

**Gold Standard for the Global Goals
Monitoring Report**



June 2017, version 1

Title of the project	Aqua Clara Water Filtration Program in Kenya
Gold Standard project id	GS 1078
Version number of the monitoring report	Version 07
Completion date of the monitoring report	25/02/2021
Date of project design certification	26/12/2013
Start date of crediting period	28/12/2011
Duration of this monitoring period	6 th verification (19/02/2019) to (18/02/2020)
Duration of previous monitoring period	(19/02/2018) to (18/02/2019)
Project representative(s)	Aqua Clara International
Host Country	The Republic of Kenya
Certification pathway (activity certification/impact certification)	Impact certification
SDG Contributions targeted (as per approved PDD)	<ul style="list-style-type: none"> • SDG 3 Good health and well-being • SDG 6 Clean water and sanitation • SDG 8 Decent work and Economic growth • SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation • SDG 13 Climate Action
Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)	GS VER
Selected methodology(ies)	Technologies and Practices to Displace Decentralized Thermal Energy Consumption ¹ 11/04/2011, Version 1.0 ¹
Estimated amount of annual average certified SDG impact (as per approved PDD)	<p>BSF technology</p> <p>SDG 3</p> <ul style="list-style-type: none"> -Usage rate: 80% -Number of persons consuming safe water:1,825 - Reduced incidence in water borne diseases: 100% -Reduced smoke levels: N/A -Reduced incidences of coughing: N/A -Reduced incidences of itchy eyes: N/A <p>SDG 6</p> <ul style="list-style-type: none"> -QP_y: 5 l/p/d -QP_{r, raw boil}: 0 l/p/d -QP_{r, clean boil}: 0 l/p/d -volume of clean water consumed: 5 l/p/d -Quality of treated water: 100% <p>SDG 13</p> <ul style="list-style-type: none"> -Number of filters sold: 7,424

¹https://www.goldstandard.org/sites/default/files/documents/gs_tpdtec_meth_110411.pdf

-Total ex-ante emission reductions: 32,801 tCO_{2e}

HHFF technology

SDG 3

- Usage rate: 80%
- Number of persons consuming safe water: 1,825
- Reduced incidence in water borne diseases: 100%
- Reduced smoke levels: N/A
- Reduced incidences of coughing: N/A
- Reduced incidences of itchy eyes: N/A

SDG 6

- QP_y: 5 l/p/d
- QP_{raw boil}: 0 l/p/d
- QP_{clean boil}: 0 l/p/d
- volume of clean water consumed: 5l/p/d
- Quality of treated water: 100%

SDG 13

- Number of filters sold: 1,842
- Total ex-ante emission reductions: 5,550 tCO_{2e}

IHFF technology

SDG 3

- Usage rate: 80%
- Number of persons consuming safe water: N/A
- Reduced incidence in water borne diseases: 100%
- Reduced smoke levels: N/A
- Reduced incidences of coughing: N/A
- Reduced incidences of itchy eyes: N/A

SDG 6

- QP_y: 1 l/p/d
- QP_{raw boil}: 0 l/p/d
- QP_{clean boil}: 0 l/p/d
- volume of clean water consumed: 1 l/p/d
- Quality of treated water: 100%

SDG 13

- Number of filters sold: 425
- Total ex-ante emission reductions: 4,088 tCO_{2e}

Combined BSF, HHFF and IHFF technologies

SDG 6

- Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: N/A

SDG 8:

- Number of persons employed by the project: N/A
- Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: N/A
- Employment wages of people employed by the project: N/A

SDG 9

- Number of people trained on filters installation and maintenance: N/A

SDG 13

- Number of workshops, seminars organized, and training-related opportunities held: N/A

<p>Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period</p>	<p>BSF technology</p> <p>SDG 3</p> <ul style="list-style-type: none"> -Usage rate: 60% -Number of persons consuming safe water: 2,821 - Reduced incidence in water borne diseases: 96.8% -Reduced smoke levels: 96.8% -Reduced incidences of coughing: 94.8% -Reduced incidences of itchy eyes: 93.5% <p>SDG 6</p> <ul style="list-style-type: none"> -QP, y: 4 l/p/d -QP, raw boil: 0 l/p/d -QP, clean boil: 0 l/p/d -volume of clean water consumed: 4 l/p/d -Quality of treated water: 94.87% <p>SDG 13</p> <ul style="list-style-type: none"> -Number of filters sold: 3,215 -Total emission reductions: 10,665 tCO_{2e} <p>HHFF technology</p> <p>SDG 3</p> <ul style="list-style-type: none"> -Usage rate: 68% -Number of persons consuming safe water: 2,059 - Reduced incidence in water borne diseases: 100% -Reduced smoke levels: 98.5% -Reduced incidences of coughing: 98.5% -Reduced incidences of itchy eyes: 97.7% <p>SDG 6</p> <ul style="list-style-type: none"> -QP, y: 4 l/p/d -QP, raw boil: 0 l/p/d -QP, clean boil: 0 l/p/d -volume of clean water consumed: 4 l/p/d -Quality of treated water: 99% <p>SDG 13</p> <ul style="list-style-type: none"> -Number of filters sold: 2,070 -Total emission reductions: 5,360 tCO_{2e} <p>IHFF technology</p> <p>SDG 3</p> <ul style="list-style-type: none"> -Usage rate: 53% -Number of persons consuming safe water: calculated separately for each institution - Reduced incidence in water borne diseases: 97.6% -Reduced smoke levels: 83.2% -Reduced incidences of coughing: 78.4% -Reduced incidences of itchy eyes: 82.4% <p>SDG 6</p> <ul style="list-style-type: none"> -QP, y: 0.87 l/p/d -QP, raw boil: 0 l/p/d -QP, clean boil: 0 l/p/d -volume of clean water consumed: 0.87 l/p/d -Quality of treated water: 100% <p>SDG 13</p> <ul style="list-style-type: none"> -Number of filters sold: 164 -Total emission reductions: 166 tCO_{2e} <p>Combined BSF, HHFF and IHFF technologies</p> <p>SDG 6</p> <ul style="list-style-type: none"> -Number of people attending workshops, seminars or trainings on water, hygiene, and sanitation management: 156
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	<p>SDG 8: -Number of persons employed by the project: 54 - Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women, 11 youths employed - Employment wages of people employed by the project: Kshs. 295,000</p> <p>SDG 9 -Number of people trained on filters installation and maintenance: 16</p> <p>SDG 13 Number of workshops, seminars organized, and training-related opportunities held: 9.</p> <p>Combined total emission reductions: 16,191 tCO₂e.</p>
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SECTION A. Description of project

A.1. Purpose and general description of project

The Aqua Clara Water Filtration Program in Kenya (the 'Project Activity') seeks to introduce Aqua Clara International's² (ACI) flagship products to the market in Kenya: the ACI BioSand Filter (BSF) and the Point-of-use Hollow Fiber Filters (HFF). These ACI water purifiers (the project technologies) displace the use of firewood fuel traditionally used to boil water for consumption and in the project scenario, offer an affordable, long-term solution for end users who typically consume raw water from turbid sources. The Project Activity seeks to introduce approximately 7,424 BSF purifiers with a capacity to purify an average of up to 36 litres per day, 1,842 household Hollow Fiber Filters with a capacity of up to 15-100 litres per day (which can also be used in institutions) and 425 institutional/commercial-use HFF units with a production capacity of 100–400 litres of water per day throughout the 10-year crediting period in rural and peri-urban Kenya. However, these capacities can be scaled up, with proper maintenance and use of the filter. Proper maintenance of the filters in this Project Activity is ensured through the PP's visit to the households as a follow-up initiative to check on the household utilisation of the water filters.

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.

As of 18/02/2020, the PP had installed a total of 3,215 Bio Sand filters (BSF) 2,070; Household Hollow Fibre Filters (HHFF) and 164 Institutional Hollow (IHFF) in the project boundary.

a) Relevant Dates of Project Activity

- Start date of Project Activity i.e., it is the date on which distribution of water filter under the proposed Project Activity began – 26/06/2009

- Annual BSF Filter sales since start date of the project:

03/09/2009³-02/09/2010: 199 filters
03/09/2010-02/09/2011: 538 filters
03/09/2011-02/09/2012: 918 filters
03/09/2012-02/09/2013: 629 filters
03/09/2013-02/09/2014: 454 filters
03/09/2014-02/09/2015: 187 filters
03/09/2015-02/09/2016: 149 filters
03/09/2016-02/09/2017: 86 filters
03/09/2017-02/09/2018: 40 filters
03/09/2018-18/02/2020: 15 filters
Total: 3,215 filters

²The Project developer changed name from Aqua Clara Foundation to Aqua Clara International (ACI) on 7th October 2017 and a certificate of amendment of the name issued. ACI shall be used in all related documentation for consistency with this change.

³The first BSF filter was sold on 26/06/2009. However, following the TSR clean-up exercise that was done, some of the filters that were no longer functional have been removed from the sales record. The vintage years have therefore been revised to reflect this change.

Annual HHFF sales since start date of the project:

01/11/2013-31/10/2014: 95 filters
 01/11/2014-31/10/2015: 194 filters
 01/11/2015-31/10/2016: 366 filters
 01/11/2016-31/10/2017: 287 filters
 01/11/2017-31/10/2018: 509 filters
 01/11/2018-31/10/2019: 555 filters
 01/11/2019-18/02/2020: 64 filters
 Total: 2,070

Annual IHFF sales since start date of the project:

19/06/2014-18/06/2015: 19 filters
 19/06/2015-18/06/2016: 5 filters
 19/06/2016-18/06/2017: 16 filters
 19/06/2017-18/06/2018: 22 filters
 19/06/2018-18/06/2019: 69 filters
 19/06/2019-18/02/2020: 33 filters
 Total: 164

The PD undertook a major exercise to clean up the TSR and reconcile with the information in the sales receipts. Following this, some filters which were found to be totally abandoned were removed from the TSR. End-users who were found to have been skipped from the TSR during data entry were added as summarised below:

Technology	End-users removed from TSR	Added to TSR	New sales
BSF	761	751	33
HHFF	44	65	599
IHFF	26	2	102

Project registration date: 26/12/2013
 Project Design Change date: 16/06/2016
 Project transitioning to Gold Standard for Global Goals: 09/07/2018
 Start Date of Monitoring Survey: 15/07/2020
 VVB remote verification: 19/10/2020

b) Total GHG emission Reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period

The total GHG emission reductions achieved in this monitoring period (between 19/02/2019 and 18/02/2020) is **16,191 tCO₂e** for all the project technologies.

c) FARs raised from the last verification

FAR # 1: The PP shall monitor the times of water filtration and amount of filled water per day to cross-check with the total water demand from households.

The PP sought a deviation request from the GS to be exempted from conducting water consumption field tests which monitors the times of water filtration and amount of water filtered, during this monitoring period due to the restrictions imposed by COVID-19. The deviation request was approved by the GS on 25/06/2020. In accordance with the guidelines issued by the GS in the deviation approval, PP was not

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required to carry out any WCFT and was allowed to apply methodology defaults as follows for the parameter "Quantity of safe water in litres supplied by project technology per person per day".

Full-day premises (households):

- If monitored water consumption values in previous MP is greater than 7 l/p/d, the PD shall apply the cap of 7 l/p/d.
- If monitored water consumption values in previous MP is between 4l/p/d and 7 l/p/d, the PD shall apply the default value of 4l/p/d.
- If monitored water consumption values in the previous MP results establish a value less than 4l/p/d, the previous MP result shall be used.
- For projects that are requesting performance certification for their first MP, the default value of 4l/p/d for water consumption shall be applied.

Half-day premises (e.g. schools) if applicable:

- If monitored water consumption values in previous MP is greater than 5.5 l/p/d, the PD shall apply the cap of 5.5 l/p/d.
- If monitored water consumption values in previous MP is between 3l/p/d and 5.5 l/p/d, the PD shall apply the default value of 3 l/p/d.
- If monitored water consumption values in the previous MP results establish a value less than 3 l/p/d, the previous MP result shall be used.
- For projects that are requesting performance certification for their first MP, the default value of 3l/p/d for water consumption shall be applied.

PP did not conduct WCFT during this monitoring period, and therefore PP could not monitor the times of water filtration and amount of filtered water per day to cross-check with the total water demand from households. PP has followed the GS guidelines outlined as detailed under section C of this monitoring report. As outlined in the deviation request, PP is required to carry out a WCFT per the approved monitoring plan within six months of end of the interim measure validity date or earlier, where possible. The PP shall ensure this FAR is complied with as required in the next verification.

However, based on the deviation approval requirement, the $Q_{p,y}$ for BSF and HHFF in the last verification was 6.56 l/p/d and 5.53 l/p/d respectively, and therefore a value of 4 l/p/d has been applied during this monitoring period which is conservative. For HHFF technology, the value from the last verification was 0.87l/p/d and this value has been applied for this monitoring period.

FAR # 2: The PP shall submit the phone questionnaires and shall not ask about the operation status of the filter prior to usage survey site visit to avoid the bias of not visiting the non-users.

The PP sought a deviation request from the GS to be allowed to carry out remote (non-physical) surveys due to the restrictions imposed by COVID-19. The deviation request was approved by the GS on 25/06/2020. The phone questionnaires are used during pre-visit calls which are usually made during physical surveys to notify the households of the forthcoming survey exercise. During this monitoring period, the PP has conducted all the surveys remotely via telephone and therefore no physical surveys were made to households. Based on this, the PP did not require to make pre-visit calls and the operation status of the filter was not asked prior to the remote surveys. The enumerators would call the households on the day of the survey and if the household were not available for the interview at that time, the enumerator would schedule an appropriate time for the survey. This has ensured that there was no form of bias when conducting the surveys among the end-users. The remote surveys were done using the standard monitoring survey templates prepared by the PP and which has been provided as a support document. As indicated in the monitoring survey summary database, all the remote surveys were undertaken between 15/07/2020 to 24/08/2020.

However, in compliance with this requirement, PP has prepared a template for the remote survey and shared the same with the PD. The pre-visit questionnaire shall be used when making the pre-visit calls prior

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to the physical surveys during the next verification. PP has provided the "GS 1078 Survey Pre-visit questionnaire" as a support document. The PP shall ensure this FAR is complied with as required in the next verification.

FAR # 3: The PP shall monitor the average number of filters in the households and discounting the ER calculation if the households use more than one unit.

The PP did not monitor the average number of filters in the households as required due to a misunderstanding of the FAR. Instead, the PP conducted an analysis of the sales record to identify households with more than one filter, based on the data registered in the TSR. The summary from this analysis is as follows:

BSF Technology

On the BSF technology, there are 45 households who share similar names, but these are different end-users with distinct filter location and contact details as listed below. Therefore, these households have all been included in the ER calculation.

1. KB8-002 and B15-229
2. ED4-43 and KF7-7
3. ED10-12 and ED8-19
4. KF7-5 and KF3-37
5. KD2-2 and PB307
6. PB308 and KB8-004
7. KG5-47 and KB11-007
8. KB7-008 and KB2-69
9. ED13-25 and KF6-10
10. ED5-39 and ED7-16
11. KD3-20 and B15-104
12. ED5-36 and EE2-32
13. KB10-8, KB2-128 and KB5-100
14. KF18-2 and KB6-29
15. KD1-2 and KE2-71
16. ED13-10 and KF16-85
17. KB2-22 and KB2-189
18. KF6-6 and KF3-25
19. ED11-28 and ED5-57
20. ED6-45 and ED2-131
21. KF18-128 and KE3-196
22. ED5-93 and ED5-17

On BSF, there are 14 filters registered under the same end-user name but located in totally different locations as summarized below. PP has included these in the ER calculations.

1. PB334 and PB394
2. ER-70 and ER-49
3. KF2-30 and KF2-29
4. KE2-46 and KF1-19
5. KE2-39 and KE2-11
6. PB303 and PB397
7. PB165 and PB209

There are 73 BSF filters that are registered under the same end user and the same location details were provided. Most of these filters were purchased on behalf of other especially elderly parents and the registration details given are for the person who purchased. This was done where the filter beneficiary did

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not have a telephone in order to enhance traceability during monitoring. Also, there are instances where men who have more than one household purchased a filter for each of their households. Due to cultural considerations, these filters were registered under the person who purchased but are used in the different households.

This data is provided in the BSF TSR and Sample Frame, tab Final TSR. PP have used different colour codes for these households for easy differentiation.

HHFF

There are 34 HHFF filters in the TSR whose end-user names are similar, but these are completely different end-users with different filter locations and contact details as detailed below. PP has included these in the ER calculations.

- HF15P-2734, HF15P-2097 and HF15P-1866
- HF15P-2315 and HF15P-2757
- HF15P-2694 and HF15P-1823
- KS-19 and HF15P-2612
- HF15P-035 and HF15P-726
- HF15P-241 and HF15P-1927
- HF15P-493 and HF15P-1853
- HF15P-731 and HF15P-955
- HF15P-1220 and HF15P-1556
- HF15P-1495 and HF15P-1573
- HF15P-1764 and HF10P-95
- HF15P-2044 and HF15P-3019
- HF15P-2201 and HF15P-1901
- HF15P-1902 and HF15P-1983
- HF15P-1324 and HF15P-2086
- HF15P-2560 and HF15P-2400

There are 22 HHFF filter in the TSR which are registered under the same end-users, but these are installed in different locations as detailed below. PP has included these in the ER calculations.

- HF15P-3252 and HF15P-3075
- HF15P-3251 and HF15P-3253
- HF15P-2962 and HF15P-397
- HF15P-2144 and HF15P-1718
- HF15P-154 and HF15P-2167
- HF15P-673 and HF15P-678
- HF15P-1019 and HF15P-1618
- HF15P-1811 and HF15P-1847
- HF15P-1347 and HF15P-1348
- HF15P-2560, HF15P-2400 and HF15P-3040
- HF15P-2770 and HF15P-2767

There are 58 HHFF filters registered under the same end users and similar location details.

