 liters per day. We assumed a conservative value of the cartridge flow rate of 12 liters per hour (the lower end of the cartridge flow rate range of 12-15L/hr). We also assumed that about the maximum amount of time that a mother or domestic help (houseboy/housegirl) would devote to filtering in a day may be done over a 6 hrs. period (This is based on an 8 hr work day balanced with other activities like cooking and daily households chores such as fetching water and fuel while filtering is in progress). Therefore, filtering for 6 hours gives you 72 liters - we rounded down to 70 to be conservative.

After step 1 the total number in the dataset for April-May was 14,022 and for October 7,457. 714 outliers were removed from the April-May dataset and 635 outliers from the October dataset based on step 2. This resulted in 13,308 remaining in the April-May dataset and 6,912 remaining in the October dataset.

The “VF-MR2-Survey-Processed.xlsx” document presents the transparent processing steps for several of the parameters. The processing steps and explanations are listed below:

**Table 1: VF-MR2-Survey-Processed.xlsx processing steps**

Step	Action	Explanation
1	Removed Households less than 1 and greater than 20	This step is to account for outliers, by recognizing that households with zero members and more than 20 members are unrealistic.
2	Removed liters filtered per day larger than 70	We assumed that those households that reported filtering more than 70 liters per day, were probably unrealistic based on the time that would be required to achieve more than 70 liters with an average flow rate. These households are therefore removed as outliers.
3	Removed all non-LifeStraw users	Remove those who say they do not use LifeStraw based on the question “What do you use to make your water safe now?”
4	Removed "do not filter water"	Even if people reported they are LifeStraw users, if they answered they do not filter for the question that asks about frequency of filtration, they are removed and considered “non LifeStraw users”
5	Removed "0" and "blank" liters of water per day	If people report using LifeStraw and filtering but in volume filtered per day show zero or blank, they are also removed and considered

		“non LifeStraw users.”
6	If "more than 60" in Z, made Z equal to AA for May Survey	In the May survey, the number of liters filtered per day had options in 5 liter increments and the final option was “more than 60.” If a household indicated more than 60, then a second question asked how much. This step is to get an accurate number for those who answered “more than 60”
7	Remove people who were not able to demonstrate how to filter water using the Lifestraw	We removed any households that were not able to adequately perform a demonstration of the filtration process.
8	Remove people who answer “never” to the question asking about frequency of cleaning the pre-filter and backwashing.	To be conservative, we assumed those households that do not clean the filter or backwash were not active users, and they were removed.
9	Removed households that were not able to demonstrate backwashing.	We removed all households that were not able to properly demonstrate how to backwash the filter.
10	Remove households that did not answer “blue tap” to a question about which tap produces safe water.	We assumed if households were not able to identify the correct tap, they were not active users. This resulted in very few households being removed, but we used this question that was present on the April-May survey in order to be conservative.
11	Remove households that did not have LifeStraw filtered water in a safe storage container.	This question was only asked in the April-May survey. In order to be conservative, we removed all households without filtered water present in a storage container. This question will be revised and asked in future surveys.
12	Removed all households that needed a replacement part on the filter.	This question was only assessed in the October survey to get a sense of repair rates, however, to be conservative we removed all households needing a replacement part. In future surveys, we will ask a question more specific to the functioning of the filter at the time of the visit.
13	Calculate $U_y$ as ratio of households after step 12 over households after step 2	Total households are considered the total remaining after outliers have been removed by steps 1&2. Then, the number after all of the non-users have been removed (steps 3-12) is divided by total households to get $U_y$
14	Calculate $L_{bl}$ liters per person per day at household level, and capped at 6.	Total liters filtered for creditable purposes/ number of family members in the household
15	Calculate Overall Average $L_{bl}$ among users	Average of all $L_{bl}$ calculations among users.
16	Calculate $L_{pj}$ - treated water that is still boiled	Number of liters of water reported to still be boiled/ number of family members for each

		household
17	Calculate overall average Lpj	Average of all Lpj calculations among users is taken
18	Calculate average people in household - Py	Average of all Py among users
19	Calculated 90% confidence interval for mean values	Confidence intervals are calculated and then proper upper and lower bounds are applied to the values for calculations
20	Calculated creditable fuel/stove combination	Included creditable stove types (3-stone and charcoal) and creditable fuel types (wood, wood sticks, charcoal)
21	Calculated wood savings parameters	Calculated wood savings in sticks per day, Reported fuel use reduction per day in project area, percentage reporting some form of wood savings

During the first monitoring period, MR1, the verification DOE raised the concern of how much of the LifeStraw treated water is used for non-creditable purposes. In response to this concern, for the VF-MR2-Survey, additional questions were asked to specifically clarify volumes of water treated for creditable purposes. These were questions 20: “How many LITERS of filtered water does your family use for drinking, washing fruits and vegetables and hand washing each day? (based on amount of the jerry can used)” and 21, “How many LITRES of LifeStraw filtered water do you use for feeding livestock, washing linens, cooking making coffee or tea or the other purposes that were mentioned? (based on amount of the jerry can used)”. The resultant VER calculations considered only responses to question 20, therefore only the creditable volumes were considered.

Additionally, Lbl and Lpj were surveyed under VF-MR2-Survey as “liters of treated water for creditable purposes” and “liters of treated water still boiled” consistent with the direction of the GS Technical Advisory Committee.