This data is provided in the HFF TSR and Sample Frame, tab Final TSR. PP have used different colour codes for these households for easy differentiation.

To ensure compliance with this FAR, PP is seeking GS approval to be allowed to monitor this FAR in the next verification covering the period 2020/2021.

A.2. Location of project

Host country: The Republic of Kenya

The Project Activity targets to operate within 23 counties within the terrestrial limits of the Republic of Kenya listed below.

Table 1: 23 counties within the Republic of Kenya which represent the Project boundary.

County	Coordinates	County	Coordinates	County	Coordinates	County	Coordinates
Nandi	-00.1666670,35.1500000	Bomet	-00.8000000,35.2333000	Kericho	-00.3666667,35.3000000	Busia	-00.4333333,34.1500000,
Uasin Gishu	-00.5166670,35.2833000	Homa Bay	-00.6833330,34.4500000	Elgeyo Marakwet	-00.9483333,35.5086111	Bungoma	-00.5833333,34.5833333
Kisii	-00.6666670,34.7500000	Migori	-00.6666667,34.8333333	Kakamega	-00.2833333,34.7500000	Trans Nzoia	-00.5833333,34.58333330
Nyamira	-00.7500000,35.0000000	Kisumu	-00.2500000,34.9167000	Siaya	-00.2833333,34.7500000	Machakos	-00.1500000,37.2500000,
Nakuru	-00.5000000,36.0000000	Kirinyaga	-00.5000000,37.2833333	Nyeri	-00.4166667,36.9500000	Nairobi	-00.1283333,36.8166667
Murang'a	-00.7500000,37.1166667	Embu	-00.5333333,37.4500000	Makueni	-00.1800000,37.6166667		

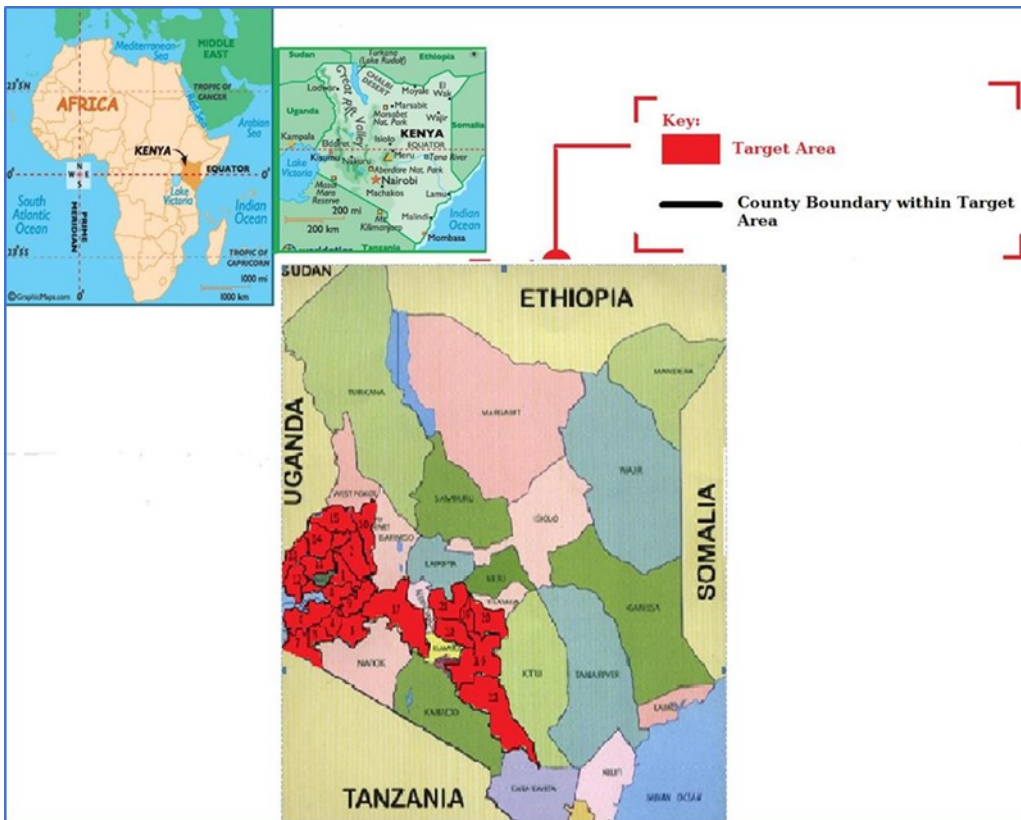


Figure 1: Kenya and the project boundary

A.3. Reference of applied methodology

The project is registered under the GS methodology: Technologies and Practices to Displace Decentralized Thermal Energy Consumption 11/04/2011, version 1.0⁴

Other Gold Standard tools and annexes included in the project development include:

1. Gold Standard for the Global Goals⁵
2. Guidelines for carrying out usage surveys for projects implementing household water filtration technologies⁶

A.4. Crediting period of project

>>The fixed 10-year crediting period started on 28/12/2011. This marks the sixth round of annual monitoring for this project which began on 19/02/2019 to 18/02/2020.

⁴<https://www.goldstandard.org/articles/gold-standard-global-goals>

⁵<https://www.goldstandard.org/project-developers/standard-documents>

⁶<https://www.goldstandard.org/wp-content/uploads/2011/09/Rule-Update-Guidelines-for-carrying-out-water-usage-surveys.pdf>

SECTION B. Implementation of project

B.1. Description of implemented project

During this monitoring period, the project continued to sell water filters within the project boundary. The project developer invested time to do through follow up on the filters whereby the filters that were found to be completely out of use for all the 3 technologies were removed from the sales data.

The project implementer also embarked on a major data entry reconciliation exercise to confirm the data on the sales receipts reconciled with what was entered in the sales record. This was following recommendation by the VVB who conducted the last verification as there were few cases of data mismatch. Following this exercise, the details in the TSR which were found to be inconsistent with the sales receipt were corrected. Also, there were cases where some end users who had purchased the filters had not been included in the total sales record. To ensure these households were given an equal chance to participate in annual monitoring, the households were included in the TSR in the respective vintage years.

To date, a total of 3,215 BioSand filters have been installed for domestic use and 2,070 HHFF units for domestic use and 164 institutional hollow fiber filters used in the institutions. Filters have been distributed in 17 counties namely Kisii, Nyamira, Uasin Gishu, Nandi, Bomet, Kericho, Nairobi, Nakuru, Kisumu, Siaya, Migori, Homa Bay, Trans Nzoia, Machakos, Murang'a, Kakamega and Elgeyo Marakwet. At the time of installation of these project technologies, households are issued with receipts and each filter is assigned a unique identification number to avoid double counting. The PP then keeps record of all sales which are then accumulated as the Total Sales Record for each technology type.

The Project Technology

1. Bio Sand Filter (BSF)

Several point-of-use water purification technologies are available in Kenya including boiling, chlorination, solar disinfection (using sunlight), flocculent-disinfectants and filtration. The average efficiency of a BSF is 95- 99% elimination of microbial contaminants. However, this figure varies based on the design and operating properties.

Maintenance of the ACI BSF is relatively simple, as it only requires that the consumer cleans the filter once or twice a year depending on the turbidity of the water. Highly turbid sources of water tend to clog the filter hence reducing the flow rate. However, the user can increase the flow rate by simply adding 10 litres of water to the BSF unit, swirling the top 4-6 cm of sand up into the water with a stick, taking all sediments into suspension, pausing to allow sand grains to settle out and then scooping and dumping the dirty water out. This simple procedure will guarantee the consumer continued filtration throughout the lifespan of the BSF unit of 10 years. The first maintenance check is done by the installer of the BSF unit, who has received training from ACI, followed by a demonstration of the maintenance.

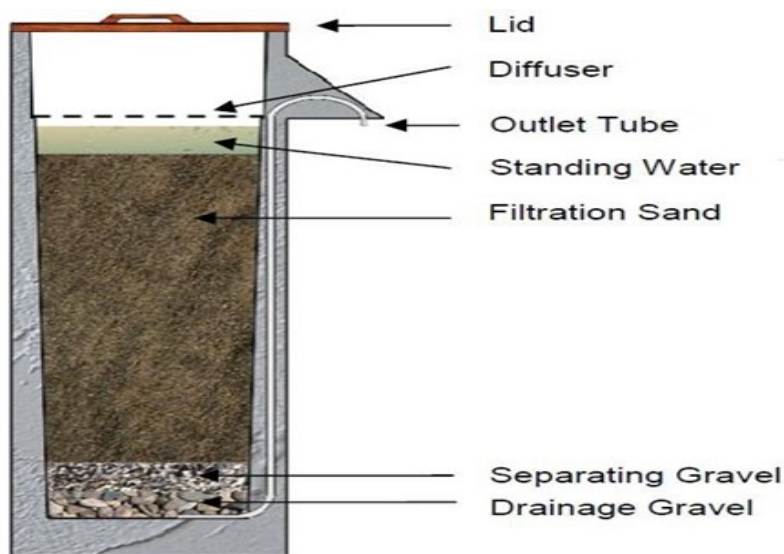


Figure 2 Cross section of a BSF

2. The ACI Hollow Fiber membrane

The ACI Hollow Fiber membrane filter is based upon hollow-fiber membrane technology, which, for decades, has been used in medical, water, food, and industrial applications for high-precision ultra-filtration. Improved manufacturing processes now make the technology economic for humanitarian projects. Hollow micro-tubes are created of polysulphone plastic. The walls of the tubes are permeated with tiny holes not greater than 0.1 microns in diameter. Water enters the filter elements on the outside of the tubes. Since bacteria are larger than 0.1 micron, they cannot flow through the holes in the tubes. Only water can get through the holes. Bacteria and debris are left on the outside of the tubes. Pure water is collected as it flows on through the filter elements. The filters are easily and quickly back flushed using a syringe to wash away the impurities that collect in the filter elements. The filtration process is completely mechanical.



No biological or chemical processes are involved. These filters are designed to be used in both in domestic set ups (households, apartments, etc.) and institutions such as schools and restaurants. The filters were designed and engineered by Aqua Clara in their laboratories at the Bioeconomic Institute of Michigan State University, in Holland, Michigan, USA.

Specifications and performance

- Nominal flow rate of standard model: first litre out of a full 5-gallon filter in 60seconds.
- Scalability: Half-litre-per-minute for small households
- Installation: 1-hour training in hygiene and maintenance; then pick up and carry home.
- Weight: <2.2 kilograms
- Start-up: no start-up process required; filter can be used immediately.
- Pause time: no pause time is required between fill-ups.
- Portability: full portability without disrupting filter processes



Figure 3: Cross Section of Hollow Fiber Membrane Filter

B.2. Post-registration changes

B.2.1. Temporary deviations from Certified Key Project Information, Project Design Document, Monitoring & Reporting Plan, applied methodology or applied standardized baseline

During this monitoring period, the PP sought a temporary deviation from the GS due to monitoring challenges imposed by the Covid-19 pandemic. The PP proposed to use alternative monitoring approach and the measures employed as per the GS approval include:

- Undertaking of non-physical usage surveys
- Remote usage surveys were done with a bigger sample size i.e., minimum 40 samples per vintage group for all the vintages with more than 40 households.
- Remote project surveys were carried out with a 10% higher sample size than required by the methodology.
- Water Consumption Field Tests were not carried out during this monitoring period as required. PP has capped the $Q_{p,y}$ for BSF and HHFF technologies at 4 l/p/d, while for IHFF technology a $Q_{p,y}$ value of 0.87l/p/d from the last verification has been applied which is conservative .
- The number of persons in a household per day was monitored and compared with value from the previous monitoring period for all the 3 project technologies. The most conservative values have been applied.
- Water quality testing has not been performed. A qualitative criterion for assessing water quality was applied and compared with the value from the previous monitoring periods. The most conservative value has been applied.

The deviation request was approved by the GS on 25/06/2020 and has been provided as part of the support documents for reference.

B.2.2. Corrections

>>There were no corrections made.

B.2.3. Changes to start date of crediting period

>>No changes have been applied on the crediting period.

B.2.4. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

The PP has made 2 permanent changes to the registered monitoring plan:

1. Cj Factor fixed ex-ante.

The Cj factor that was previously a monitored parameter and is now fixed ex-ante. This is in compliance with the registration review FAR that stated:

“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”.

The PP conducted the baseline testing were conducted between 13th to 28th July 2015 and approved in December 2016 in accordance with the Gold Standard methodology. The Household Cj factor is 18%, fixed ex-ante. This CJ was first used during the 2016 monitoring period.

2. Biennial Monitoring of the Water Consumption per filter end user per day:

The registered PDD refers to the frequency of conducting the WCFT as annually. The PP would like to amend this frequency to every other year (biennially). The methodology employed for this project, i.e., ‘Technologies and Practices to Displace Decentralized Thermal Energy Consumption - 11/04/2011’ states:

‘For each or of the baseline scenario and project scenario the BFT and PFT is updated every two years, respectively’,

At registration, the PP had chosen a conservative approach of annually monitoring this parameter. However, the PP got approval from the Gold Standard to conduct this as per the methodological threshold of once in every 2 years. The permanent deviation was approved by the GS on 16/09/2016.

Project transitioning to Gold Standard for Global Goals on 09/07/ 2018. As a result, there were some changes in the monitored parameters. This includes, inclusion of SDGs, Monitoring the number of people employed by the project and follow up and reporting on grievances raised and recorded on the logbook during the monitoring period.

B.2.5. Changes to project design of approved project

The Project Design now includes the inclusion of institutions to the project boundary. This design change was validated and approved by the Gold Standard Foundation- TAC on 16/06/2016.

SECTION C. Description of monitoring system applied by the project

1. Monitoring Procedure

A total sales record and a project database was maintained continuously and stored on an electronic database maintained by both ClimateCare and Aqua Clara International for the BSF, HHFF and IHFF.

Total Sales Record

An accurate and complete sales record has been maintained by the project proponent and backed up electronically by the ClimateCare, the carbon asset development consultant. A Total Sales Record provided as a support document, records the following data:

- 1) Date of sale
- 2) Geographic area of sale
- 3) Model/type of project technology sold.
- 4) Quantity of project technologies sold.
- 5) Name and telephone number and address:
- 6) Mode of use: domestic, commercial or other:
- 7) Unique Filter serial number

Project Database

This has been developed from the total sales record.

2. On-going Monitoring Studies

The monitoring exercise was a combination of the Usage Survey, Monitoring Survey, and the Water quality testing.

- a) **Monitoring Survey** Completed annually, beginning 1 year after project registration. The project participant has conducted the annual monitoring surveys which were used to investigate annual changes in the project scenario. The monitoring surveys were conducted remotely via telephone as per the GS requirements in the deviation approval obtained. The monitoring period covers the duration from 19/02/2019 to 18/02/2020. The monitoring surveys were conducted between 15/07/2020 to 24/08/2020. The GS requirement in the deviation approval is that *"Remote project surveys shall be carried out with a 10% higher sample size than required by the methodology applied"*. The methodology requires a minimum sample of 30 per vintage.

BSF

Table 1: Sampling and Interview Summary for BSF

Age	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	Total
Total Population	199	538	918	629	454	187	149	86	40	15	3215
Samples selected	50	50	50	50	50	50	50	40	40	15	445
Samples required under the meth	30	30	30	30	30	30	30	30	30	30	300
Required sample for surveys (10% more)	33	33	33	33	33	33	33	33	33	33	330
Households interviewed	37	41	41	45	45	40	44	42	38	15	388

For the last vintage, there were only 15 households, and these were all included in the sample frame.

HHFF

Table 2: Sampling and Interview Summary for HHFF

Age	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Total
Total Population	95	194	366	287	509	555	64	2070
Sample size	50	50	50	50	50	50	40	340
Samples required under the meth	30	30	30	30	30	30	30	210
Required sample for surveys (10% more)	33	33	33	33	33	33	33	231
Households interviewed	48	45	47	42	46	43	40	311

IHFF

Table 3: Sampling and Interview Summary for IHFF

Age	14/15	15/16	16/17	17/18	18/19	19/20	Total
Total Population	19	5	16	22	69	33	164
Sample size	19	5	16	22	40	33	135
Samples required under the meth	30	30	30	30	30	30	180
Required sample for surveys (10% more)	33	33	33	33	33	33	198
Households interviewed	19	5	16	22	40	33	164

All the vintages apart from 18/19 and 19/20 had less than 30 households and these were all interviewed during the surveys. For the 2 vintages, 40 and 33 households respectively were interviewed.

- b) **Usage Survey**- Completed annually, or more frequently, and in all cases on time for any request of issuance. The usage survey in this monitoring exercise provides a single usage parameter based on drop off rates that are representative of the age distribution for project technologies in the total sales record. The usage parameter in the usage survey shall be based on users who completely abandon use of the ACI filter and those that do not properly use or maintain the filter to affect the quality of water treated. This survey was carried out remotely via telephone using closed questionnaires. The usage survey was carried out from 15/07/2020 to 24/08/2020. The 90/10 confidence level/precision required for this parameter was achieved on the surveys conducted. Detailed analysis on the sampling criteria is provided in Section D.3 of this Monitoring report.

In compliance with the GS Deviation request approval requirement “The remote monitoring usage survey results shall be compared with the usage rate estimated based on previous monitoring periods. The expected usage rate can be estimated based on usage trend observed for each age group in previous years. The conservativeness of the monitored parameter obtained using remote surveys should be cross-checked with the results of the monitored parameter from the previous monitoring period. If the previous monitoring period result is conservative, it shall be applied”.