<b>Data / Parameter:</b>	$X_{nr,pj,y}$
Data unit:	Fraction
Description:	Non-renewability of woody biomass fuel in year y in project scenario
Source of data:	C4EcoSolutions independent report “Calculation of the Non-Renewable Biomass usage for project areas in accordance with the Gold Standard methodology (Version 02),” as adapted and presented in Annex A of the VF-MR1 Report: Updated Non-Renewable Biomass fraction parameter for GS886 “Sustainable Deployment of the LifeStraw Family in Rural Kenya”.
Value Applied	<b>0.93</b>
Description of measurement methods and procedures	<b>Reference Annex A of the VF-MR1 monitoring report.</b>

applied:	
QA/QC procedures applied:	3 <sup>rd</sup> party study and report
Any comment:	No less than biennial monitoring frequency

<b>Data / Parameter:</b>	$i_y$
Data unit:	Units/year
Description:	Number of LifeStraw® units distributed
Source of data:	Stockroom Counts
Value Applied	<b>877,505</b>
Description of measurement methods and procedures applied:	A detailed stockroom count was kept of all LifeStraw Family distributions during the distribution campaign in May, 2011. The resultant count recorded that the number of LifeStraw Family units listed above were distributed to households in Western Province, Kenya.
QA/QC procedures applied:	Cross check of stockroom counts by Vestergaard supervisors during the campaign deployment.
Any comment:	

<b>Data / Parameter:</b>	$LE_y$
Data unit:	tCO <sub>2</sub> e/y
Description:	Leakage; potential GHG emissions outside project boundary caused by project activity
Source of data:	Calculated based on methods presented in PDD and data collected from total sales record of LifeStraw® Family units produced and distributed.
Value Applied	<b>1,431.766 tonnes</b>
Description of measurement methods and procedures applied:	<p>The distribution stock count (equivalent to total sales record), parameter <math>i_y</math>, is used in combination with the calculations presented in section B.6.1 of the registered PDD for this project, “Leakage to determine the ex-post leakage emissions”. The approved calculation estimates a conservative leakage of 1.673 kg of CO<sub>2</sub> per LifeStraw distributed (representing a 3 year lifetime). Therefore for 877,505 LifeStraws distributed, the pro-rated (for 11 months of the monitoring period out of the 3 year life of the product) production emissions associated are 449 tonnes of CO<sub>2</sub>.</p> <p>In addition, for the MR2, there is additional leakage associated with the household education and monitoring visits conducted over the verification period. A conservative calculation of this leakage is provided below:</p> <p>For each household visit, one community health worker is transported by one motorbike. During the training and education campaign from April – May 2012, there were 2,005 motorbikes contracted for the 26 days of the campaign. Motorbike contracts reflect this. During the Campaign in October, 2014 motorbikes were contracted for a period of 14 working days (reflecting the verification period.)</p> <p>We have made a conservative estimate that each motorcycle travels a maximum of 100 kilometers per day.</p> <p>For the first campaign in the verification period, 2,005 motorbikes *26 days * 100 km = 5,213,000 kms of travel. Using a purpose-built motorcycle emissions</p>

	calculator <sup>1</sup> , and assuming a “medium” engine size and “sometimes” of city driving, this equates to 12.24 tonnes of CO <sub>2</sub> emissions per 100,000 kms and a total of 638 tonnes of CO <sub>2</sub> emissions. Similarly applies, for portion of the 2 <sup>nd</sup> campaign that fell under the audit period: 2,104 motorbikes * 14 days * 100km/day = 2,819,600 kms travelled. Using the carbon emissions calculator, this equates to 345 tonnes of CO <sub>2</sub> emitted. Thus, the total CO <sub>2</sub> emitted from transport activities during the campaign dates that fell in the monitoring period is 983. This is added to the leakage associated with the production of the filters, for a <b>total leakage for MR2 of 1,431.766 tonnes.</b>
QA/QC procedures applied:	Cross check of education visits Vestergaard supervisors during the education campaigns.
Any comment:	Leakage will be applied ex-post as the Total Sales Record and education campaign numbers are updated, and applied prior to each verification. The calculation methodology described will be reviewed with biennial monitoring frequency.

<b>Data / Parameter:</b>	$B_{bl,i,y}$
Data unit:	Tbiomass/y
Description:	Mass of woody biomass combusted in the baseline in year y
Source of data:	Calculation
Value Applied	Please reference “ <b>VF_VERCalculation2ndVerification</b> ”
Description of measurement methods and procedures applied:	Calculated per the methodology (page 35) as shown in section B.6 of the registered PDD for this project.
QA/QC procedures applied:	Calculation
Any comment:	No less than biennial monitoring frequency

<b>Data / Parameter:</b>	$B_{pj,i,y}$
Data unit:	Tbiomass/y
Description:	Mass of woody biomass combusted in the project in year y
Source of data:	Calculation
Value Applied	Please reference “ <b>VF_VERCalculation1stVerification</b> ”
Description of measurement methods and procedures applied:	Calculated per the methodology (page 35) as shown in section B.6.
QA/QC procedures applied:	Calculation
Any comment:	No less than biennial monitoring frequency

<b>Data / Parameter:</b>	$U_y$
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<sup>1</sup> <http://calculator.carbonfootprint.com/calculator.aspx?tab=5>