The PP compared the results from the last verifications with results obtained during this monitoring period to determine the usage rate. For BSF and HHFF, the value of 63.92% and 83.92% respectively obtained during this monitoring period was most conservative and this has been applied. For IHFF, the value of 64.89% from the last verification was most conservative and this has been applied in ER calculation. The summary is provided below.

Verification Year	13/06/2012 to 21/07/2014	22/07/2014 to 18/02/2016	19/02/2016 to 18/02/2017	19/02/2017 to 18/02/2018	19/02/2018 to 18/02/2019	19/02/2019 to 18/02/2020	Value applied during this MP
Usage rate BSF	85.40%	2014 = 68.31% 2015 = 68.52% 2016 = 69.29% Average: 68.7%	74%	60%	90.65%	63.92%	60%
Usage rate HHFF	NA	2014 = 72.73% 2015 = 71.55% 2016 = 71.49% Average: 71.9%	96%	68%	85.41%	83.92%	68%
Usage rate IHFF	NA	NA	53%	100%	64.89%	92.59%	53%

As per the GS Deviation approval requirement “Remote Usage surveys shall be done with a bigger sample size i.e., minimum 40 samples per vintage group or higher”. The usage surveys were carried out from 15/07/2020 to 24/08/2020. The sampling requirement was met as shown below:

Age	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	Total
Total Population	199	538	918	629	454	187	149	86	40	15	3215
Samples selected	50	50	50	50	50	50	50	40	40	15	445
Recommended samples	40	40	40	40	40	40	40	40	40	40	400
Households interviewed	37	41	41	45	45	40	44	42	38	15	388

For vintages 09/10 and 17/18, the households sampled were 37 and 38 respectively which is below the required 40. However, all the other vintages have fulfilled this requirement apart from the last vintage, with only 15 households, and these were all included in the sample frame and were interviewed.

HHFF

Age	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Total
Total Population	95	194	366	287	509	555	64	2070
Sample size	50	50	50	50	50	50	40	340
Recommended samples	40	40	40	40	40	40	40	280
Households interviewed	48	45	47	42	46	43	40	311

For all the vintages, the minimum sample size of 40 households was achieved.

IHFF

Table 4: Sampling and Interview Summary for IHFF

Age	14/15	15/16	16/17	17/18	18/19	19/20	Total
Total Population	19	5	16	22	69	33	164
Sample size	19	5	16	22	40	33	135
Recommended sample	40	40	40	40	40	40	240
Households interviewed	19	5	16	22	40	33	164

All the vintages apart from 18/19 had less than 40 households and these were all included in the sample frame. For vintage 18/19, 40 households were included in the sample frame and these were interviewed during the surveys.

- c) **Project Field Test Update-** Completed biennially, the project was supposed to conduct the project field update during this monitoring period. However, due to challenges imposed by the COVID-19 pandemic, PP was exempted from conducting the PFT update during this monitoring update. This is an extension of the project PFT and provides a water consumption assessment representative of project technologies currently every year. Hence the PFT update accounts for changes in the project scenario over time as project technologies age and new customers are added, also as new models and designs are introduced.

d) Water Consumption Field Test (WCFT) Protocol Report:

The PP did not conduct the 3-day water consumption field test during this monitoring period as per the deviation request approved by the GS. The GS requirement is as follows:

Full-day premises (households):

- If monitored water consumption values in previous MP is greater than 7 l/p/d, the PD shall apply the cap of 7 l/p/d.
- If monitored water consumption values in previous MP is between 4l/p/d and 7 l/p/d, the PD shall apply the default value of 4l/p/d.
- If monitored water consumption values in the previous MP results establish a value less than 4l/p/d, the previous MP result shall be used.
- For projects that are requesting performance certification for their first MP, the default value of 4l/p/d for water consumption shall be applied.

Half-day premises (e.g., schools) if applicable:

- If monitored water consumption values in previous MP is greater than 5.5 l/p/d, the PD shall apply the cap of 5.5 l/p/d.
- If monitored water consumption values in previous MP is between 3l/p/d and 5.5 l/p/d, the PD shall apply the default value of 3 l/p/d.
- If monitored water consumption values in the previous MP results establish a value less than 3 l/p/d, the previous MP result shall be used.
- For projects that are requesting performance certification for their first MP, the default value of 3l/p/d for water consumption shall be applied.

Based on these requirement, the $Q_{p,y}$ for all the project technologies was below 7 l/p/d. In compliance with the GS requirement, the $Q_{p,y}$ for BSF and HHFF from the last verification was 6.56 l/p/d and 5.53 l/p/d respectively, and therefore a value of 4 l/p/d has been applied during this monitoring period which is conservative. For IHFF technology, the value from the last verification was 0.87 l/p/d and this value has been applied for this monitoring period. The Project Developer shall carry out a WCFT per the approved monitoring plan within six months of end of the interim measure validity date or earlier. The results are as summarised below:

Technology	$Q_{p,y}$ last verification (2018/2019)	$Q_{p,y}$ applied during this MP
BSF	6.56 l/p/d	4 l/p/d
HHFF	5.53 l/p/d	4 l/p/d
IHFF	0.87 l/p/d	0.87 l/p/d

Number of people

The GS requirement on the number of people is that *“The number of persons in a household or students/staff in the institutional premises shall be accounted for in a conservative manner. Projects may determine this as part of the Usage/Project Survey; however, the resulting values shall be compared with the results of the previous monitoring period or host country census data (for residential units) or school attendance and enrolment records (for schools) and apply the most conservative value for this MP”*.

The number of people was determined as part of the usage surveys and the results obtained were compared with the results from the last verification. Based on this, the summary is as follows:

Technology	No. of people from last verification (2018/2019)	No. of people during this MP	Result applied during this verification
BSF	7.79	7.73	7.73
HHFF	5.64	5.73	5.64
IHFF	For institutions, the number of people per institution is determined for each institution but the average was 143.36.	For institutions, the number of people per institution is determined for each institution but the average was 85.49.	For institutions, the number of people per institution is determined for each institution but the average was 85.49.

The most conservative value on the number of people per household/institution has been applied.

e) Water Quality Tests

The PP did not perform water quality testing. The GS guidelines in the deviation request approval were followed to assess the quality of treated water. The assessment was done through the remote surveys and included a qualitative criterion for Water Quality which covered the following aspects:

- Reported incidence of water borne disease in child/members in last 30 days
- User satisfaction
- Level of hygiene including but limited to Hand washing & Safe storage practices being followed.

90/30 confidence level/precision required for this parameter was achieved on the surveys conducted. Detailed analysis on the sampling criteria and results from the qualitative criteria used to determine the quality of treated water is provided in Section D.3 of this Monitoring report.

In compliance with the GS requirement in the deviation approval "*The Water Quality survey results shall be compared with the water quality results obtained in previous monitoring periods. The conservativeness of the monitored parameter obtained using remote surveys should be informed by the results of the monitored parameter from the previous monitoring period*", PP compared the results obtained with data from the last verifications as follows:

Verification Year	13/06/2012 to 21/07/2014	22/07/2014 to 18/02/2016	19/02/2016 to 18/02/2017	19/02/2017 to 18/02/2018	19/02/2018 to 18/02/2019	19/02/2019 to 18/02/2020	Value applied during this MP
WQT BSF	94.87%	98.35%	100%	100%	99.29%	100%	94.87%
WQT HHFF	N/A	100%	100%	99%	100%	100%	99%
WQT IHFF	N/A	N/A	100%	100%	100%	100%	100%

The trend on the water quality achieved by the project over the years is generally good and the most conservative values have been applied. The Project Developer shall carry out a Water Quality Test as per the approved monitoring plan within three months of end of the interim measure validity date or earlier, where possible.

f) Leakage Assessment

The methodology prescribes possible parameters that should be evaluated for leakage emissions.

i) The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.

Fuel wood is gathered and consumed locally. Therefore, an increase in supply of wood in one locality (due to filtration) will not increase supply in another location. Total Kenyan demand for fuel wood remains well above supply⁷, therefore the gradual increase of fuel wood supplies due to diminished consumption in the target area will not warrant a reduction in prices so as to increase supply. Kenya has a wood supply potential of 31.4 million m³ against a national demand of 41.7 million m³ hence a current deficit of 10.3 million m³. The supply for firewood and charcoal stands at 13,654,022m³ and 7,358,717m³ while demand stands at 18,702,748m³ and 16,325,810m³ respectively⁸. Forecasts for a 20-year period indicate a 20.0% increase in supply and 21.6% increase in demand by the year 2032 which signifies a gradually increasing deficit. The Project Activity will not displace the baseline technology but rather, it seeks to displace the baseline practice of boiling water. Therefore, there is minimal risk of the baseline technologies being reused outside the project boundary.

ii) The non-renewable biomass or fossil fuels saved under the Project Activity are used by non-project users who previously used lower emitting energy sources.

Fuel wood is gathered and consumed locally. As per the baseline survey, most of the households/ institutions use firewood and charcoal to boil water. Since the demand for firewood and charcoal is very high in Kenya as explained in question (I) it is very unlikely that the firewood/ charcoal saved after introduction of the project will cause the non-project users to switch from lower emitting energy to using fossil fuels.

iii) The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario.

An estimation of 7,424 BSF filters, 1,842 Household ACI Hollow Fiber membrane filters and 425 Institutional/commercial-use HFF units respectively are projected to be sold/ installed within the crediting period and a baseline fuel consumption of 4.11 tonnes of fuel wood per household (in the BSF and Household HFF units project scenario) and 0.00013056 tonnes of fuel wood in institutions. The population of the country is increasing hence the demand of NRB in households and institutions will continue to increase. Additionally, people are becoming aware on the importance of consuming safe water hence there is a possibility of increased boiling practices hence the project will not alter the countries NRB significantly.

iv) The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.

In the project area, evening temperatures are 18°C and people do not use any space heating. Therefore, there is no loss of space heating for not filtering water, so there is no leakage as people do not light fires anyway.

⁷ Gender and equity in bio energy Access and Delivery in Kenya:

<http://practicalaction.org/page/docs/consulting/pisces/gender-and-equity-in-bioenergy-kenya.pdf>

⁸<http://www.kenyaforestservice.org/documents/redd/Analysis%20of%20Demand%20and%20Supply%20of%20Wood%20Products%20in%20Kenya.pdf>

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v) By virtue of promotion and marketing of a new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.

The technology involves distribution of zero energy water treatment units hence even if households who in the baseline were using treatment chemicals opt to use the filter, there is no risk of emissions.

g) Non-Renewable Biomass Assessment Update

The NRB assessment update will not occur for the project given its fixed baseline and the fact that the project scale is not large enough to affect the national NRB fraction.

h) **Hygiene Campaigns:** As per the deviation approval *“Project Developers are not required to carry out the hygiene campaigns, however, they are required to provide information to end-users on maintaining hygiene, as part of their remote surveys. The information provided shall be logged for audit purpose”*. The project implementor undertook a remote hygiene campaign when conducting the monitoring surveys. The enumerators were provided with a guide detailing the information to be communicated. All the households and institutions who were surveyed were sensitized on measures for improving safe water storage and personal hygiene through handwashing. PP has provided the *“Hygiene Campaign Information Guide”* which contains the information shared with the households as a support document.

Non-binding recommendations in the deviation request

- Photographic evidence – The project developer may gather photographs of the project SWS units, where possible, to collect visual data on the status, safe water storage practices, etc. of the unit. The end users shared some photographic evidence on the water filters. PP has shared some of the photos as support documents.
- Water Quality - Project Developer can obtain an endorsement of their Water Quality results from a local health/medical officer/School representative. For example, the officer can provide inputs on incidences water borne disease, incidence of floods, infiltration events etc. during the monitoring period. This information/feedback from medical officer shall be included in the MR along with an explanation on the likely impact on the water quality in the project area for the VVB to assess.

An endorsement letter has been submitted to the GS as a supporting document.

i) Registration with other Carbon standards

The project is not registered with any other carbon standard and hence there is no likelihood that double counting would occur. Additionally, each filter is provided with a unique filter serial number which gives a distinction on the end users which further ensures there is no double counting.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Relevant SDG Indicator	SDG 6: Clean Water and Sanitation Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
Data/parameter	C _j
Unit	%
Description	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
Source of data	Baseline Surveys
Value(s) applied	18% - Households 76% - Institutions and commercial facilities
Choice of data or Measurement methods and procedures	Baseline surveys carried out in project boundary showed that out of 144 households interviewed, 26 households had access to safe drinking water without boiling. That is, 12 households used treatment chemicals, 5 households would have used treatment chemicals if it wasn't for suppressed demand, while the other 9 households used either rain or piped water. The C _j factor was determined based on the methodological requirements by dividing the 26 households by the total in the sample frame. The same process was applied to the institutions/commercial facilities C _j value except that the number of sample units with access to safe water was 47 out of the total (62 sample units).
Purpose of data	To determine the portion of users of the project technology who in the baseline were already consuming safe water without boiling it.
Additional comment	N/A

Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data/parameter:	EF _{b, fuel, CO₂}
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor of the wood fuel
Source of data	IPCC Default emission factors
Value(s) applied)	112
Choice of data or measurement methods and procedures	IPCC default values provide an accurate and conservative estimate of emissions reduction from various fuel sources.
Purpose of data	CO ₂ emission factor of the wood fuel
Additional comments	N/A

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Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data/parameter	EF _{b, fuel, CH₄}
Unit	tCO ₂ /TJ
Description	CH ₄ emission factor of the wood fuel
Source of data	IPCC Default emission factors
Value(s) applied	0.03
Choice of data or Measurement methods and procedures	IPCC default values provide an accurate and conservative estimate of emissions reduction from various fuel sources.
Purpose of data	Calculation of CH ₄ emission factor of the wood fuel
Additional comment	N/A

Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data/parameter	EF _{b, fuel, N₂O}
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor of the wood fuel
Source of data	IPCC Default emission factors
Value(s) applied	0.004
Choice of data or Measurement methods and procedures	IPCC default values provide an accurate and conservative estimate of emissions reduction from various fuel sources.
Purpose of data	Determining CO ₂ emission factor of the wood fuel
Additional comment	N/A

Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data/parameter	W _{b,y}
Unit	Tonnes/litre
Description	Quantity of fuel in tonnes required to treat 1 litre of water using technologies representative of baseline scenario b
Source of data	GS default
Value(s) applied	Households – 0.0004 Institutions/commercial facilities – 0.0004
Choice of data or Measurement methods and procedures	N/A
Purpose of data	To estimate the quantity of fuel in tonnes required to treat 1 litre of water using technologies representative of baseline scenario b
Additional comment	N/A

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Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data/parameter	NCV _b
Unit	TJ/tonne
Description	Net calorific value of wood fuel used in the baseline
Source of data	IPCC default value
Value(s) applied	0.015
Choice of data or Measurement methods and procedures	IPCC default values provide an accurate and conservative estimate of emissions reduction from various fuel sources.
Purpose of data	To determine the calorific value of wood fuel used in the baseline
Additional comment	N/A

Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data/parameter	GWP
Unit	t CO ₂ e/t CH ₄
Description	Global Warming Potential of CH ₄
Source of data	IPCC default value
Value(s) applied	25
Choice of data or Measurement methods and procedures	IPCC Third Assessment Report: Climate Change 2001.
Purpose of data	To determine the Global Warming Potential of CH ₄
Additional comment	N/A

Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data/parameter	GWP
Unit	t CO ₂ e/tN ₂ o
Description	Global Warming Potential of N ₂ O
Source of data	Literature Review:
Value(s) applied	298
Choice of data or Measurement methods and procedures	IPCC Third Assessment Report: Climate Change 2001.
Purpose of data	To determine the Global Warming Potential of N ₂ O
Additional comment	N/A

D.2. Data and parameters monitored

Relevant SDG Indicator	SDG 3: Good health and well being. <i>Target 3.3:</i> By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.
Data / Parameter:	Up,y
Unit:	Percentage
Description:	Usage rate in project scenario p during year y. This data will be used to account for end users which discontinue use of the filters from the monitored sample frame and thereafter be extrapolated across the total sales record.
Measured/Calculated / Default:	Calculated
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Usage Survey
Value(s) of monitored parameter:	BSF 2019– 60% 2020– 60% HHFF 2019–68% 2020– 68% IHFF 2019– 53% 2020–53%
Monitoring equipment:	Monitoring Survey
Measuring/Reading/ Recording frequency:	Annually
Calculation method (if applicable):	The PP has provided excel based calculations that demonstrate the calculation of the usage parameter.
QA/QC procedures:	The guidance questions in the usage survey section in the monitoring survey template clearly determined the operational and non-operational filters in the project scenario.
Purpose of data:	Calculations of total Emission reductions
Additional comment:	The usage value attained during this monitoring period for BSF, HHFF and IHFF are 63.92%, 83.92% and 92.59% respectively. The values applied in the ER calculations are 60% (2017/2018), 68% (2017/2018) and 53% (2016/2017) respectively since they are the most conservative from all previous verifications. The 90/10 confidence/precision has been used to determine minimum required sample size as required by the methodology. As per the GS deviation approval, a minimum sample of 40 end-users per vintage year was selected where the end-users were more than 40. The samples selected for usage survey were as follows: BSF-388, HHFF-311 and IHFF-135.

Relevant SDG Indicator	SDG 3: Good health and well being. Target 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.
Data / Parameter:	Np,y
Unit:	Person.days
Description:	Number of persons consuming water supplied by project scenario p through year y
Measured/ Calculated/Default:	Calculated
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Inputs
Value(s) of monitored parameter:	BSF – 2,821 HHFF – 2,059 IHFF – Calculated individually for each institution. Calculations have been provided on the ERs sheet tab ER- calculation- IHFF.
Monitoring equipment:	Open ended question from the Monitoring surveys
Measuring/Reading/ Recording frequency:	Biennially
Calculation method (if applicable):	Households and institutions were asked the number of people living in their household and institutions for that day in the three consecutive days during the water consumption field test. An average of this number was then calculated, and an average of the total obtained. The figure was multiplied by 365 days in a year to obtain the figure for BSF and HHFF and by specific number of days a filter in in operation for IHFF.
QA/QC procedures:	The number of people living in a household and institution for the three consecutive days during the water consumption field test was obtained to capture the differences in the household and institution number of people throughout the year.
Purpose of data:	Calculation of project emissions.
Additional comment:	The GS requirement in the deviation request approval was that “The number of persons in a household shall be accounted for in a conservative manner. Projects may determine this as part of the Usage/Project Survey; however, the resulting value shall be compared with the results of the previous monitoring period or host country census data (for residential units) or school attendance and enrolment records (for schools) and apply the most conservative value for this MP”. The applied values during this monitoring period for BSF is 2,821 which is more conservative compared to last verification. For HHFF the value of 2,059 has been applied since its more conservative compared to this year’s 2,091. The value for IHFF is calculated separately for each institution due to difference in days of operation.

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Relevant SDG Indicator/Safeguarding Principle	SDG 3: Good health and well being. <i>Target 3.9:</i> By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
Data / Parameter	Number of filters sold.
Unit	Number of filters
Description	Number of filters sold as per the Total Sales Records (TSR)
Source of data	Total Sales Records for BSF, HHFF and IHFF
Value(s) applied	BSF:3,215 HHFF:2,070 IHFF: 164
Measurement methods and procedures	Records kept electronically by the PP.
Monitoring frequency	Annual
QA/QC procedures	Continuous updates of the TSR to ensure that filter sales are updated.
Purpose of data	Calculating emission reductions.
Additional comment	None

Relevant SDG Indicator	SDG 6: Clean water and Sanitation Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
Data / Parameter:	Quality of Treated Water
Unit:	Percentage
Description:	Quality of filtered water
Measured/Calculated /Default:	N/A
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Water Quality
Value(s) of monitored parameter:	BSF: 94.87% HHFF:99% IHFF: 100%
Monitoring equipment:	Field Laboratory Tests
Measuring/ Reading/Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	The water test results are compared against values provided from the product specifications
Purpose of data:	Sustainable development Monitoring; Methodological Requirement.
Additional comment:	<p>The water quality assessment was done during the remote surveys and included a qualitative criterion for Water Quality which covered the following aspects:</p> <ul style="list-style-type: none"> • Reported incidence of water borne disease in child/members in last 30 days • User satisfaction • Level of hygiene including but limited to Hand washing & Safe storage practices being followed. <p>The water quality testing value from the last verification (2018/2019) was 99.29%,100% and 100% for BSF, HHFF and IHFF respectively. In compliance with the GS deviation approval, the most conservative values from previous verifications have been applied for BSF and HHFF as follows: BSF 94.87% (2012/2014) and HHFF 99% (2017/2018). For IHFF, the WQT value from all verification is 100% which indicates a consistent trend on the quality of the water supplied by the project. PP has also provided an endorsement letter from the Ministry of Health, Kijauri Sub-County as a support documents which further confirms the quality of water provided by the project.</p> <p>The methodological requirement is that the 90/30 confidence/precision should be used to determine the minimum required sample size. This has been achieved as the water quality assessment was undertaken for all the end-users with functional water filters. The samples were as follows: BSF-248, HHFF-261 and IHFF-125.Detailed analysis on the sampling criteria is provided in Section D.3 of the Monitoring report.</p>

Relevant SDG Indicator	SDG 6: Clean water and sanitation Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
Data / Parameter:	$Q_{p,y}$
Unit:	Litres per person per day
Description:	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day
Measured/Calculated/Default:	Calculated
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Inputs
Value(s) of monitored parameter:	BSF – 4 HHFF – 4 IHFF – 0.87
Monitoring equipment:	Calibrated Buckets for measuring water
Measuring/ Reading/Recording frequency:	Biennially, 3 consecutive days of the monitoring exercise with exception of holidays and weekends
Calculation method (if applicable):	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.
QA/QC procedures:	The enumerators were provided with calibrated buckets to ensure they took accurate measurements during the WCFT protocol. To ensure accuracy, the enumerators were advised to read calibrated units less of topmost numbers which could be easily read.
Purpose of data:	Calculation of emissions reductions
Additional comment:	Based on these requirement, the $Q_{p,y}$ for BSF and HHFF from the last verification was 6.56 l/p/d and 5.53 l/p/d respectively, and therefore a value of 4 l/p/d has been applied during this monitoring period which is conservative. For IHFF technology, the value from the last verification was 0.87 l/p/d and this value has been applied for this monitoring period. The sampling requirement is that the 90/30 confidence/precision shall be used to determine the minimum required sample size. WCFT was not undertaken during this monitoring period and hence no sampling was done for this parameter.

Relevant SDG Indicator	SDG 6: Clean water and sanitation Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
Data / Parameter:	$Q_{p, \text{cleanboil}, y}$
Unit:	Litres per person per day
Description:	Quantity of safe (treated, or from safe supply) water boiled in the project scenario p, after installation of project technology
Measured/Calculated / Default:	Calculated
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Inputs
Value(s) of monitored parameter:	BSF - o HHFF – o IHFF – o
Monitoring equipment:	Monitoring surveys
Measuring/Reading/Recording frequency:	Biennially
Calculation method (if applicable):	The amount of filtered 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.
QA/QC procedures:	The enumerators were trained how to accurately measure this parameter using calibrated buckets. The households were advised not to boil the water before the enumerators measured it.
Purpose of data:	Calculation of project emissions.
Additional comment:	As per the GS deviation approval the value applied in the last verification has been applied. The sampling requirement is that the 90/30 confidence/precision shall be used to determine the minimum required sample size. WCFT was not undertaken during this monitoring period and hence no sampling was done for this parameter.

Relevant SDG Indicator	SDG 6: Clean water and sanitation Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
Data / Parameter:	$Q_{p,rawboil,y}$
Unit:	Litres per person per day
Description:	Quantity of raw water boiled in the project scenario p per person per day
Measured/Calculated / Default:	Calculated
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Inputs
Value(s) of monitored parameter:	BSF - 0 HHFF - 0 IHFF - 0
Monitoring equipment:	3-day measurement using calibrated measuring buckets
Measuring/ Reading/Recording frequency:	Biennially
Calculation method (if applicable):	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. (There were no households/ institutions boiling water in the project scenario)
QA/QC procedures:	The enumerators were trained how to accurately measure this parameter using calibrated buckets. The households were advised not to boil the water before the enumerators measured it.
Purpose of data:	Calculation of baseline and project emissions.
Additional comment:	As per the GS deviation approval the value applied in the last verification has been applied. The sampling requirement is that the 90/30 confidence/precision shall be used to determine the minimum required sample size. WCFT was not undertaken during this monitoring period and hence no sampling was done for this parameter.

Relevant SDG Indicator	SDG 6: Clean water and sanitation Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
Data / Parameter:	Volume of safe water consumed in the project scenario
Unit:	Litres consumed per person per day
Description:	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day
Measured/Calculated/Default:	Calculated
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Inputs
Value(s) of monitored parameter:	BSF -4 l/p/d HHFF -4 l/p/d IHFF -0.87 l/p/d
Monitoring equipment:	Calibrated Buckets for measuring water
Measuring/ Reading/Recording frequency:	Biennially, 3 consecutive days of the monitoring exercise with exception of holidays and weekends
Calculation method (if applicable):	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.
QA/QC procedures:	The enumerators were provided with calibrated buckets to ensure they took accurate measurements during the WCFT protocol. To ensure accuracy, the enumerators were advised to read calibrated units less of topmost numbers which could be easily read.
Purpose of data:	Calculation of emissions reductions
Additional comment:	In accordance with the GS deviation request approval, the volume of water consumed per person per day for BSF and HHFF during the last verification was 6.56 l/p/d and 5.53 l/p/d respectively, and therefore a value of 4 l/p/d has been applied during this monitoring period which is conservative. For IHFF technology, the value from the last verification was 0.87 l/p/d and this value has been applied for this monitoring period. The sampling requirement is that the 90/30 confidence/precision shall be used to determine the minimum required sample size. WCFT was not undertaken during this monitoring period and hence no sampling was done for this parameter.

Relevant SDG Indicator	SDG 3: Good health and well being. Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
Data / Parameter:	Reduction in water borne diseases such as skin rash, diarrhoea, foot sores, parasites, eye problems and other water borne diseases.
Unit:	Percentage
Description:	Number of persons who have experienced a decrease of water borne diseases such as skin rash, diarrhoea, foot sores, parasites, eye problems and other water borne diseases since using the filter
Measured/Calculated / Default:	N/A
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Sustainable Development
Value(s) of monitored parameter:	BSF: 96.8% HHFF: 100% IHFF: 97.6%
Monitoring equipment:	Open ended questionnaires to ascertain real and perceived improvements in household health and reduction of water borne diseases.
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	The questionnaire is asked in an unbiased manner to ensure the respondents are not coerced into any answer by the interviewer
Purpose of data:	Gold Standard's Sustainable Development Monitoring
Additional comment:	Surveys were conducted remotely for all households with functional water filters. The 90/10 confidence/precision has been used to determine minimum required sample size. This has been achieved as the sustainable development assessment was undertaken for all the end-users with functional water filters. The samples were as follows: BSF-248, HHFF-261 and IHFF-125.

Relevant SDG Indicator	SDG 3: Good health and well being. Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
Data / Parameter:	Air Quality
Unit:	Percentage
Description:	Measurement of user perceptions between the baseline and project scenario: smoke levels, incidence of coughing, incidence of respiratory illness, and incidence of itchy eyes.
Measured/Calculated /Default:	Measured
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Sustainable Development
value(s) of monitored parameter:	BSF Reduced Smoke levels in the House: Yes = 96.8% No Change = 3.2% Reduced Incidents of Coughing: Yes = 94.8% No Change = 5.2% Reduced incidences of Itchy Eyes: Yes = 93.5% No Change = 6.5%
Monitoring equipment:	Monitoring Survey questionnaire
Measuring/ Reading/Recording frequency:	Annually
Calculation method (if applicable):	The number of end users with the perceived outcome e.g., reduced levels of smoke was divided by the total units in the sample frame and multiplied by 100 to get the percentage.
QA/QC procedures:	The monitoring survey questions related to air quality were fashioned in an unbiased manner so as not to influence the feedback from the respondents in any way.
Purpose of data:	Gold Standard's sustainable development monitoring
Additional comment:	The 90/10 confidence/precision has been used to determine minimum required sample size. The 90/10 confidence/precision has been used to determine minimum required sample size. This has been achieved as the sustainable development assessment was undertaken for all the end-users with functional water filters. The samples were as follows: BSF-248, HHFF-261 and IHFF-125.

Relevant SDG Indicator	SDG 3: Good health and well-being. Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
Data / Parameter:	Air Quality
Unit:	Percentage
Description:	Measurement of user perceptions between the baseline and project scenario: smoke levels, incidence of coughing, incidence of respiratory illness, and incidence of itchy eyes.
Measured/Calculated /Default:	Measured
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Sustainable Development
value(s) of monitored parameter:	HHFF Reduced Smoke levels in the House Yes = 98.5% No Change = 1.5% Reduced Incidents of Coughing: Yes = 98.5% No Change = 1.5% Reduced incidences of Itchy Eyes: Yes = 97.7% No Change = 2.3%
Monitoring equipment:	Monitoring Survey questionnaire
Measuring/ Reading/Recording frequency:	Annually
Calculation method (if applicable):	The number of end users with the perceived outcome e.g., reduced levels of smoke was divided by the total units in the sample frame and multiplied by 100 to get the percentage.
QA/QC procedures:	The monitoring survey questions related to air quality were fashioned in an unbiased manner so as not to influence the feedback from the respondents in any way.
Purpose of data:	Gold Standard's sustainable development monitoring
Additional comment:	Surveys were conducted remotely for all households with functional water filters. The 90/10 confidence/precision has been used to determine minimum required sample size. The 90/10 confidence/precision has been used to determine minimum required sample size. This has been achieved as the sustainable development assessment was undertaken for all the end-users with functional water filters. The samples were as follows: BSF-248, HHFF-261 and IHFF-125.

Relevant SDG Indicator	SDG 3: Good health and well-being. Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
Data / Parameter:	Air Quality
Unit:	Percentage
Description:	Measurement of user perceptions between the baseline and project scenario: smoke levels, incidence of coughing, incidence of respiratory illness, and incidence of itchy eyes.
Measured/Calculated /Default:	Measured
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Sustainable Development
value(s) of monitored parameter:	IHFF Reduced Smoke levels in the House: Yes = 83.2 No Change = 16.8% Reduced Incidents of Coughing: Yes = 78.4% No Change = 21.6% Reduced incidences of Itchy Eyes: Yes = 82.4% No Change = 17.6%
Monitoring equipment:	Monitoring Survey questionnaire
Measuring/ Reading/Recording frequency:	Annually
Calculation method (if applicable):	The number of end users with the perceived outcome e.g., reduced levels of smoke was divided by the total units in the sample frame and multiplied by 100 to get the percentage.
QA/QC procedures:	The monitoring survey questions related to air quality were fashioned in an unbiased manner so as not to influence the feedback from the respondents in any way.
Purpose of data:	Gold Standard's sustainable development monitoring
Additional comment:	Surveys were conducted remotely for all households with functional water filters. The 90/10 confidence/precision has been used to determine minimum required sample size. The 90/10 confidence/precision has been used to determine minimum required sample size. This has been achieved as the sustainable development assessment was undertaken for all the end-users with functional water filters. The samples were as follows: BSF-248, HHFF-261 and IHFF-125.

Relevant SDG Indicator	SDG 6: Clean water and Sanitation Target 6b: Support and strengthen the participation of local communities in improving water and sanitation management
Data / Parameter:	Number of people attending training/ workshops on maintenance of the water filters, water hygiene and sanitation management.
Unit:	Number people
Description:	This parameter will be collected to demonstrate that the project provides training and workshops on filter assembly, installation, use and maintenance
Measured/Calculated /Default:	N/A
Source of data:	GS 1078 Training records
Value(s) of monitored parameter:	<p>gtrainings were held as summarised below:</p> <ul style="list-style-type: none"> • WASHiriki WASH training on 26th -28th November 2019 at Nyamira, Kenya: 30 participants • Community WASH promotion: 17th -19th June 2020 at Sotik, Kenya: 18 participants • P&G WASH promotion and training: 11/2/2020 at Kisumu, Kenya: 11 participants • Nyamira WASH learning exchange workshop for NGOs and Ministry of Health: 24/10/2019 at Nyamira, Kenya: 29 participants • Delivering effective wash training workshop: 23rd -26th July 2019 at Kisii, Kenya: 14 participants • Introduction to household water treatment and safe water storage workshop: 22nd -23rd October 2019 at Nyamira, Kenya: 16 participants • Community WASH promoters training: 28th -31st October 2019 at Narok, Kenya: 21 participants • Community WASH promoters training, Mwongori-Mogusii: 8th -10th October 2019 at Kisii, Kenya: 22 participants • Community WASH promoters training-Motiret: 27th -19th October 2019 at Narok, Kenya: 11 participants
Monitoring equipment:	Training records
Measuring/ Reading/Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/Procedures:	Accurate and up to date records on trainings held by the project are kept by the project participant.
Purpose of data:	Gold Standard's Sustainable Development Monitoring
Additional comment:	One Skype training session was held in preparation for the monitoring survey exercise. The training was conducted by Lilian Kagume ClimateCare, with the Aqua Clara team leader for the monitoring exercise, Josephine Orare and the three enumerators employed to undertake the monitoring surveys. The training was held on 10 th July 2020.

Relevant SDG Indicator	SDG 8: Decent Work and Economic Growth Target 8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.
Data / Parameter:	Number of people employed by the project
Unit:	Number of people
Description:	Number of people employed by the project.
Measured/Calculated / Default:	Measured
Source of data:	GS 1078 Employment Records
Value(s) of monitored parameter:	54 people were employed by the project. These included 15 permanent employees at Aqua Clara, 36 people who were employed in the filter distribution program and 3 as enumerators for the monitoring survey exercise. Both women and youth have been employed in this project as evidenced in the employment record and monitoring survey summary. For the filter installers, 12 were men and 23 women. Out of the 15 permanent ACI employees, 11 people in total are youths, defined in Kenya as persons under the age of 35 years ⁹ .
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	The employment records shall be up to date and backed up electronically
Purpose of data:	Gold Standard's Sustainable Development Monitoring
Additional comment:	The project has employed both men and women. From the employment records it is evident that all the employees are paid equally depending on equal value of work done as in the case of the where the sales agents get a pay of 500 depending on sales channel for each filter sold. Additionally, all payments are above the official Kenya's minimum wage ¹⁰ Those working on a part time basis are paid above KShs. 67.80 per hour, while those employed as permanent employees are paid above KShs. 13,572.