Data unit:	Percentage
Description:	Usage of water treatment units in place
Source of data:	<b>VF-MR2-Survey</b>
Value Applied	<b>74.98%</b>
Description of measurement methods and procedures applied:	<p>Extensive surveys were conducted in between April 11-May 24 and October 15-31 of 2012 of LifeStraw® Family users, in which households were asked about their usage of the LifeStraw Family.</p> <p>These results are presented in the <b>VF-MR2-Survey-Processed.xlsx</b> as the <math>U_y</math> parameter. . A compendium of indicators were used including self-reported and observational data. These indicators included: responding “LifeStraw” when asked what is used to make their water safe, frequency of filtration is not zero, quantity of water filtered is not zero or blank, household was able to properly demonstrate filtering, household reported greater than zero frequency of cleaning the filter, household was able to properly demonstrate backwashing, household was able to identify the blue tap for safe water, household had LSF filtered water in a storage container, household did not need any replacement parts for the filter. This data was processed as described in Table 1, above.</p> <p>This compendium of usage indicators was recommended by a group of independent expert reviewers contracted by the Gold Standard, additional recommendations have been recommended for future surveys and the new compendium is referenced on page in the monitoring report.</p>
QA/QC procedures applied:	<p>Spot checks by 3<sup>rd</sup> party, EXP Agency as presented in <b>EXP-MR2-Survey</b>. These results, shown on page 13, show a total of 94.37% reported usage.</p> <p>Additional expert review of usage data contracted independently by the Gold Standard, with final report issued in December, 2013.</p>
Any comment:	No less than biennial monitoring frequency

<b>Data / Parameter:</b>	$W_i$
Data unit:	Kg/L
Description:	New stove performance and existing stove performance
Source of data:	Baseline Water Boiling Test (BWBT) Kitchen Test
Value Applied	0.36 - Determined via baseline water boiling tests (see Annex 3 of the registered PDD).
Description of measurement methods and procedures applied:	Reference Annex 3 of the registered PDD, Baseline Information, Baseline Water Boiling Test (BWBT)
QA/QC procedures applied:	Reference Annex 3 of the registered PDD, Baseline Information, Baseline Water Boiling Test (BWBT)

Any comment:	<p>Will be conducted only if the Kitchen Test reveals that the baseline water boiling conditions have materially changed, necessitating a new BWBT.</p> <p>Conditions including significant differences in stove types or fuel mix are monitored annually to assess if BWBT should be reassessed.</p> <p>Because <b>VF-MR2-Survey</b> and <b>EXP-MR2-Survey</b> did not show a material change in stove types or fuel mix, BWBT was not re-evaluated during this verification period. The discount factor of 3% for alternative stoves and fuels determined in MR1 is again applied here in the VER calculations.</p> <p>The VF-MR1-Survey reported that over 97% of respondents are still using 3-stone fires or charcoal fires, and 94% are using wood, or charcoal. The previous MR determined that 97% of stoves were three stone or charcoal. Therefore, there has been no significant change in the cooking practices to warrant new Baseline Water Boiling Tests.</p> <p>Because the PP discounts VER generation by whatever proportion of people are NOT using three stone fires or charcoal fires, which is evaluated every monitoring period, this is a conservative approach that takes into account changing cooking practices.</p> <p>It is in the PP's interest to evaluate the BWBT periodically to increase VER generation. Should the PP never conduct another BWBT, it would be a conservative approach.</p>
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<b>Data / Parameter:</b>	$L_{bl,i,v}$
Data unit:	L/p/d – Liters per person per day
Description:	Raw water treated with the water treatment technology
Source of data:	<b>EXP-MR2-Survey</b>
Value Applied	<b>2.63</b>
Description of measurement methods and procedures applied:	<p>Extensive surveys were conducted in between April 11-May 24 and October 15-31 of 2012 of LifeStraw® Family users, in which households , were asked how many liters of LifeStraw Family filtered water is used per day for creditable purposes (drinking, washing hands, fruits and vegetables).</p> <p>These results are presented in the <b>VF-MR2-Survey-Processed.xlsx</b>, wherein the <math>L_{bl,i,v}</math> parameter is determined described in Table 1, above.</p>
QA/QC procedures applied:	<p>Spot checks by 3<sup>rd</sup> party, EXP Agency as presented in <b>EXP-MR2-Survey</b>. These results, shown on page 15 show the most conservative water use for creditable purposes as 2.63 liters/person/day. VF-MR2-Survey measured 3.27 liters/person/day.</p> <p>Therefore, the <b>EXP-MR2-Survey</b> is more conservative, and is used as the calculation parameter in this report.</p> <p>In any difference observed between EXP-MR2-Survey and VF-MR2-Survey, the more conservative value is applied.</p>

Any comment:	No less than biennial monitoring frequency.  This value will be capped at 6.0, per direction from the Gold Standard Technical Advisory Committee dated January 10, 2012.
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<b>Data / Parameter:</b>	$L_{pj,i,y}$
Data unit:	L/p/d – liters per person per day
Description:	Treated water that is still boiled
Source of data:	<b>VF-MR2-Survey</b>
Value Applied	<b>0.01453</b>
Description of measurement methods and procedures applied:	Extensive surveys were conducted in between April 11-May 24 and October 15-31 of 2012 of LifeStraw® Family users, in which households were asked if they boil any of the LifeStraw water that is used for creditable purposes after they filter, and if so, how many liters of LifeStraw Family filtered water is then boiled.  These results are presented in the <b>VF-MR2-Survey-Processed.xlsx</b> , wherein the $L_{pj,i,y}$ parameter is determined described in Table 2, above, and then the upper bound of the confidence interval is taken as the value applied to be most conservative.
QA/QC procedures applied:	Spot checks by 3 <sup>rd</sup> party, EXP Agency as presented in <b>EXP-MR2-Survey</b> . These results, shown on page 14 show that 0.01 liters of water are boiled for drinking purposes within the spot check population.  Therefore, the <b>VF-MR2-Survey</b> is more conservative; the upper bound of the confidence interval is also applied to be most conservative and is used as the calculation parameter in this report.  In any difference observed between EXP-MR2-Survey and VF-MR2-Survey, the more conservative value is applied.
Any comment:	No less than biennial monitoring frequency.