⁹https://theyouthcongress.org/wp-content/uploads/2017/05/youth_policy_guide_kenya.pdf

¹⁰http://kenyalaw.org/kl/fileadmin/pdfdownloads/LegalNotices/2015/LN117_2015.pdf

Relevant SDG Indicator	SDG 8: Decent Work and Economic Growth Target 8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.
Data / Parameter:	Employment wages of people employed by the project
Unit:	Wages of the people employed by the project
Description:	This parameter will be collected to indicate the project provides decent work for all men and women.
Measured/ Calculated / Default:	Calculated
Source of data:	GS 1078 Employment Records Sales per sales agent Enumerators employment record
Value(s) of monitored parameter:	36 people were employed in the filter distribution program. Each person was paid KShs. 500 for each filter sold. The highest record of filters sold by the employees is 135 filters where the employee was paid Kshs. 67,500. While the lowest had sold receiving 1 filter and got Kshs. 500. There are also 15 permanent employees working with the project. The employment records have been submitted separately. Total income generated by the employees from filter distribution is KShs. 295,000 while that from the monitoring exercise is Kshs.46,400.
Monitoring equipment:	Employment and wages Records
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	Employment Records are kept electronically and updated frequently to ensure they are up to date.
Purpose of data:	Gold Standard's sustainable development monitoring
Additional comment:	Employment records for both permanent and part time staff have been submitted as support documents. Equal pay was made to both men and women depending on the number of filters sold where a payment of Kshs. 500 was made for every filter sold.

Relevant SDG Indicator	SDG9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation Target: 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
Data / Parameter:	Number of people attending training/ workshops on filter installation and maintenance
Unit:	Number of people
Description:	This parameter will be collected to demonstrate that the project provides training and workshops on filter assembly, installation, and use
Measured/Calculated /Default:	N/A
Source of data:	GS 1078 Training records
Value(s) of monitored parameter:	16
Monitoring equipment:	Training records
Measuring/ Reading/Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	Accurate and up to date records on trainings held by the project are kept by the project participant.
Purpose of data:	Gold Standard's Sustainable Development Monitoring
Additional comment:	During this monitoring period, there is a total of 16 filter installers who were trained on filter assembly, installation and maintenance and safe storage. These included 7women and 9men. At installation, the households/ institutions are also trained on proper usage and maintenance of the filter.

Relevant SDG Indicator	SDG 13: Take urgent action to combat climate change and its impacts. Target 13.1: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.
Data / Parameter:	Number of workshops, seminars organized, and training-related opportunities held.
Unit:	Number of workshops, seminars and trainings
Description:	This parameter will be collected to demonstrate that the project provides training and workshops on filter assembly, installation, and use
Measured/ Calculated / Default:	N/A
Source of data:	Training records
Value(s) of monitored parameter:	9 trainings and workshops
Monitoring equipment:	Training records
Measuring/ Reading/Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	Accurate and up to date records on trainings held by the project are kept by the project participant.
Purpose of data:	Gold Standard's Sustainable Development Monitoring
Additional comment:	A total of 9 trainings were conducted. The trainings were on filter installation and maintenance and WASH promotion.

Relevant SDG Indicator/Safeguarding Principle	SDG 13: Climate Action Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.
Data / Parameter	LE _{p,y}
Unit	tCO _{2e} per year
Description	Leakage in project scenario p during year y
Source of data	Literature review
Value(s) applied	0
Measurement methods and procedures	In accordance with the methodology an assessment of all project scenarios which might result in leakage emissions has been conducted. This demonstrated, there are no potential leakage emission sources arising.
Monitoring frequency	Parameter to be monitored biennially.
QA/QC procedures	There are no perceived leakage risks for this project as explained in section E.2 of this Monitoring report.
Purpose of data	Calculation of Emissions Reductions.
Additional comment	N/A

Relevant SDG Indicator	SDG 13: Climate Action Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Data / Parameter:	Bb,y
Unit:	Tons
Description:	Quantity of wood fuel consumed in baseline scenario b during the year y in tons
Measured/ Calculated / Default:	Calculated
Source of data:	GS1078 Combined Monitoring survey summary, tabs BSF, HHFF and IHFF Inputs
Value(s) of monitored parameter:	BSF: 3.7014 HHFF: 2.7008 IHFF: 0.000084
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	The parameter is a function of the Cj factor, Np,y, Wb,y, Qpy and Qp _{raw,boil} as shown in the equation below: $Bb_y = (1 - C_j) * W_{b,y} * N_{p,y} * (Q_{p,y} + Q_{p,raw,boil})$
QA/QC procedures:	The variables were based on accurate monitored data as well as data fixed ex-ante. Additionally, the formula used is derived from the GS approved methodology "Technologies and practices to Displace Decentralized Thermal Energy Consumption, version 1.0"
Purpose of data:	Calculation of Baseline emissions.
Additional comment:	N/A

D.3 Implementation of sampling plan

1. Water Quality Testing

The PP did not perform water quality testing. The GS guidelines in the deviation request approval were followed to assess the quality of treated water. The assessment was done through the remote surveys and included a qualitative criterion for Water Quality which covered the following aspects:

- Reported incidence of water borne disease in child/members in last 30 days
- User satisfaction (Highly satisfied, moderately satisfied or not satisfied)
- Level of hygiene including but limited to Hand washing & Safe storage practices being followed.

Further, as recommended by the GS, the Project Developer obtained an endorsement of their Water Quality results from a local public health officer. The letter confirms that there has been a significant reduction of water borne diseases in the project area due to more people consuming safe water provided by the project.

In compliance with the GS deviation request, the PP has compared the Water Quality survey results obtained during this verification with the water quality results obtained in the previous monitoring period and the most conservative value have been applied.

The Project Developer shall carry out a Water Quality Test as per the approved monitoring plan within three months of end of the interim measures' validity date.

The methodological requirement is that the 90/30 confidence/precision shall be used to determine the minimum required sample size. The PD conducted the water quality assessment on all the households with functional water filters and the survey's results were recorded.

Any household/institution which reported that it had not witnessed any incidence of water borne disease within the last 30 days, and the level of satisfaction with using the filter was either high or moderate was considered a user. This was also backed up with a demonstration that the household/institution practices some level of hygiene. Based on this assessment, the user/non-user analysis was then done to determine the overall quality of the treated water as outlined below.

The 90/30 confidence level required for water quality was achieved on the samples that were surveyed as indicated below.

BSF Technology

The sample required to meet the 90/30 confidence level was 8. However, PP undertook water quality testing survey for all the 248 households sampled with functional BSF filters.

What margin of error can you accept? <small>5% is a common choice</small>	<input type="text" value="30"/> %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? <small>Typical choices are 90%, 95%, or 99%</small>	<input type="text" value="90"/> %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? <small>If you don't know, use 20000</small>	<input type="text" value="3215"/>	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? <small>Leave this as 50%</small>	<input type="text" value="50"/> %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under More information if this is confusing.
Your recommended sample size is	8	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

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Alternate scenarios

With a sample size of	<input type="text" value="100"/>	<input type="text" value="200"/>	<input type="text" value="300"/>	With a confidence level of	<input type="text" value="90"/>	<input type="text" value="95"/>	<input type="text" value="99"/>
Your margin of error would be	8.10%	5.63%	4.52%	Your sample size would need to be	8	11	19

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HHFF technology

The sample required to meet the 90/30 confidence level was 8. However, PP undertook water quality testing survey for all the 261 households sampled with functional HHFF filters.

Sample size calculator

What margin of error can you accept? <small>5% is a common choice</small>	<input style="width: 100%;" type="text" value="30"/> %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? <small>Typical choices are 90%, 95%, or 99%</small>	<input style="width: 100%;" type="text" value="90"/> %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? <small>If you don't know, use 20000</small>	<input style="width: 100%;" type="text" value="2070"/>	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? <small>Leave this as 50%</small>	<input style="width: 100%;" type="text" value="50"/> %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under More information if this is confusing.
Your recommended sample size is	8	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

Online surveys with Vovici have completion rates of 66%!

Alternate scenarios							
With a sample size of	<input style="width: 100%;" type="text" value="100"/>	<input style="width: 100%;" type="text" value="200"/>	<input style="width: 100%;" type="text" value="300"/>	With a confidence level of	<input style="width: 100%;" type="text" value="90"/>	<input style="width: 100%;" type="text" value="95"/>	<input style="width: 100%;" type="text" value="99"/>
Your margin of error would be	8.03%	5.53%	4.39%	Your sample size would need to be	8	11	19

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IHFF technology

The sample required to meet the 90/30 confidence level was 8. However, PP undertook water quality testing survey for all the 125 institutions sampled with functional IHFF filters.

Sample size calculator

What margin of error can you accept? <small>5% is a common choice</small>	<input style="width: 100%;" type="text" value="30"/> %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? <small>Typical choices are 90%, 95%, or 99%</small>	<input style="width: 100%;" type="text" value="90"/> %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? <small>If you don't know, use 20000</small>	<input style="width: 100%;" type="text" value="164"/>	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? <small>Leave this as 50%</small>	<input style="width: 100%;" type="text" value="50"/> %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under More information if this is confusing.
Your recommended sample size is	8	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

Online surveys with Vovici have completion rates of 66%!

Alternate scenarios							
With a sample size of	<input style="width: 100%;" type="text" value="100"/>	<input style="width: 100%;" type="text" value="200"/>	<input style="width: 100%;" type="text" value="300"/>	With a confidence level of	<input style="width: 100%;" type="text" value="90"/>	<input style="width: 100%;" type="text" value="95"/>	<input style="width: 100%;" type="text" value="99"/>
Your margin of error would be	5.15%	0.00%	0.00%	Your sample size would need to be	8	11	17

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2. Water quality testing results

The water quality results from the monitoring surveys are as summarised in table below:

BSF technology

WATER QUALITY SURVEY ANALYSIS			
	Response	Value	Percentage
Incidence of water borne diseases.	Yes	0	0%
	no	248	100%
	Total	248	100%
Level of satisfaction	High	246	99%
	Moderate	2	1%
	Low	0	0%
	Total	248	100%
Hygiene practices	Yes	247	99.6%
	no	1	0.4%
	Total	248	100%

User/Non-user analysis based on water quality		
	Value	percentage
Users	248	100%
Non-users	0	0%
Total	248	100%

HHFF technology

WATER QUALITY SURVEY ANALYSIS			
	Response	Value	Percentage
Incidence of water borne diseases.	Yes	0	0%
	no	261	100%
	Total	261	100%
Level of satisfaction	High	257	98%
	Moderate	3	1%
	Low	0	0%
	Total	261	100%
Hygiene practices	Yes	261	100.0%
	no	0	0.0%
	Total	261	100%

User/Non-user analysis based on water quality		
	Value	percentage
Users	261	100%
Non-users	0	0%
Total	261	100%

WATER QUALITY SURVEY ANALYSIS			
	Response	Value	Percentage
Incidence of water borne diseases.	Yes	0	0%
	no	125	100%
	Total	125	100%
Level of satisfaction	High	109	87%
	Moderate	16	13%
	Low	0	0%
	Total	125	100%
Hygiene practices	Yes	125	100%
	no	0	0%
	Total	125	100%

User/Non-user analysis based on water quality		
	Value	percentage
Users	125	100%
Non-users	0	0%
Total	125	100%

3. Sampling method

Simple Random sampling method was used to determine the random test subjects from the total sales record. The methodological requirement is that the 90/10 precision should be achieved in cases of single sample tests. Also, the minimum total sample size should be 100, with at least 30 samples for project technologies of each age being credited.

The GS requirement as per the deviation request approval was that the usage surveys shall be done with a bigger sample size i.e., minimum 40 samples per vintage group or higher.

Determination of the Sample size

A total of 445 households for the BSF, 340 HHFF and 135 IHFF were initially randomly selected for this monitoring period. PP ensured that at least 40 samples for BSF and HHFF were selected for each age being interviewed where the population was above 40.

Out of the 164 IHFF sold, 135 were included in the sample frame. For all the filter ages apart from year 18/19, all the households in the ages were included in the sample frame since they were below 40 households.

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The following method was used to determine the 445 sampling units for BSF and 340 HHFF sampling units.

1. A list of the geographical regions in the total sales record and the total number of filters sold in these regions was determined.
2. Cumulative sum of all the BSF filters and Household HHFF filters sold was 3,215 BSF Filters and 2,070 HHFF.
3. PD (Project Developer) opted for a larger sample size of 50 households per age for BSF where the population was more than 90 households. The extra households were to cater for households that were not available or could not be contacted for the remote surveys. For vintages with less than 90 samples a random sample of 40 was selected. PD opted for this approach to ensure that a minimum sample size of at least 40 households would be achieved for each filter age. For the one vintage (18/19) with less than 40 households, all the 15 households were included in the sample frame. For BSF, PD reached out to those selected on the sample frame, and once the minimum sample was reached, they would move to the next age. For BSF, out of a sample size of 445, 388 households were surveyed.

For HHFF, PD also run a sample of 50 households per age for all the vintages with more than 90 households. For any replacements required for households not available for the monitoring survey, the PD would pick a household below the once selected and interview them.

For IHFF, all the vintages apart from 2018/2019 had less than 40 households and these households were all included in the sample frame. For the 2018/2019 vintage, a random sample of 40 households was selected.

4. The total number of filters sold in the respective age groups was then divided by the sample size chosen for that particular age group for BSF and HHFF. This result determined the Sample Interval.
5. A random number was determined between 1 and the Sample Interval which gave the Random Start.
6. Sample units were then determined as
 - a) $SU_1=RS$
 - b) $SU_2=RS+SI$
 - c) $SUN=RS+(n-1)SI$
7. The identified sample units were then identified with corresponding household in the Total Sales Record which provided the name of the household and the details of the location of the household.

The sample size utilized for analysis of this monitoring period for BSF has decreased from 445 to 388, that of HHFF has reduced from 340 to 311 and the sample size for IHFF remained 135 as all institutions included in the sample frame were surveyed. This is because for BSF, PD reached out to households as selected, and once the minimum sample was reached, they would move to the next age as they didn't want to have a very big sample which would be very expensive as well. Once they would call a household and there was no response, or the number was off or the household would not be available during the monitoring date, they would move to the next household on the sample frame until the sample size was attained. A total of 40 replacements were made in the BSF technology.

For the HHFF, there was a total of 29 replacements which were made to ensure the sample size did not fall below the required minimum of 40. The PD made replacements due to several reasons namely such as some of the users had relocated to other locations, some could not be traced, and some phone numbers were no longer in service. The PP has opted to discount these households as not applicable due to their availability. Counting them as non-users automatically would be as inaccurate as automatically counting them as users. Therefore, these households that cannot be traced have not been included in the final sample frame. The

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sample size and calculations have been provided as supporting documentation. There were no replacements done for the IHFF.

For BSF, the sample used for Usage Survey is 388, for water quality test analysis, a sample of 248 was used since for households no longer using their filters and the water quality assessment was not undertaken. For HHFF the sample used for usage survey was 311 whereas the sample for water quality tests was 261. For IHFF samples used for usage survey was 135 whereas those used for water quality analysis was 125 samples.

BSF

Table 3: Sampling Summary for BSF

Age	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	Total
Total Population	199	538	918	629	454	187	149	86	40	15	3215
Samples selected (oversampling per filter age)	50	50	50	50	50	50	50	40	40	15	445

HHFF

Table 4: Sampling Summary for HHFF

Age	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Total
Total Population	95	194	366	287	509	555	64	2070
Sample size	50	50	50	50	50	50	40	340

IHFF

Table 5: Sampling Summary for IHFF

Age	14/15	15/16	16/17	17/18	18/19	19/20	Total
Total Population	19	5	16	22	69	33	164
Sample size	19	5	16	22	40	33	135

The Total Sales Record provided as a supporting document gives the total sample size per vintage year with the additional households.

Sample size selected meets the 90/10 precision that is required as demonstrated below:

BSF technology

Sample size calculator

What margin of error can you accept? <small>5% is a common choice</small>	<input style="width: 90%;" type="text" value="10"/> %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? <small>Typical choices are 90%, 95%, or 99%</small>	<input style="width: 90%;" type="text" value="90"/> %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? <small>If you don't know, use 20000</small>	<input style="width: 90%;" type="text" value="3215"/>	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? <small>Leave this as 50%</small>	<input style="width: 90%;" type="text" value="50"/> %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under More information if this is confusing.
Your recommended sample size is	67	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

Online surveys with Vovici have completion rates of 66%!

Alternate scenarios							
With a sample size of	<input style="width: 90%;" type="text" value="100"/>	<input style="width: 90%;" type="text" value="200"/>	<input style="width: 90%;" type="text" value="300"/>	With a confidence level of	<input style="width: 90%;" type="text" value="90"/>	<input style="width: 90%;" type="text" value="95"/>	<input style="width: 90%;" type="text" value="99"/>
Your margin of error would be	8.10%	5.63%	4.52%	Your sample size would need to be	67	94	158

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HFF technology

Sample size calculator

What margin of error can you accept? <small>5% is a common choice</small>	<input style="width: 90%;" type="text" value="10"/> %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? <small>Typical choices are 90%, 95%, or 99%</small>	<input style="width: 90%;" type="text" value="90"/> %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? <small>If you don't know, use 20000</small>	<input style="width: 90%;" type="text" value="2070"/>	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? <small>Leave this as 50%</small>	<input style="width: 90%;" type="text" value="50"/> %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under More information if this is confusing.
Your recommended sample size is	66	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

Online surveys with Vovici have completion rates of 66%!

Alternate scenarios							
With a sample size of	<input style="width: 90%;" type="text" value="100"/>	<input style="width: 90%;" type="text" value="200"/>	<input style="width: 90%;" type="text" value="300"/>	With a confidence level of	<input style="width: 90%;" type="text" value="90"/>	<input style="width: 90%;" type="text" value="95"/>	<input style="width: 90%;" type="text" value="99"/>
Your margin of error would be	8.03%	5.53%	4.39%	Your sample size would need to be	66	92	154

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Raosoft®
Sample size calculator

What margin of error can you accept? <small>5% is a common choice</small>	<input style="width: 80%;" type="text" value="10"/> %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? <small>Typical choices are 90%, 95%, or 99%</small>	<input style="width: 80%;" type="text" value="90"/> %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? <small>If you don't know, use 20000</small>	<input style="width: 80%;" type="text" value="164"/>	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? <small>Leave this as 50%</small>	<input style="width: 80%;" type="text" value="50"/> %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under More information if this is confusing.
Your recommended sample size is	49	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

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Alternate scenarios

With a sample size of	<input style="width: 80%;" type="text" value="100"/>	<input style="width: 80%;" type="text" value="200"/>	<input style="width: 80%;" type="text" value="300"/>	With a confidence level of	<input style="width: 80%;" type="text" value="90"/>	<input style="width: 80%;" type="text" value="95"/>	<input style="width: 80%;" type="text" value="99"/>
Your margin of error would be	5.15%	0.00%	0.00%	Your sample size would need to be	49	61	83

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More information

Procedures for Administering Data Collection and Minimizing Non-Sampling Errors

1. Procedures for Data Collection

ClimateCare trained the enumerators on the monitoring questionnaire administration. A key emphasis was given on the usage survey where enumerators were to interview the households/ institutional members via telephone to ensure the process was accurate.

2. Data Collected

The data collected from the field exercise included the following information:

- Basic Information of the Household/ institution
- Usage survey information
- Sustainable Development Indicators
- Water Quality samples

The enumerators submitted the results telephone surveys to the Project Developer through a software app called m-Water which enables the enumerators to send real time data from the survey. This approach of using mobile phones to collect the data is more efficient and less bulky as compared to using printed questionnaires.

The monitoring surveys were then submitted to ClimateCare and stored electronically. A summary of the data collected has been submitted in excel format as a support document.

3. Quality Control/Quality Assurance

To ensure quality control and quality assurance, the following was implemented:

1. ClimateCare¹¹ conducted random checks on the survey team to ensure adherence to the set protocol in interviewing the project technologies end users.

¹¹The Carbon Asset Developer changed from Viability Africa to ClimateCare Limited as per the cover letter submitted to the Gold standard.

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2. Data was collected and recorded electronically by Aqua Clara and submitted to ClimateCare.

4. Data Analysis

Data was analysed solely by ClimateCare and is presented in excel format as a support document.

E.1. Calculation of baseline value or estimation of baseline situation of each SDG outcome

SDG 3: BSF technology

Parameter	Value applied	Remarks
Usage rate ($U_{p,y}$)	0%	No persons were using the project technology in the baseline scenario
Number of person.days consuming water supplied by project scenario p through year y ($N_{j,y}$)	0	No persons were using the project technology in the baseline scenario
Reduced incidence in water borne diseases	High incidence of water borne diseases: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced smoke levels	High smoke level in the households: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced incidences of coughing	High Incidences of coughing: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced incidences of itchy eyes	High incidence of itchy eyes: 0% reduction	No persons were using the project technology in the baseline scenario

SDG 3: HFFF technology

Parameter	Value applied	Remarks
Usage rate ($U_{p,y}$)	0%	No persons were using the project technology in the baseline scenario
Number of person.days consuming water supplied by project scenario p through year y ($N_{j,y}$)	0	No persons were using the project technology in the baseline scenario
Reduced incidence in water borne diseases	High incidence of water borne diseases: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced smoke levels	High smoke level in the households: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced incidences of coughing	High Incidences of coughing: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced incidences of itchy eyes	High incidence of itchy eyes: 0% reduction	No persons were using the project technology in the baseline scenario

SDG 3: IHFF technology

Parameter	Value applied	Remark
Usage rate ($U_{p,y}$)	0%	No persons were using the project technology in the baseline scenario
Number of person.days consuming water supplied by project scenario p through year y ($N_{j,y}$)	0	No persons were using the project technology in the baseline scenario
Reduced incidence in water borne diseases	High incidence of water borne diseases: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced smoke levels	High smoke level in the households: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced incidences of coughing	High Incidences of coughing: 0% reduction	No persons were using the project technology in the baseline scenario
Reduced incidences of itchy eyes	High incidence of itchy eyes: 0% reduction	No persons were using the project technology in the baseline scenario

SDG 6: BSF technology

Parameter	Value applied	Remarks
QP,y	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
QP,raw boil	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
QP,clean boil	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
Volume of clean water consumed	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
Quality of treated water	0%	No clean and safe water was being supplied by the project in the baseline scenario.
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	0	No trainings or workshops were being organised by the project in the baseline scenario.

SDG 6: HHFF technology

Parameter	Value applied	Remark
QP,y	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
QP,raw boil	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
QP,clean boil	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
Volume of clean water consumed	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
Quality of treated water	0%	No clean and safe water was being supplied by the project in the baseline scenario.
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	0	No trainings or workshops were being organised by the project in the baseline scenario.

SDG 3: IHFF technology

Parameter	Value applied	Remark
QP,y	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
QP,raw boil	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
QP,clean boil	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
Volume of clean water consumed	0 l/p/d	No clean and safe water was being supplied by the project in the baseline scenario.
Quality of treated water	0%	No clean and safe water was being supplied by the project in the baseline scenario.
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	0	No trainings or workshops were being organised by the project in the baseline scenario.

SDG 8: BSF, HHFF and IHFF technologies

Parameter	Value applied	Remark
Number of persons employed by the project	0	No persons were employed by the project in the baseline scenario
Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups	0	No persons were employed by the project in the baseline scenario
Employment wages of people employed by the project	0	No persons were employed by the project in the baseline scenario

SDG 9: BSF, HHFF and IHFF technologies

Parameter	Value applied	Remark
Number of people trained on filters installation and maintenance	0	No persons were being trained by the project in the baseline scenario

SDG 13: BSF technology

Parameter	Value applied	Remark
Number of filters sold	0	No filters had been distributed by the project in the baseline
Number of workshops, seminars organized, and training-related opportunities held	0	No persons were being trained by the project in the baseline scenario
Bb,y	3.7014	
Total baseline emissions	10,665 tCO₂e	

SDG 13: HHFF technology

Parameter	Value applied	Remark
Number of filters sold	0	No filters had been distributed by the project in the baseline
Number of workshops, seminars organized, and training-related opportunities held	0	No persons were being trained by the project in the baseline scenario
Bb,y	2.7008	
Total baseline emissions	5,360 tCO₂e	

Parameter	Value applied	Remark
Number of filters sold	0	No filters had been distributed by the project in the baseline
Number of workshops, seminars organized, and training-related opportunities held	0	No persons were being trained by the project in the baseline scenario
B _{b,y}	0.000084	
Total baseline emissions	166 tCO₂e	

BASELINE EMISSIONS CALCULATIONS

>> Baseline Emissions are calculated as follows:

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

In accordance with Gold Standard requirements on Global warming potentials for project activities, all monitoring, verifications and requests for issuance from Gold Standard Certified Emission Reductions (GS CERs) and GS VERs that fall within the second commitment period (from 1st January 2013) will be calculated using the revised GWPs. Projects emission reductions accrued before 1st January 2013 will use the former GWP values¹².

Quantity of fuel consumed in baseline scenario b during year y, in tons (B_{b,y})

BSF, HHFF and IHFF Filters:

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

Where:

Parameter	Description	Value applied BSF	Value applied HHFF	Value applied IHFF
N _{j,y}	Number of person.days consuming water supplied by project scenario p through year y	2,821	2,059	x*365=y (this parameter was calculated individually for each filter in the institutions, see ER excel)
C _j	Expressed as a percentage, this is the portion of users of the project technology j who in the baseline are already consuming safe water without boiling it	18%	18%	76%

¹²<http://www.goldstandard.org/wp-content/uploads/2011/09/Global-Warming-Potentials-for-Gold-Standard-Project-Activities-2013.pdf>

B _{b,y}	Quantity of fuel consumed in baseline scenario b during the year y in tons.	3.70144	2.70084	0.000084
Q _{p,y}	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day.	4 l/p/d	4 l/p/d	0.87 l/p/d
Q _{p, raw,boil,y}	Quantity of raw water boiled in the project scenario p per person per day.	0 l/p/d	0 l/p/d	0 l/p/d
W _{b,y}	Quantity of fuel in tons required to treat 1 litre of water using technologies representative of baseline scenario b during project year y, as per Baseline Water Boiling Test.	0.0004	0.0004	0.0004
f _{NRB,b,y}	Fraction of non-renewable biomass	0.92	0.92	0.92
EF _{b, fuel, CO2}	CO ₂ emission factor of the wood fuel	112	112	112
EF _{b, fuel, CH4}	CH ₄ emission factor of the wood fuel	0.75 (0.03*25)	0.75 (0.03*25)	0.75 (0.03*25)
EF _{b, fuel, N2O}	N ₂ O emission factor of the wood fuel	1.192 (0.004*298)	1.192 (0.004*298)	1.192 (0.004*298)
NCV _{b, fuel}	Net calorific value of the fuel that is substituted or reduced	0.015	0.015	0.015
BE _{,by}	Baseline emissions	2019:9,234 tCO ₂ e 2020: 1,431 tCO ₂ e Total: 10,665 tCO ₂ e	2019:4,567 tCO ₂ e 2020:793 tCO ₂ e Total: 5,360 tCO ₂ e	2019:146 tCO ₂ e 2020:20 tCO ₂ e Total: 166 tCO ₂ e

NB: For IHFF technology, the parameters average number of persons living in the institution(N) and Number of person.days consuming water supplied by project scenario p through year y (N_{p,y}) will be presented using variable x and y respectively. The ER calculations are provided in the GS 1078-IHFF MSS and ERs excel sheet tab ER calculation- IHFF). This is because this parameter has been calculated individually for each filter due to difference in days of operation in the institutions.

Combined Summary of Baseline emissions in the monitoring period by both BSF, HHFF and IHFF

Table 6: summary of baseline emissions in the monitoring period

Period	BSF Total Baseline Emissions (tCO ₂ e)	HHFF Total Baseline Emissions (tCO ₂ e)	IHFF total Baseline Emissions (tCO ₂ e)	Combined Totals (tCO ₂ e)
19/02/2019-31/12/2019	9,234	4,567	146	13,947
01/01/2020-18/02/2020	1,431	793	20	2,244
Total	10,665	5,360	166	16,191

SDG 3: BSF technology

Parameter	Value applied	Source of data
Usage rate (Up,y)	60%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF Usage survey
Number of person.days consuming water supplied by project scenario p through year y(Np,y)	2,821	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF Inputs
Reduced incidence in water borne diseases	96.8%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF Sustainable development
Reduced smoke levels	96.8%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF Sustainable development
Reduced incidences of coughing	94.8%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF Sustainable development
Reduced incidences of itchy eyes	93.5%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF Sustainable development

SDG 3: HHFF technology

Parameter	Value applied	Source of data
Usage rate (Up,y)	68%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF Usage survey
Number of person.days consuming water supplied by project scenario p through year y(Np,y)	2059	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF Inputs
Reduced incidence in water borne diseases	100%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF sustainable development
Reduced smoke levels	98.5%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF sustainable development
Reduced incidences of coughing	98.5%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF sustainable development
Reduced incidences of itchy eyes	97.7%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF sustainable development

SDG 3: IHFF technology

Parameter	Value applied	Source of data
Usage rate (Up,y)	53%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF Usage survey
Number of person.days consuming water supplied by project scenario p through year y(Np,y)	Calculated separately for each institution	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF ER calculations IHFF
Reduced incidence in water borne diseases	97.6%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF Sustainable development
Reduced smoke levels	83.2%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF Sustainable development
Reduced incidences of coughing	78.4%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF Sustainable development
Reduced incidences of itchy eyes	82.4%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF Sustainable development

SDG 6: BSF technology

Parameter	Value applied	Source of data
QP,y	4 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF inputs
QP,raw boil	0 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF inputs
QP,clean boil	0 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF inputs
Volume of clean water consumed	4 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF inputs
Quality of treated water	94.87%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF Water quality
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	156	GS 1078 Training records

SDG 6: HHFF technology

Parameter	Value applied	Source of data
QP,y	4 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF inputs
QP,raw boil	0 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF inputs
QP,clean boil	0 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF inputs
Volume of clean water consumed	4 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF inputs
Quality of treated water	99%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF water quality
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	156	GS 1078 Training records

SDG 6: IHFF technology

Parameter	Value applied	Source of data
QP,y	0.87 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF inputs
QP,raw boil	0 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF inputs
QP,clean boil	0 l/p/d	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF inputs
Quality of treated water	100%	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF water quality
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	156	GS 1078 Training records

SDG 8: BSF, HHFF and IHFF technologies

Parameter	Value applied	Source of data
Number of persons employed by the project.	54	GS 1078 Employment records 19-20
Change in number of jobs and positions for women or Change in income and asset. distributions by region, ethnicity, religion, and socioeconomic groups	6 women and 11 youths	GS 1078 Employment records 19-20
Employment wages of people employed by the project.	Kshs. 295,000	GS 1078 Employment records 19-20

SDG 9: BSF, HHFF and IHFF technologies

Parameter	Value applied	Source of data
Number of people trained on filters installation and maintenance	16	GS 1078 Training records 19-20

SDG 13: BSF technology

Parameter	Value applied	Source of data
Number of filters sold.	3,215	BSF TSR and Sample frame 2019-2020, tab TSR
Number of workshops, seminars organized, and training-related opportunities held.	9	GS 1078 Training records 19-20
Bp,y	0 tonnes	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF 2019/2020
Total project emissions	0 tCO ₂ e	GS1078 Combined ER and MSS 19-20 spreadsheet, tab BSF 2019/2020

Parameter	Value applied	Source of data
Number of filters sold	2,070	HHFF TSR and Sample frame 2019-2020, tab TSR
Number of workshops, seminars organized, and training-related opportunities held	9	GS 1078 Training records 19-20
B _{p,y}	0 tonnes	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF 2019/2020
Total project emissions	0 tCO _{2e}	GS1078 Combined ER and MSS 19-20 spreadsheet, tab HHFF 2019/2020

SDG 13: IHFF technology

Parameter	Value applied	Source of data
Number of filters sold.	164	IHFF TSR and Sample frame 2019-2020, tab TSR
Number of workshops, seminars organized, and training-related opportunities held.	9	GS 1078 Training records 19-20
B _{p,y}	0 tonnes	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF 2019/2020
Total project emissions	0	GS1078 Combined ER and MSS 19-20 spreadsheet, tab IHFF 2019/2020

PROJECT EMISSIONS CALCULATIONS

Project Emissions are calculated as follows:

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

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

B_{p, y} calculations

$$B_{p,y} = \text{Number of person.days} \times \text{Project Fuel used to boil water (T/L)} \times \text{Total volume of water boiled in project scenario (L/p/d)}$$

BSF technology

Parameter	Description	Value applied
N _{p, y}	Number of person. days consuming water supplied by project scenario p through year y	2,821
C _j	Expressed as a percentage, this is the portion of users of the project technology j or who in the baseline were already consuming safe water without boiling it	18%
Q _{p, rawboil,y}	Quantity of raw water boiled in the project scenario p per person per day	0 l/p/d
Q _{p, cleanboil,y}	Quantity of safe water boiled in the project scenario p per person per day	0 l/p/d

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$W_{p,y}$	Quantity of wood fuel or fossil fuel in tons required to treat 1 litre of water using technologies representative of the project scenario p during project year y	0.0004tonnes
$B_{p,y}$	Quantity of fuel consumed in project scenario p during the year y in tons	$= (1-0.18) * 2821 * 0.0004 * (0+0) = 0$ tonnes

HHFF technology

Parameter	Description	Value applied
$N_{p,y}$	Number of person. days consuming water supplied by project scenario p through year y	2,059
C_j	Expressed as a percentage, this is the portion of users of the project technology j or who in the baseline were already consuming safe water without boiling it	18%
$Q_{p, rawboil,y}$	Quantity of raw water boiled in the project scenario p per person per day	0 l/p/d
$Q_{p, cleanboil,y}$	Quantity of safe water boiled in the project scenario p per person per day.	0 l/p/d
$W_{p,y}$	Quantity of wood fuel or fossil fuel in tons required to treat 1 litre of water using technologies representative of the project scenario p during project year y	0.0004 tonnes
$B_{p,y}$	Quantity of fuel consumed in project scenario p during the year y in tons	$= (1-0.18) * 2059 * 0.0004 * (0+0) = 0$ tonnes

IHFF technology

Parameter	Description	Value applied
$N_{p,y}$	Number of person. days consuming water supplied by project scenario p through year y	Calculated separately for each (see GS 1078-IHFF MSS and ERs 18-19 excel sheet tab ER calculation- IHFF).
C_j	Expressed as a percentage, this is the portion of users of the project technology j or who in the baseline were already consuming safe water without boiling it	76%
$Q_{p, rawboil,y}$	Quantity of raw water boiled in the project scenario p per person per day	0 l/p/d
$Q_{p, cleanboil,y}$	Quantity of safe water boiled in the project scenario p per person per day	0 l/p/d
$W_{p,y}$	Quantity of wood fuel or fossil fuel in tons required to treat 1 litre of water using technologies representative of the project scenario p during project year y	0.0004tonnes
$B_{p,y}$	Quantity of fuel consumed in project scenario p during the year y in tons	$= (1-0.76) * y * 0.0004 * (0+0)$ =0 tonnes

Calculation of Project Emissions

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

BSF technology

Parameter	Description	Value applied
$f_{NRB,b,y}$	Fraction of biomass used in year y for project scenario b that can be established as non-renewable biomass.	0.92
$EF_{b, fuel, CO_2}$	CO ₂ emission factor of the wood fuel	112
$EF_{b, fuel, CH_4}$	CH ₄ emission factor of the wood fuel	= 0.75(0.03*25)
$EF_{b, fuel, N_2O}$	N ₂ O emission factor of the wood fuel	= 1.192 (0.004*298)
$NCV_{b, fuel}$	Net calorific value of the fuel that is substituted or reduced	0.015
$B_{p,y}$	Quantity of fuel consumed in project scenario p during the year y in tons	0
PE_y	Project emissions	0 tCO₂e

HHFF technology

Parameter	Description	Value applied
$f_{NRB, b, y}$	Fraction of biomass used in year y for project scenario b that can be established as non-renewable biomass.	0.92
$EF_{b, fuel, CO_2}$	CO ₂ emission factor of the wood fuel	112
$EF_{b, fuel, CH_4}$	CH ₄ emission factor of the wood fuel	= 0.75(0.03*25)
$EF_{b, fuel, N_2O}$	N ₂ O emission factor of the wood fuel	= 1.192 (0.004*298)
$NCV_{b, fuel}$	Net calorific value of the fuel that is substituted or reduced	0.015
$B_{p, y}$	Quantity of fuel consumed in project scenario p during the year y in tons	0
PE _y	Project emissions	0 tCO ₂ e

IHFF technology

Parameter	Description	Value applied
$f_{NRB, b, y}$	Fraction of biomass used in year y for project scenario b that can be established as non-renewable biomass.	0.92
$EF_{b, fuel, CO_2}$	CO ₂ emission factor of the wood fuel	112
$EF_{b, fuel, CH_4}$	CH ₄ emission factor of the wood fuel	= 0.75(0.03*25)
$EF_{b, fuel, N_2O}$	N ₂ O emission factor of the wood fuel	= 1.192 (0.004*298)
$NCV_{b, fuel}$	Net calorific value of the fuel that is substituted or reduced	0.015
$B_{p, y}$	Quantity of fuel consumed in project scenario p during the year y in tons	0
PE _y	Project emissions	0 tCO ₂ e

Combined Summary of Project emissions in the monitoring period by both BSF, HHFF and IHFF

Period	BSF Total Project Emissions (tCO ₂ e)	HHFF total project Emissions (tCO ₂ e)	IHFF total project Emission (tCO ₂ e)	Combined Totals
19/02/2019-31/12/2019	0	0	0	0
01/01/2020-18/02/2020	0	0	0	0
Total	0	0	0	0

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Calculation of leakage

As demonstrated in section C of this monitoring report, there is no leakage identified during this monitoring period for all the 3 filter technologies.