<b>Data / Parameter:</b>	$P_{i,y}$
Data unit:	p/h
Description:	Average people per LifeStraw® Family unit
Source of data:	<b>VF-MR2-Survey</b>
Value Applied	<b>5.49994</b>
Description of measurement methods and procedures applied:	During the <b>VF-MR2-Survey</b> residents were asked how many people are in their household, served by the LifeStraw Family.  These results are presented in the <b>VF-MR2-Survey-Processed.xlsx</b> , wherein the $L_{bl,i,y}$ parameter is determined described in Table 1, above.
QA/QC procedures applied:	Spot checks by 3 <sup>rd</sup> party, EXP Agency as presented in <b>EXP-MR2-Survey</b> . These results, shown on page 12, show an average of 5.62 people per household.  Therefore, the <b>VF-MR2-Survey</b> is more conservative; the upper bound of the 90% confidence interval is then taken to be most conservative and is used as the calculation parameter in this report.

	In any difference observed between EXP-MR2-Survey and VF-MR2-Survey, the more conservative value is applied.
Any comment:	No less than annual survey.

<b>Data / Parameter:</b>	$X_{boil}$
Data unit:	Fraction
Description:	Percentage of users that would boil water as a form of water treatment
Source of data:	<b>EXP-MR1-FAR-Survey</b>
Value Applied	<b>0.796</b>
Description of measurement methods and procedures applied:	See VF MR1 Report.
QA/QC procedures applied:	<p>EXP Agency reported to the Project Proponent that their survey coordinator reviewed all of the EXP-MR1-FAR-Survey results and took the following quality control and assurance steps:</p> <p>The survey coordinator reconfirmed and clarified results that were ambiguous or seemingly contradictory, or outliers from the rest of the data set.</p> <p>The survey coordinator also randomly selected several households from the survey to re-visit in person or call to re-confirm reported results.</p>
Any comment:	No less than biennial monitoring frequency.

<b>Data / Parameter:</b>	$AF_{pj,y}$
Data unit:	Tfuel/year
Description:	Alternative fuel consumed in the project
Source of data used:	
Value of data applied Value Applied	0.92414
Description of measurement methods and procedures applied:	VF-MR2-Survey. Households were surveyed to determine their primary cookstove type. 88.63% of households reported using a 3-stone fire, of which 94.05% reported using a creditable fuel type of either wood, charcoal or sticks. This left 83.358% of households creditable based on their use of 3 stone fires. An additional 9.06% of households reported use of charcoal stoves, which are also creditable, yielding a total creditable percentage of 92.414%.
QA/QC procedures applied:	Spot checks by 3 <sup>rd</sup> party.
Any comment:	No less than biennial monitoring frequency.

## 5. Voluntary Emission Reduction Calculations

Per the PDD, the baseline emission are calculated as follows.

Approach 1 per the methodology is used to estimate baseline emissions.

$$BE_y = [B_{bl,y} \times i \times X_{boil}] \times [X_{nr,bl,y} \times EF_{bl,bio,co2} + EF_{bl,bio,ch4} + EF_{bl,bio,n2o}] \dots \dots \dots \text{Eqn B.1a (modified)}$$

Where

$BE_y$  = baseline emissions in year y (in tonnes CO<sub>2</sub>e per year)

$X_{nr,bl,y}$  = the non-renewable fraction of the woody biomass harvested in the project collection area in year y in the baseline scenario

$B_{bl,y}$  = the mass of woody biomass consumed during boiling in the baseline in year y (tonnes/year).

i = Number of water treatment units in place

$X_{boil}$  = fraction of users that boil water as a form of water treatment (additional parameter not identified in the methodology)

$EF_{bl,bio,co2,net}$  = the CO<sub>2</sub> emission factor for use of the biomass fuel in the baseline scenario in tonnes CO<sub>2</sub> per tonne fuel (tonnes/TJ)

NCV = Net calorific value of biomass used (woodfuel) (TJ/tonne)

$EF_{bl,bio,co2} = EF_{bl,bio,co2,net} \times NCV$  = CO<sub>2</sub> emission factor for wood (tonnes CO<sub>2</sub>/tonne woodfuel)

$EF_{bl,bio,ch4,net}$  = the CH<sub>4</sub> emission factor for use of the biomass fuel in the baseline scenario in tonnes CO<sub>2</sub> per tonne fuel (tonnes CH<sub>4</sub>/tonne biomass)

$GWP_{CH4}$  = The global warming potential for CH<sub>4</sub>

$EF_{bl,bio,ch4} = EF_{bl,bio,ch4,net} \times GWP_{CH4}$  = the CH<sub>4</sub> emission factor for use of the biomass fuel in the baseline scenario in tonnes CO<sub>2</sub> per tonne fuel (tonnes CO<sub>2</sub>/tonne biomass)

$EF_{bl,bio,n2o,net}$  = the N<sub>2</sub>O emission factor for use of the biomass fuel in the baseline scenario in tonnes CO<sub>2</sub> per tonne fuel (tonnes N<sub>2</sub>O/tonne biomass)

$GWP_{N2O}$  = The global warming potential for N<sub>2</sub>O

$EF_{bl,bio,n2o} = EF_{bl,bio,n2o,net} \times GWP_{N2O}$  = the N<sub>2</sub>O emission factor for use of the biomass fuel in the baseline scenario in tonnes CO<sub>2</sub> per tonne fuel (tonnes CO<sub>2</sub>/tonne biomass)

In accordance with Annex 3,  $B_{bl,y}$  is calculated as follows:

$B_{bl,y} = L_{bl,y} \times W \times 365 \text{ days} \times P_y \dots$  for **Eqn B1, B2**

Where,

$L_{bl,y}$  = the total amount of treated water for consumption per person per day (in liters).

W = amount of wood-fuel or fossil fuel (in tonnes) required to boil 1L of water on a three-stone stove to be safe for consumption

$P_y$  = members per household in year y

Note:  $AF_{bl,i,y}$  = The mass of alternative fuel i in the baseline in year y in accordance with trends projected throughout the project period, in tonnes. This mass can be set to zero in cases where the KT is appropriately designed to subsume alternative fuels (approach 3). Therefore this parameter is not included in this project activity emissions calculation.

Per the PDD, the project emissions are calculated as follows.

Approach 1 is applies values of mass for each fuel in the mix:

$$PE_y = [B_{pj,y} \times i \times X_{boil}] \times [X_{nr,pi,y} \times EF_{bl,bio,co2} + EF_{bl,bio,ch4} + EF_{bl,bio,n2o}] \dots \dots \dots \text{Eqn P.1a (modified)}$$

Where (noting that parameters common to baseline equations are not repeated):

$PE_y$  = project emissions in year y (in tonnes CO2e per year)

$X_{nr,pi,y}$  = the non-renewable fraction of the woody biomass harvested in the project collection area in year y in the project scenario

$B_{pj,y}$  = the mass of woody biomass consumed during boiling of water in the project each year (in tonnes/year).

In accordance with Annex 3,  $B_{p,y}$  is calculated as follows:

$$B_{pi,y} = [W \times 365 \text{ days} \times P_y] \times [[L_{pj,y} \times U_y] + [[1 - U_y] \times L_{bl,y}]] \dots \text{for Eqn P1}$$

Where,

$L_{pj,y}$  = the total amount of water still boiled per person per day (in liters). This is equal to the amount of treated water still boiled for creditable purposes.

$W$  = amount of wood-fuel or fossil fuel (in tonnes) required to boil 1L of water on a three-stone stove to be safe for consumption

$P_y$  = members per household in year y

### Baseline Emissions estimate for 12 month period

Description	Parameter	Value
Number of Lifestraws distributed	<b>i</b>	877505
Adjustment for % alternative water treatment	<b>X<sub>boil</sub></b>	79.6%
Nonrenewable Biomass %	<b>X<sub>nr</sub></b>	93%
Treated water per person/day (l/day)	<b>L<sub>bl</sub></b>	2.630
Wood used to boil 1 liter water (kg/l)	<b>W<sub>i</sub></b>	0.36
Members per LifeStraw®	<b>Py</b>	5.500
Adjustment for alternative fuels %		0.924
Biomass consumption per year (t/yr)	<b>B<sub>bl</sub></b>	1.76
CO2 emission factor for wood (tonnes/TJ)	<b>EF<sub>bl,bio,co2,net</sub></b>	112

Net Calorific Value (NCV) of wood (TJ/t)	<b>NCV</b>	0.0156
CO2 emission factor for wood (tonnes/t)	<b>EF<sub>bl,bio,co2</sub></b>	1.7472
CH4 emission factor for wood (tonnes/TJ)	<b>EF<sub>bl,bio,ch4,net</sub></b>	1.224
GWP CH4	<b>GWP<sub>CH4</sub></b>	21
CH4 emission factor for wood (tonnes/t)	<b>EF<sub>bl,bio,ch4</sub></b>	0.4009824
N2O emission factor for wood (t/TJ)	<b>EF<sub>bl,bio,n2o,net</sub></b>	0.01125
GWP N2O	<b>GWP<sub>N2O</sub></b>	310
N2O emission factor for wood (tonnes/TJ)	<b>EF<sub>bl,bio,n2o</sub></b>	0.054405
<b>Baseline emissions (tCO2e/yr)</b>	<b>BE</b>	2,552,302

### Project Emissions estimate for 12 month period

Description	Parameter	Value
Number of Lifestraws distributed	<b>i</b>	877505
Adjustment for % alternative water treatment	<b>X<sub>boil</sub></b>	79.6%
Usage of water treatment systems in place	<b>U<sub>y</sub></b>	74.980%
Nonrenewable Biomass %	<b>X<sub>nrb</sub></b>	93%
Treated water per person/day (l/day)	<b>L<sub>bl</sub></b>	2.630
Liters of water still boiled (l/day)	<b>L<sub>pl</sub></b>	0.01453
Wood used to boil 1 liter water (kg/l)	<b>W<sub>i</sub></b>	0.36
Members per LifeStraw®	<b>Py</b>	5.500
Project biomass consumption per year (t/yr)	<b>B<sub>pj</sub></b>	0.483
CO2 emission factor for wood (tonnes/TJ)	<b>EF<sub>bl,bio,co2,net</sub></b>	112
Net Calorific Value (NCV) of wood (TJ/t)	<b>NCV</b>	0.0156
CO2 emission factor for wood (tonnes/t)	<b>EF<sub>bl,bio,co2</sub></b>	1.7472
CH4 emission factor for wood (tonnes/TJ)	<b>EF<sub>bl,bio,ch4,net</sub></b>	1.224
GWP CH4	<b>GWP<sub>CH4</sub></b>	21
CH4 emission factor for wood (tonnes/t)	<b>EF<sub>bl,bio,ch4</sub></b>	0.4009824
N2O emission factor for wood (tonnes/TJ)	<b>EF<sub>bl,bio,n2o,net</sub></b>	0.01125
GWP N2O	<b>GWP<sub>N2O</sub></b>	310
N2O emission factor for wood (tonnes/t)	<b>EF<sub>bl,bio,n2o</sub></b>	0.054405
<b>Project emissions (tCO2e/yr)</b>	<b>PE</b>	702,446