GHG Emission Reductions calculations

Overall GHG were calculated as follows:

The overall GHG reductions are calculated as follows:

$$ER_y = (\sum BE_{b,y} - \sum PE_{p,y}) * U_{p,y} - \sum LE_{p,y} \quad (13)$$

Where:

$U_{p,y}$ Cumulative usage rate for technologies in project scenario p during year y, based on cumulative installation rate and drop off rate.

BSF technology

Emission Reductions 2019 per filter

$(5.8288 - 0) * 60\% * 94.87\% - 0 = 3.3178tCO_2e$ (This figure was then divided by 365 days in a year to get the emission reductions per day i.e., 0.00909tCO₂e)

Emission Reductions 2020 per filter

$(5.8288 - 0) * 60\% * 94.87\% - 0 = 3.3178tCO_2e$ (This figure was then divided by 365 days in a year to get the emission reductions per day i.e., 0.00909tCO₂e).

HHFF technology

Emission Reductions 2019 per filter

$(4.2532 - 0) * 68\% * 99\% - 0 = 2.86323tCO_2e$ (This figure was then divided by 365 days in a year to get the emission reductions per day i.e. 0.00784).

Emission Reductions 2020 per filter

$(4.2532 - 0) * 68\% * 99\% - 0 = 2.86323tCO_2e$ (This figure was then divided by 365 days in a year to get the emission reductions per day i.e. 0.00784).

IHFF technology

Emission Reductions 2019 per filter

Emissions Reductions have been calculated individually for operation days of each filter installed. Stepwise calculations have been done on GS 1078- IHFF MSS and ERs excel sheet.

Emission Reductions 2020 per filter

Emissions Reductions have been calculated individually for operation days of each filter installed. Stepwise calculations have been done on GS 1078- IHFF MSS and ERs excel sheet.

Summary of ERs accrued in this monitoring period:

BSF technology

Table 8: Summary of BSF ERs

Period	Emission Reduction (tCO ₂ e)
19/02/2019-31/12/2019	9,234
01/01/2020-18/02/2020	1,431
Total	10,665

HHFF technology

Table 9: Summary of HHFF ERs

Period	Emission Reduction (tCO ₂ e)
19/02/2019-31/12/2019	4,567
01/01/2020-18/02/2020	793
Total	5,360

IHFF technology

Table 10: Summary of IHFF ERs

Period	Emission Reduction (tCO ₂ e)
19/02/2019 - 31/12/2019	146
01/01/2020 - 18/2/2020	20
Total	166

Table 11: Summary of ER for BSF, HHFF and IHFF

Period	BSF total Emission Reduction (tCO ₂ e)	HHFF total Emission Reduction (tCO ₂ e)	IHFF total Emission Reduction (tCO ₂ e)	Combined Totals
19/02/2019-31/12/2019	9,234	4,567	146	13,947
01/01/2020-18/02/2020	1,431	793	20	2,244
Total	10,665	5,360	166	16,191

E.3. Calculation of net benefits as difference of baseline and project values or direct calculation for each SDG outcome

SDG 3: BSF technology

Parameter	Baseline value	Project Value	Net benefit
Usage rate (Up,y)	0% (no persons were using the filter technology)	60%	60%
Number of person.days consuming water supplied by project scenario p through year y(Np,y)	0 (no persons were using the filter technology)	2,821	2,821
Reduced incidence in water borne diseases	0% (high incidence of water borne diseases)	96.8%	96.8%
Reduced smoke levels	0% (high incidence of smoke)	96.8%	96.8%
Reduced incidences of coughing	0% (high incidence of coughing)	94.8%	94.8%
Reduced incidences of itchy eyes	0% (high incidence of coughing)	93.5%	93.5%

SDG 3: HHFF technology

Parameter	Baseline value	Project Value	Net benefit
Usage rate (Up,y)	0% (no persons were using the filter technology)	68%	68%
Number of person.days consuming water supplied by project scenario p through year y(Np,y)	0 (no persons were using the filter technology)	2,059	2,059
Reduced incidence in water borne diseases	0% (high incidence of water borne diseases)	100%	100%
Reduced smoke levels	0% (high incidence of smoke)	98.5%	98.5%
Reduced incidences of coughing	0% (high incidence of coughing)	98.5%	98.5%
Reduced incidences of itchy eyes	0% (high incidence of coughing)	97.7%	97.7%

SDG 3: IHFF technology

Parameter	Baseline value	Project Value	Net benefit
Usage rate (Up,y)	0% (no persons were using the filter technology)	53%	53%
Number of person.days consuming water supplied by project scenario p through year y(Np,y)	0 (no persons were using the filter technology)	Calculated individually per institution	Calculated individually per institution.
Reduced incidence in water borne diseases	0% (high incidence of water borne diseases)	97.6%	97.6%
Reduced smoke levels	0% (high incidence of smoke)	83.2%	83.2%
Reduced incidences of coughing	0% (high incidence of coughing)	78.4%	78.4%
Reduced incidences of itchy eyes	0% (high incidence of coughing)	82.4%	82.4%

SDG 6: BSF technology

Parameter	Baseline value	Project Value	Net benefit
QP,y	0 l/p/d	4 l/p/d	4 l/p/d
QP,raw boil	N/A	0 l/p/d	0 l/p/d
QP,clean boil	N/A	0 l/p/d	0 l/p/d
Volume of clean water consumed	0 l/p/d	4 l/p/d	4 l/p/d
Quality of treated water	0%	94.87%	94.87%
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	0 (no workshops were being held by the project in the baseline)	156	156

SDG 6: HHFF technology

Parameter	Baseline value	Project Value	Net benefit
QP,y	0 l/p/d	4 l/p/d	4 l/p/d
QP,raw boil	N/A	0 l/p/d	0 l/p/d
QP,clean boil	N/A	0 l/p/d	0 l/p/d
Volume of clean water consumed	0 l/p/d	4 l/p/d	4 l/p/d
Quality of treated water	0%	99%	99%

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Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	0 (no workshops were being held by the project in the baseline)	156	156
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SDG 6: IHFF technology

Parameter	Baseline value	Project Value	Net benefit
QP,y	0 l/p/d	0.87 l/p/d	0.87 l/p/d
QP,raw boil	N/A	0 l/p/d	0 l/p/d
QP,clean boil	N/A	0 l/p/d	0 l/p/d
Volume of clean water consumed	0 l/p/d	0.87 l/p/d	0.87 l/p/d
Quality of treated water	0 %	100%	100%
Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management	0 (no workshops were being held by the project in the baseline)	156	156

SDG 8: BSF, HHFF and IHFF technologies

Parameter	Baseline value	Project Value	Net benefit
Number of persons employed by the project	0 (no persons employed by the project in the baseline)	54	54
Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups	0 (no persons employed by the project in the baseline)	6 women and 11 youths employed	6 women and 11 youths employed
Employment wages of people employed by the project	0 (no persons employed by the project in the baseline)	KShs. 295,000	Kshs. 295,000

SDG 9: BSF, HHFF and IHFF technologies

Parameter	Baseline value	Project Value	Net benefit
Number of people trained on filters installation and maintenance	0 (no workshops/trainings were being held by the project in the baseline)	16	16

SDG 13: BSF technology

Parameter	Baseline value	Project Value	Leakage emissions	Net benefit
Number of filters sold.	0	3,215	-	3,215
Number of workshops, seminars organized, and training-related opportunities held.	0	9	-	9
Bb,y	3.70144	0		3.70144
Total emissions reductions	10,665 tCO₂e	0 tCO₂e	0 tCO₂e	10,665 tCO₂e

SDG 13: HHFF technology

Parameter	Baseline value	Project Value	Leakage emissions	Net benefit
Number of filters sold	0	2,070	-	2,070
Number of workshops, seminars organized, and training-related opportunities held	0	9	-	9
Bb,y	2.70088	0		2.70088
Total emissions reductions	5,360 tCO₂e	0 tCO₂e	0 tCO₂e	5,360 tCO₂e

SDG 13: IHFF technology

Parameter	Baseline value	Project Value	Leakage emissions	Net benefit
Number of filters sold.	0	164	-	164
Number of workshops, seminars organized, and training-related opportunities held.	0	9	-	9
Bb,y	0.000084			0.000084
Total emission reductions	166 tCO₂e	0 tCO₂e	0 tCO₂e	166 tCO₂e

E.4. Summary of ex-post values of each SDG outcome for the current monitoring period

BSF technology

Table 12: Summary for ex-post values each SDG for BSF filter

Item	Baseline estimate	Project estimate	Net benefit
SDG 3 Good Health and well being	<ul style="list-style-type: none"> Usage: 0% Np,y :0 Reduced incidence in water borne diseases: high incidence: 0% reduction Reduced smoke levels: High smoke levels, 0% reduction Reduced incidences of coughing: high incidences of coughing, 0% reduction Reduced incidences of itchy eyes:0% 	<ul style="list-style-type: none"> Usage: 60% Np,y: 2,821 Reduced incidence in water borne diseases: 96.8% Reduced smoke levels: 96.8% Reduced incidences of coughing: 94.8% Reduced incidences of itchy eyes:93.5% 	<ul style="list-style-type: none"> Usage:60% Np,y: 2,821 Reduced incidence in water borne diseases: 96.8% Reduced smoke levels: 96.8% Reduced incidences of coughing: 94.8% Reduced incidences of itchy eyes:93.5%
SDG 6 Clean water and sanitation	<ul style="list-style-type: none"> QP,y: 0 QP_{,raw boil}: 0 QP_{,clean boil}: 0 Quality of treated water: 0% Volume of safe water consumed: 4l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: 0 	<ul style="list-style-type: none"> Qp,y: 4l/p/d QP_{, raw boil} 0 QP_{,clean boil} 0 Quality of treated water: 94.87% Volume of safe water consumed: 4l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management:156 	<ul style="list-style-type: none"> Qp,y: 4l/p/d QP_{, raw boil} 0 QP_{,clean boil}: 0 Quality of treated water: 94.87% Volume of safe water consumed: 4l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management):156
SDG 8 Decent work and economic growth	<ul style="list-style-type: none"> Number of persons employed by the project: 0 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups : 0 Employment wages of people employed by the project: 0 	<ul style="list-style-type: none"> Number of persons employed by the project: 54 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the 	<ul style="list-style-type: none"> Number of persons employed by the project: 54 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths Employment wages of people employed by the project: 36 people were employed in the filter distribution

		employees is Kshs. 295,000	program. Total income paid to the employees is Kshs. 295,000
SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation Target	<ul style="list-style-type: none"> Number of people trained on filters installation and maintenance: 0 	<ul style="list-style-type: none"> Number of people trained on filters installation and maintenance: 16 	<ul style="list-style-type: none"> Number of people trained on filters installation and maintenance: 16
SDG 13 Take urgent action to combat climate change and its impacts	<ul style="list-style-type: none"> Number of filters sold: 7,424 Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 0 Bb,y: 0 	<ul style="list-style-type: none"> Number of filters sold: 3,215 Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 Bb,y: 3.7014 	<ul style="list-style-type: none"> Number of filters sold: 3,215 Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 Bb,y: 3.7014
Total emission reductions	<ul style="list-style-type: none"> 19/02/2019 – 31/12/2019 = 9,234 tCO₂e 01/01/2020- 18/02/2020 = 1,431 tCO₂e Total: 10,665 tCO₂e 	<ul style="list-style-type: none"> 19/02/2019 – 31/12/2019 = 0 tCO₂e 01/01/2020- 18/02/2020 = 0 tCO₂e Total: 0 tCO₂e 	<ul style="list-style-type: none"> 19/02/2019 – 31/12/2019 = 9,234 tCO₂e 01/01/2020- 18/02/2020 = 1,431 tCO₂e Total: 10,665 tCO₂e

Table 13: Summary for ex-post values each SDG for HFF filter

Item	Baseline estimate	Project estimate	Net benefit
SDG 3 Good Health and well being	<ul style="list-style-type: none"> Usage: 0% Np,y :0 Reduced incidence in water borne diseases: high incidence,0% reduction Reduced smoke levels: High smoke levels, 0% reduction Reduced incidences of coughing: high incidences of coughing, 0% reduction Reduced incidences of itchy eyes: 0% 	<ul style="list-style-type: none"> Usage: 68% Np,y: 2,059 Reduced incidence of water borne diseases: 100% Reduced smoke levels: 98.5% Reduced incidences of coughing: 98.5% Reduced incidences of itchy eyes:97.7 % 	<ul style="list-style-type: none"> Usage: 68% Np,y: 2,059 Reduced incidence of water borne diseases: 100% Reduced smoke levels: 98.5% Reduced incidences of coughing: 98.5% Reduced incidences of itchy eyes:97.7%
SDG 6 Clean water and sanitation	<ul style="list-style-type: none"> Qp,y: 0 QP_{,raw boil}:0l/p/d QP_{,clean boil}: 0l/p/d Quality of treated water: 0% Volume of safe water consumed: 0l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management:0 	<ul style="list-style-type: none"> Qp,y: 4l/p/d QP_{,raw boil}:0l/p/d QP_{,clean boil}: 0l/pd Quality of treated water: 99% Volume of safe water consumed: 4l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: 156 	<ul style="list-style-type: none"> Qp,y: 4l/p/d QP_{,raw boil}:0l/p/d QP_{,clean boil}: 0l/p/d Quality of treated water: 99% Volume of safe water consumed: 4l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management:156

<ul style="list-style-type: none"> • SDG 8 Decent work and economic growth 	<ul style="list-style-type: none"> • Number of persons employed by the project: 0 • Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 0 • Employment wages of people employed by the project: 0 	<ul style="list-style-type: none"> • Number of persons employed by the project: 54 • Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths employed. • Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the employees is KShs. 295,000 	<ul style="list-style-type: none"> • Number of persons employed by the project: 54 • Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths employed. • Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the employees is Kshs. 295,000
<p>SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation Target</p>	<ul style="list-style-type: none"> • Number of people trained on filters installation and maintenance: 0 	<ul style="list-style-type: none"> • 16 people were trained on filter installation including 7 women and 9 men 	<ul style="list-style-type: none"> • 16 people were trained on filter installation including 7 women and 9 men
<p>SDG 13 Take urgent action to combat climate change and its impacts</p>	<ul style="list-style-type: none"> • Number of filters sold: 1,842 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 0 • Bb,y: 0 	<ul style="list-style-type: none"> • Number of filters sold: 2,070 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 • Bb,y: 2.7008 	<ul style="list-style-type: none"> • Number of filters sold: 2,070 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 • Bb,y: 2.7008
<p>Total emission reductions</p>	<ul style="list-style-type: none"> • 19/02/2019 – 31/12/2019 = 4,567 tCO₂e • 01/01/2020- 18/02/2020 = 793 tCO₂e • Total: 5,360 tCO₂e 	<ul style="list-style-type: none"> • 19/02/2019 – 31/12/2019 = 0 tCO₂e • 01/01/2020- 18/02/2020 = 0 tCO₂e • Total: 0 tCO₂e 	<ul style="list-style-type: none"> • 19/02/2019 – 31/12/2019 = 4,567 tCO₂e • 01/01/2020- 18/02/2020 = 793 tCO₂e • Total: 5,360 tCO₂e

Table 14: Summary for ex-post values each SDG for IHFF filter

Item	Baseline estimate	Project estimate	Net benefit
SDG 3 Good Health and well being	<ul style="list-style-type: none"> Usage: 0% $N_{p,y} : 0$ Reduced incidence in water borne diseases: high incidence: 0% reduction Reduced smoke levels: High smoke levels, 0% reduction Reduced incidences of coughing: high incidences of coughing, 0% reduction Reduced incidences of itchy eyes: 0% 	<ul style="list-style-type: none"> Usage: 53% $N_{p,y}$: Calculated separately for each institution Reduced incidences of water borne diseases: 97.6% Reduced smoke levels: 83.2% Reduced incidences of coughing: 78.4% Reduced incidences of itchy eyes: 82.4% 	<ul style="list-style-type: none"> Usage: 53% $N_{p,y}$: Calculated separately for each institution Reduced incidences of water borne diseases: 97.6% Reduced smoke levels: 83.2% Reduced incidences of coughing: 78.4% Reduced incidences of itchy eyes: 82.4%
SDG 6 Clean water and sanitation	<ul style="list-style-type: none"> $Q_{p,y} : 0$ l/p/d $Q_{p,raw\ boil} : 0$ l/p/d $Q_{p,clean\ boil} : 0$ l/p/d Quality of treated water: 0% Volume of safe water consumed: 0 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management : 0 	<ul style="list-style-type: none"> $Q_{p,y} : 0.87$ l/p/d $Q_{p,raw\ boil} : 0$ l/p/d $Q_{p,clean\ boil} : 0$ Quality of treated water: 100% Volume of safe water consumed: 0.87 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: 156 	<ul style="list-style-type: none"> $Q_{p,y} : 0.87$ l/p/d $Q_{p,raw\ boil} : 0$ l/p/d $Q_{p,clean\ boil} : 0$ l/p/d Quality of treated water: 100% Volume of safe water consumed: 0.87 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: 156
SDG 8 Decent work and economic growth	<ul style="list-style-type: none"> Number of persons employed by the project: 0 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 0. 	<ul style="list-style-type: none"> Number of persons employed by the project: 54 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths employed. 	<ul style="list-style-type: none"> Number of persons employed by the project: 54 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths employed.