### Monitoring Report Period Emissions Reductions

#### VERs 2011

Parameter	Value
Number of units December 1, 2011 to December 31, 2011	877,505
Days of crediting December 1, 2011 to December 31, 2011	31

Estimation of baseline emissions (tCO <sub>2</sub> e) per unit per day	0.007968738
Estimation of Project Activity Emissions (tCO <sub>2</sub> e) per unit per day	0.002193161
Estimation of leakage (tCO <sub>2</sub> e) per unit per day	0.000004470
Estimation of overall emission reductions (tCO <sub>2</sub> e) per unit per day	0.005771106
Emission Reductions December 1, 2011 to December 31, 2011	156,989
Total (tonnes of tCO <sub>2</sub> e) December 1, 2011 - December 31, 2011	156,989

## VERs 2012

Parameter	Value
Number of units January 1, 2012 to October 31, 2012	877,505
Days of crediting January 1, 2012 to October 31, 2012	305
Estimation of baseline emissions (tCO <sub>2</sub> e) per unit per day	0.007968738
Estimation of Project Activity Emissions (tCO <sub>2</sub> e) per unit per day	0.002193161
Estimation of leakage (tCO <sub>2</sub> e) per unit per day	0.000004470
Estimation of overall emission reductions (tCO <sub>2</sub> e) per unit per day	0.005771106
Emission Reductions January 1, 2012 to October 31, 2012	1,544,573
Total (tonnes of tCO <sub>2</sub> e) January 1, 2012 - October 31, 2012	1,544,573

These emission reduction estimates are lower than the baseline estimates presented in the registered PDD. There are several factors that have contributed to changes in the VER calculation estimates. The increase in the NRB fraction from 65% to 93% based on recent literature and an increase in the average family size from to about 5.5 from 4, and in  $X_{\text{boil}}$  from 71% to over 79% has contributed to an increase in estimates. However,  $L_{\text{bl}}$ , a significant parameter, is lower in this MR than in the PDD, going from 4.11 to 2.63, and  $U_y$ , also a significant parameter is lower going from 83% to 74.98% based on a more rigorous evaluation of usage indicators.

## 6. Monitored parameters in Gold Standard Passport

The sections below present the sustainable development parameters that are monitored from the registered Gold Standard Passport for this project, the resultant data values, sources, and justifications.

No	1
Indicator	<b>Air Quality</b>
Mitigation measure	NA
<i>Repeat for each parameter</i>	

Chosen parameter		Average annual biomass consumed for boiling water by families in the project boundary.
Current situation of parameter		In Kenya, exposure to indoor air pollution (commonly measured by the pollutants carbon monoxide and fine particles) is responsible for the annual loss of 383,800 disability-adjusted life years (DALYs) per year <sup>2</sup> . The DALY is a standard metric used by the World Health Organization (WHO) to indicate the burden of death and illness due to a specific risk factor. The WHO also estimates that exposure to indoor air pollution is responsible for 13,000 deaths per year in Kenya.
Estimation of baseline situation of parameter		See above
Future target for parameter		Considerable reduction of indoor smoke due to reduced emissions from treating water using LifeStraw® Family instead of boiling water using fuel wood.
Way of monitoring	How	Kitchen Surveys and relevant academic reports or literature using decreased fuel as a proxy for improved air quality.
	When	Annual
	By who	Project proponent

Results: The **EXP-MR2-Survey** indicated that, conservatively, households have saved approximately 20% of their daily biomass fuel use. In addition, **The VF-MR-2** survey conducted by the PP in April and May, 2012 asked these two questions:

Question39	How many pieces of wood did you use every day before LifeStraw?
Question40	How many pieces of wood do you use now?

On average, across approximately 10,018 users from the April-May survey surveys, households reported saving approximately 3.42 pieces of wood, per family, per day. Overall for the project area there was an average of 25% reduction in fuel use and 36% of households reported some form of wood savings. There was an error in the previous calculation, that is now corrected in the Excel file “VF-MR-2-Survey-Processed” on sheet Apr-May in column BK and averaged in sheet “Results (combined), rows 20-22, and the MR.

Therefore, the project proponent assigns a positive (+) score for this project on this indicator.

No	2
Indicator	<b>Water Quality and Quantity</b>
Mitigation measure	NA
<i>Repeat for each parameter</i>	
Chosen parameter	Number of people served with a satisfactory quality of potable water according to the EPA microbiological standard.

<sup>2</sup> World Health Organization; Indoor Air Pollution: National Burden of Disease Estimates: [http://www.who.int/indoorair/publications/indoor\\_air\\_national\\_burden\\_estimate\\_revised.pdf](http://www.who.int/indoorair/publications/indoor_air_national_burden_estimate_revised.pdf)

Current situation of parameter	Only 57 percent of households in Kenya have access to potable water, which is the cause of many waterborne diseases <sup>3</sup> . The LifeStraw® Family unit high quality ultra-filtration mechanism has been proven to be 99.99% effective in reduction of protozoa, bacteria and viruses and comply with U.S. Environmental Protection Agency guidelines for microbiological water quality <sup>4</sup> .	
Estimation of baseline situation of parameter	See above	
Future target for parameter	An estimated 1 million households will have improved water quality as a result of clean water from LifeStraw® Family units.  During distribution of the LifeStraw Family water treatment units, and during subsequent monitoring, education, maintenance and repair activities, the recipient residents will be taught proper operation and maintenance of the LifeStraw Family. Additionally, pictorial printed documentation describing proper operation and maintenance will be provided to the residents. This documentation and in-person instruction includes identification of how to monitor filter effectiveness and blockage, through flowrate changes, and how to respond to such degraded performance through filter “backwashing”, repair and replacement when needed.	
Way of monitoring	How	Surveys and records for number of households/people served with the LifeStraw® Family units
	When	Quarterly
	By who	Project proponent

Results: The stockroom distribution database indicates that 877,505 LifeStraw Family units were distributed to households in June, 2011. As reported by **VF-MR2-Survey**, with an average family size of more than 5.5 this indicates that approximately 4.8 million people now have access to a LifeStraw Family. **VF-MR2-Survey** indicates that 74.98% of those families use the LifeStraw Family on a regular basis. Therefore, there are now 3,618,743 people with regular access and usage of clean drinking water in the Western Province of Kenya, as a direct result of this project.

Therefore, the project proponent assigns a positive (+) score for this project on this indicator.

In addition, we also collect information about the type of water sources to review whether more households have received access to piped water. However, in the project area, water from the tap is not always safe due to lack of maintenance of the infrastructure resulting in contamination, and inconsistent treatment practices, so a small portion of LifeStraw users do have access to tap water but continue to filter to ensure the safety of their drinking water.

<sup>3</sup> UNDP Kenya Millennium Development Goals: <http://www.ke.undp.org/mdgs/18>

<sup>4</sup> Vestergaard Frandsen LifeStraw® Family Overview Presentation, 2010

The results for the combined MR2 surveys show the following mix of primary water sources among users:

As part of the water quality and quantity parameter, beginning with this MR, we will also report on a series of safe storage indicators, as safe storage education is an integral part of our health education messages and is also noted as an important part of ensuring water is safe at the time of consumption.

For both surveys combined as the MR2, 96.4% of households that were considered users of LifeStraw based on the processing steps in Table 1, also reported having a designated safe storage container. In the October survey we asked additional questions, and of the households reporting having a designated safe storage container, 95% of containers had a cover or lid, and 98% of households were able to properly explain the purpose of safe storage. In future MRs, we will report on a more comprehensive compendium of safe storage questions.

No	4	
Indicator	<b>Other Pollutants</b>	
Mitigation measure	The LifeStraw Family water filters will be replaced and disposed of every three years. The prevailing practice for disposal in Kenya is landfill, and the project proponent will ensure that, if any units are disposed of, it will be by landfill and not by incineration.	
<i>Repeat for each parameter</i>		
Chosen parameter	Number of LifeStraw Family water treatment units collected by the PP and disposed of in landfill.	
Current situation of parameter	The prevailing practice for disposal in Kenya is landfill.	
Estimation of baseline situation of parameter	The prevailing practice for disposal in Kenya is landfill.	
Future target for parameter	Disposal of all spent LifeStraw Family units in landfill.	
Way of monitoring	How	Replacement and disposal records kept by PP.
	When	Annual reporting, but records maintain constantly
	By who	Project Proponent

Results: There have been a total of 1,121 LifeStraw units replaced, and 1,081 cartridges replaced during the monitoring period. The replaced units have been retained by Vestergaard Frandsen for later re-use or recycling, or ultimately safe disposal.

Therefore, the project proponent assigns a neutral (0) score for this project on this indicator.

No	7
Indicator	<b>Livelihood of the Poor</b>
Mitigation measure	NA

<i>Repeat for each parameter</i>		
Chosen parameter		<ol style="list-style-type: none"> <li>1) Fuel savings from reduced boiling with firewood and charcoal</li> <li>2) Money saved from reduced fuel consumption and;</li> <li>3) Time saved by users from reduced gathering of firewood and charcoal.</li> </ol>
Current situation of parameter		Dwindling resources lead to an additional workload for women and children, as they have to spend more time collecting firewood and/or spending money on firewood or charcoal. Families can use these saved resources to meet other basic household needs, more productive works, education and better child care. Fuel saving, time saving and better health due to improved water quality and decreased level of indoor air pollution are indicators for better livelihood.
Estimation of baseline situation of parameter		See above
Future target for parameter		Decreased firewood and charcoal consumption for cooking (or boiling water) will save time and money for end users <sup>5</sup> .
Way of monitoring	How	Kitchen Survey and relevant academic reports or literature; Fuel savings from kitchen performance tests multiplied by current market price for charcoal and wood (if purchased). During Kitchen Surveys, residents will be asked if, during the period since receiving the LifeStraw Family, the cost or effort spent gathering fuelwood has been reduced.
	When	Annually
	By who	Project proponent

To address this indicator, the project proponent contracted with EXP Agency in July, 2012 to conduct surveys of 252 households (of which 234 households were responses were verified and used for analysis), randomly selected from the Project Developer database with representation from all 32 districts. Approximately half of the sample was selected randomly from the sample contained in **VF-MR2-Survey** while the other half was selected from the Project Developer database that was not included in the **VF-MR2-Survey**. The split sampling was designed to verify the VF-MR2-Survey data and verify that this data was representative of the broader project population. This survey was a secondary, comparison data source for several parameters, and is hereafter referred to as “**EXP-MR2- Survey**”.