	<ul style="list-style-type: none"> • Employment wages of people employed by the project: 0 	<ul style="list-style-type: none"> • Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the employees is Kshs. 295,000 	<ul style="list-style-type: none"> • Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the employees is Kshs. 295,000
SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation Target	<ul style="list-style-type: none"> • Number of people trained on filters installation and maintenance: 0 	<ul style="list-style-type: none"> • Number of people trained on filters installation and maintenance: 16 	<ul style="list-style-type: none"> • 16 people were trained on filter installation including 7 women and 9 men
SDG 13: Take urgent action to combat climate change and its impacts.	<ul style="list-style-type: none"> • Number of filters sold: 425 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 0 • Bb,y: 0 	<ul style="list-style-type: none"> • Number of filters sold: 164 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 • Bb,y: 0.000084 	<ul style="list-style-type: none"> • Number of filters sold: 164 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 • Bb,y: 0.000084
Total emission reductions	<ul style="list-style-type: none"> • 19/02/2019 – 31/12/2019 = 146 tCO₂e • 01/01/2020 - 18/02/2020 = 20 tCO₂e • Total: 166 tCO₂e 	<ul style="list-style-type: none"> • 19/02/2019 – 31/12/2019 = 0 tCO₂e • 01/01/2020 - 18/02/2020 = 0 tCO₂e • Total: 0 tCO₂e 	<ul style="list-style-type: none"> • 19/02/2019 – 31/12/2019 = 146 tCO₂e • 01/01/2020 - 18/02/2020 = 20 tCO₂e • Total: 166 tCO₂e

E.5. Comparison of actual value of outcomes with estimates in approved PDD

BSF technology

Table 15: Comparison of actual value of outcomes with estimates in approved PDD for BSF

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 3: Good Health and well being	<ul style="list-style-type: none"> Usage: 80% Np,y :1,825 Reduced incidence in water borne diseases: N/A Reduced smoke levels: N/A Reduced incidences of coughing: N/A Reduced incidences of itchy eyes: N/A 	<ul style="list-style-type: none"> Usage: 60% Np,y: 2,821 Reduced incidence of water borne diseases: 96.8% Reduced smoke levels: 96.8% Reduced incidences of coughing: 94.8% Reduced incidences of itchy eyes:93.5%
SDG 6 Clean water and sanitation	<ul style="list-style-type: none"> Qp,y: 5l/p/d QP,raw boil :0l/p/d QP,clean boil :0 l/p/d Quality of treated water: 100% Volume of safe water consumed: 5 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: N/A 	<ul style="list-style-type: none"> Qp,y: 4 l/p/d QP, raw boil 0 l/p/d QP,clean boil 0 l/p/d Quality of treated water: 94.87% Volume of safe water consumed: 4 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management:156
SDG 8 Decent work and economic growth	<ul style="list-style-type: none"> Number of persons employed by the project: N/A Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: N/A Employment wages of people employed by the project: N/A 	<ul style="list-style-type: none"> Number of persons employed by the project: 54 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths employed Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the employees is KShs. 295,000
SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	<ul style="list-style-type: none"> Number of people trained on filters installation and maintenance: 0 	<ul style="list-style-type: none"> 16 people were trained on filter installation including 7 women and 9 men
SDG 13: Take urgent action to combat climate change and its impacts	<ul style="list-style-type: none"> Number of filters sold: 7,424 Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): N/A B,by: 4.115375 	<ul style="list-style-type: none"> Number of filters sold: 2,070 Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 B,by: 3.70144

Total emission reductions	32,801 tCO ₂ e	19/02/2019 – 31/12/2019 = 9,234 tCO ₂ e 01/01/2020- 18/02/2020 = 1,431 tCO ₂ e Total: 10,665 tCO₂e
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HHFF

Table 16: Comparison of actual value of outcomes with estimates in approved PDD for HHFF

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 3 Good Health and well being	<ul style="list-style-type: none"> Usage: 80% Np,y :1,825 Reduced incidence in water borne diseases: N/A Reduced smoke levels: N/A Reduced incidences of coughing: N/A Reduced incidences of itchy eyes: N/A 	<ul style="list-style-type: none"> Usage: 68% Np,y: 2,059 Reduced incidence of water borne diseases: 100% Reduced smoke levels: 98.5% Reduced incidences of coughing: 98.5% Reduced incidences of itchy eyes: 97.7%
SDG 6 Clean water and sanitation	<ul style="list-style-type: none"> QP,y: 5 l/p/d QP_{,raw boil}: 0 l/p/d QP_{,clean boil}: 0 l/p/d Quality of treated water: 100% Volume of safe water consumed: 5 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: N/A 	<ul style="list-style-type: none"> QP,y: 4l/p/d QP_{,raw boil}: 0 l/p/d QP_{,clean boil}: 0l/p/d Quality of treated water: 99% Volume of safe water consumed: 4l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management:156
SDG 8 Decent work and economic growth	<ul style="list-style-type: none"> Number of persons employed by the project: N/A Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: N/A Employment wages of people employed by the project: N/A 	<ul style="list-style-type: none"> Number of persons employed by the project: 54 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths employed. Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the employees is Kshs. 295,000
SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	<ul style="list-style-type: none"> Number of people trained on filters installation and maintenance: N/A 	<ul style="list-style-type: none"> 16 people were trained on filter installation including 7 women and 9 men
SDG 13: Take urgent action to combat climate	<ul style="list-style-type: none"> Number of filters sold: 1,842 Number of workshops, seminars organized, and trainings (water and 	<ul style="list-style-type: none"> Number of filters sold: 2,070 Number of workshops, seminars organized, and trainings (water and

change and its impacts	sanitation management and filter installation and maintenance): N/A	sanitation management and maintenance of the water filters): 9
	<ul style="list-style-type: none"> Bb,y: 4.115375 	<ul style="list-style-type: none"> Bb,y: 2.70088
Total ER Achieved	5,550tCO ₂ e	<ul style="list-style-type: none"> 19/02/2019 – 31/12/2019 = 4,567 tCO₂e 01/01/2020- 18/02/2020 = 793 tCO₂e Total: 5,360 tCO₂e

IHFF Technology

Table 17: Comparison of actual value of outcomes with estimates in approved PDD for IHFF

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 3 Good Health and well being	<ul style="list-style-type: none"> Usage: 80% Np,y :N/A Reduced incidences of water borne diseases: N/A Reduced smoke levels: N/A Reduced incidences of coughing: N/A Reduced incidences of itchy eyes: N/A 	<ul style="list-style-type: none"> Usage: 53% Np,y: calculated individually for each institution Reduced incidences of water borne diseases: 97.6% Reduced smoke levels: 83.6% Reduced incidences of coughing: 78.4% Reduced incidences of itchy eyes:82.4%
SDG 6 Clean water and sanitation	<ul style="list-style-type: none"> Qp,y: 1 l/p/d Qp,raw boil: 0 l/p/d QP, clean boil: 0 l/p/d Quality of treated water: 100% Volume of safe water consumed: 1 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management: N/A 	<ul style="list-style-type: none"> Qp,y: 0.87 l/p/d QP, raw boil: 0 l/p/d QP, clean boil: 0 l/p/d Quality of treated water: 100% Volume of safe water consumed: 0.87 l/p/d Number of people attending workshops, seminars or trainings on water, hygiene and sanitation management:156
SDG 8 Decent work and economic growth	<ul style="list-style-type: none"> Number of persons employed by the project: N/A Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: N/A Employment wages of people employed by the project: N/A 	<ul style="list-style-type: none"> Number of persons employed by the project: 54 Change in number of jobs and positions for women or Change in income and asset distributions by region, ethnicity, religion, and socioeconomic groups: 6 women and 11 youths employed. Employment wages of people employed by the project: 36 people were employed in the filter distribution program. Total income paid to the employees is Kshs. 295,000
SDG 9: Build resilient infrastructure, promote inclusive and sustainable	<ul style="list-style-type: none"> Number of people trained on filters installation and maintenance: N/A 	<ul style="list-style-type: none"> 16 people were trained on filter installation including 7 women and 9 men

industrialization and foster innovation Target		
SDG 13: Take urgent action to combat climate change and its impacts	<ul style="list-style-type: none"> • Number of filters sold: 425 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): N/A • Bb,y: 0.00013056 	<ul style="list-style-type: none"> • Number of filters sold: 164 • Number of workshops, seminars organized, and trainings (on installation, water and sanitation management and maintenance of the water filters): 9 • Bb,y: 0.000084
Total Emission reductions	4,088 tCO ₂ e	<ul style="list-style-type: none"> • 19/02/2019 – 31/12/2019 = 146 tCO₂e • 01/01/2020- 18/02/2020 = 20 tCO₂e • Total: 166 tCO₂e

E.6. Remarks on difference from estimated value in approved PDD

1. For BSF and HHFF technologies, in the ex-ante PP had estimated a $Q_{p,y}$ of 5l/p/d, however as per the deviation approval guidelines issued by the GS, PP has applied a value of 4l/p/d to ensure conservativeness.
2. IHFF in the ex-ante, PP had estimated a $Q_{p,y}$ of 1 litre but a value of 0.87 from the last verification has been applied which is more conservative.
3. In the ex-ante, $N_{p,y}$ for BSF and HHFF at 1,825. However, during monitoring, $N_{p,y}$ of 2,821 and 2,059 were achieved respectively. IHFF $N_{p,y}$ was not estimated in the ex-ante, however during monitoring, this parameter was monitored for each individual institution.
4. BSF usage rate was estimated at 80% but during this monitoring period the usage rate of 60% has been achieved. This is lower compared to the ex-ante estimate since the most conservative value from previous verifications has been applied in compliance with GS deviation approval.
5. HHFF, usage rate was estimated at 80% but a usage rate of 68% has been applied during this monitoring period since the most conservative value from previous verifications has been applied in compliance with GS deviation approval. .
6. IHFF, usage rate was estimated at 80% in the ex-ante, a usage rate of 53 has been achieved applied during this monitoring period since the most conservative value from previous verifications has been applied in compliance with GS deviation approval.

SECTION F. Stakeholder inputs and legal disputes

F.1. List all inputs/grievances which have been received for the project during the monitoring period together with their respective answers/actions

During this monitoring, a logbook was placed at the project developers (Aqua Clara) office where filter owners could file their grievances in relation to the project. The filter owners also have the office contacts and those of the installing CDE, in case any information or assistance is needed. Grievances were recorded using the prescribed format. In this period, a total of 30 grievances were recorded, and all of them were adequately resolved. These issues revolved around the operation and maintenance of the filters and the necessary support was given. There were no other grievances raised from other platforms apart from those included in the logbook as outlined below:

Aqua Clara Water Filtration Program in Kenya – Logbook2019-2020

Contact Person: Monitoring and Evaluation Officer

Person's name: Josephine Mokeira Orare

Office/ telephone number: (Rigoma) Kisii Office, +254716406687

Cell phone number: +254724784897

Email address: orarejosephine@yahoo.com

Stakeholders have also been provided with the Gold Standard contact which they can use to reach the standard in case of any issues or comments. The email provided for this purpose is info@goldstandard.org.

No	Date of comment	Comment	Action required from the project implementer	Response from the project implementer	Name of the person who will handle the issue	Was the issue resolved?	Date the issue was resolved
1.	20/02/2019	Slow flow rate	Re-installation and maintenance	Re-installation and maintenance of the biological layer	Jane Oburi	Yes	20/02/2019
2.	19/02/2019	Spout broken	Replacing the spout and PVC pipes	Spout repaired and PVC pipes replaced	Jane Oburi	Yes	19/02/2019
3.	06/03/2019	HHF lid cracked	Replacing the lid	Lid replaced and customer advised to be careful when tightening the filter membrane	Josephine Orare	Yes	06/03/2019
4.	11/03/2019	Spout leakage	Sealed with silicon sealant	Leakage sealed	Peter Moindi	yes	11/3/19

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5.	11/03/2019	Filter body burst	Replace container	Replacement	Peter Moindi	yes	12/3/2019
6.	7/3/2019	Spouts damaged	Replacement of spout pipes	Re-installation and replacement	Peter Moindi	yes	7/3/2019
7.	13/3/2019	Slow flow rate	Backwash the membrane	Membrane backwashed	Josephine	yes	13/3/2019
8.	13/3/2019	Slow flow rate	Backwash the membrane	Membrane backwash	Josephine	yes	13/3/2019
9.	19/3/2019	Unclear water	Don't disturb the filter	Keep away children from playing near container	Josephine	yes	19/3/2019
10.	26/3/2019	Spout broken	Replace spout	Replacement	Peter	yes	26/3/2019
11.	1/4/2019	Overflow of water on the floor	Replace the container	Re-installation	Jane	yes	1/4/2019
12.	11/4/2019	Spout broken	Repair spout	Repaired	Peter	yes	11/4/2019
13.	11/4/2019	Slow flow rate	backwashing	Filter backwashed	Peter	yes	11/4/2019
14.	14/3/2019	breakage	replacement	Replaced and re installed	Jane	yes	14/3/2019
15.	15/4/2019	Spout broken	Replace spout	Spout replaced	Peter	yes	15/4/2019
16.	2/4/2019	Spout leakage	Seal the spout	sealed	Peter	yes	2/4/2019
17.	27/6/2019	Leakage from tap	Instruct client to tighten the tap	Tap tightened	Emma	Yes	27/6/2019
18.	22/8/2019	Turbid filtered water	Recall product for assessment	Membrane threads cut- Replace membrane	Josephine	Yes	22/8/2019
19.	04/11/2019	Slow flow rate Broken tap	Backwashing Replace tap	Membrane backwashed Tap replaced	Josephine	Yes	04/11/2019
20.	3/9/2019	Broken bottom container	Replace the storage container	Storage container replaced	Josephine	Yes	3/9/2019

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21.	9/10/2019	Leakage from top container	Visit school to assess the situation	Tighten the membranes on the top container	Peter	Yes	9/10/2019
22.	5/11/2019	Slow flow rate Client demands change of filter containers	Backwash the membrane Change containers	Membrane backwashed Filter containers changed; code changed from HF10P182 to HF15P-3459	Josephine	Yes	5/11/2019
23.	28/11/2019	Client diagnosed with amoeba after taking water from the filter	Recall the filter, do a water quality test to ascertain its effectiveness	Filter assessed, initially not well assembled allowing raw water into the safe storage container, water quality test done, filter membrane still effective	Josephine	Yes	29/11/2019
24.	11/12/2019	Turbid filtered water	Visit household and assess the situation to determine the cause of the problem	Maintain the biological layer and advice client to use diffuser when pouring water to the filter	Peter Moindi	Yes	11/12/2019
25.	30/12/2019	Broken spout	Inspection of filter status to determine the extent of damage	Replacement of the PVC pipes and reinstallation of the filter	Jane Oburi	Yes	10/1/2020
26.	08/01/2020	Blockage	Backwashing of the membrane to un-clog it at the office	Recalled the membrane to the office for backwashing, tested and returned to the client	Josephine Orare	Yes	9/1/2020
27.	08/01/2020	Leakage of filter body	Replacement of the filter body	Replacement of the filter body and reinstallation of the filter	Peter Moindi	Yes	10/1/2020
28.	09/01/2020	Leakage of filter body	Replacement of the filter body	Replacement of the filter body and PVC pipes and reinstallation of the filter	Jane Oburi	Yes	15/01/2020

29.	15/01/2020	Blockage of a school filter	Physical visit to the school for refresher training	Backwashed the school filter and conducted refresher training on backwashing and filter maintenance	Daniel Nyakundi	Yes	17/01/2020
30.	29/01/2020	Slow flow rate	Physical visit for refresher training of the end user on usage and maintenance	Backwashing the filter membrane	Jane Oburi	Yes	29/01/2020

F.2. List all inputs/grievances from previous monitoring period where follow up action is to be verified in this monitoring period

No grievances were raised from previous monitoring required further follow-up.

F.3. Provide details of any legal contest or dispute that has arisen with the project during the monitoring period

None, the project has not had any legal contests or disputes.