-Their results of this survey are shown on pages 17-20 of **EXP-MR2-QAQC-Survey Findings**, and indicate that on average families have saved both wood fuel directly, and time and money to procure wood fuel since the project started, six months ago. The **EXP-MR2-Survey** indicated that, conservatively, households have saved approximately 20% of their daily biomass fuel use.

<sup>5</sup> Djédjé et al. Results Assessment: Survey on Impacts of the Stove Project in Transmara, Western and Central Cluster of Kenya; <http://www.gtz.de/de/dokumente/en-kenya-results-assessment-stoves-2009.pdf>

In addition, the survey conducted by the PP in April and May, 2012 asked these two questions:

Question39	How many pieces of wood did you use every day before LifeStraw?
Question40	How many pieces of wood do you use now?

On average, across approximately 10,018 users from the April-May survey surveys, households reported saving approximately 3.42 pieces of wood, per family, per day. Overall for the project area there was an average of 25% reduction in fuel use and 36% of households reported some form of wood savings. There was an error in the previous calculation, that is now corrected in the Excel file “VF-MR-2-Survey-Processed” on sheet Apr-May in column BK and averaged in sheet “Results (combined), rows 20-22, and the MR.

Finally, the survey conducted by the PP in October of 2012, asked:

Question41	Have you had any cost savings as a result of using LifeStraw ?
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94.72% of households surveyed responded yes, that they had experienced some form of cost savings. The primary reasons for cost savings were reported as savings in medical expenditures, savings in purchasing fuel, and savings in not having to purchase other water treatment methods.

Therefore, the project proponent assigns a positive (+) score for this project on this indicator.

No	8	
Indicator	<b>Access to affordable and clean energy services</b>	
Mitigation measure	NA	
<i>Repeat for each parameter</i>		
Chosen parameter	Number of households served with LifeStraw® Family units	
Current situation of parameter	Targeted end users are currently boiling water using firewood and charcoal inefficiently.	
Estimation of baseline situation of parameter	See above	
Future target for parameter	An estimated 1 million households served with LifeStraw® Family unit will have access to clean water which is more affordable and efficient than boiling water by the traditional method of using firewood <sup>6</sup> .	
Way of monitoring	How	Kitchen Surveys
	When	Annually
	By who	Project Proponent

<sup>6</sup> Vestergaard Frandsen Project Design Document, Sustainable Deployment of the LifeStraw® Family in rural Kenya, August 2010.

**Results:** The stockroom distribution database indicates that 877,505 LifeStraw Family units were distributed to households in June, 2011. As reported by **VF-MR2-Survey**, with an average family size of more than 5.5 this indicates that approximately 4.8 million people now have access to a LifeStraw Family. **VF-MR2-Survey** indicates that 74.98.% of those families use the LifeStraw Family on a regular basis. Therefore, there are now 3,618,743 people with regular access and usage of clean drinking water in the Western Province of Kenya, as a direct result of this project.

Therefore, the project proponent assigns a positive (+) score for this project on this indicator.

No	10	
Indicator	<b>Quantitative employment and income generation</b>	
Mitigation measure	NA	
<i>Repeat for each parameter</i>		
Chosen parameter	Number of new jobs created as a result of the project activity.	
Current situation of parameter	None yet employed	
Estimation of baseline situation of parameter	None yet employed	
Future target for parameter	The project will generate thousands of jobs during the project distribution, monitoring and replacement phases.	
Way of monitoring	How	Employment records
	When	Annual reporting, but records maintain constantly
	By who	Project Proponent

This project has employed thousands of Kenyan staff during the initial distribution, and following education campaigns.

Therefore, the project proponent assigns a positive (+) score for this project on this indicator.

These results are shown in the table below:

Campaign 3 (April-May 2012)	Number employed
i. Educators	1,960
ii. QC's	40
iii. District Coordinators	40
iv. Area Coordinators	5
v. Logistics & Administration Coordinator	1
vi. Motorbike drivers under subcontract	2005
vii. Drivers (Phiaton contract)	32
viii. EXP – Soccer Tournament, Road Show & support staff	17
ix. EXP – Survey (July/August)	38
x. IT Team	4
xi. Security team	8

Campaign 4 (October 2012)	
i. Educators	1,945
ii. QC's	40
iii. District Coordinators	40
iv. Area Coordinators	5
v. Logistics & Administration Coordinator	1
vi. Motorbike drivers under subcontract	2,014
vii. Drivers (Phiaton contract)	37
viii. EXP – Launch Processions	2
	7
ix. EXP – Forums	55
x. EXP – Roadshows	8
xi. IT Team	6
xii. Security team	8
xiii. Payroll Team	4
xiv. Warehouse Team	5
a. On-going	
i. Area Coordinators	5
ii. LSF Coordinators	40
iii. Logistics & Administration Coordinator	1

Based on the above evidence, the scoring for these parameters has been updated below:

Indicator	Mitigation measure	Preliminary score in registered Passport	Monitoring Period 2 Score
Air quality	NA	+	+
Water quality and quantity	NA	+	+
Other pollutants	Monitoring of collected LifeStraw Family units	0	0
Livelihood of the poor	NA	+	+
Access to affordable and clean energy services	NA	+	+
Quantitative employment and income generation	NA	+	+