Gold standard for the global goals
Monitoring report

November 2017, version 1

Gold Standard®

Title of the project	GS1247 VPA 11 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 19 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 20 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 21 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 22 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 41 Gatsibo District Boreholes (GS4202) GS1247 VPA 42 Gatsibo District Boreholes (GS4203) GS1247 VPA 151 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 152 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 153 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 154 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda GS1247 VPA 155 Improved Kitchen Regimes: Gatsibo District Borehole Project, Rwanda
Gold Standard project id	GS3306, GS3430-3, GS4202-3, GS6786-90
Version number of the monitoring report	6
Completion date of the monitoring report	16/06/2020
Date of project design certification	GS3306: 28/7/2015 GS3430-3433, 4202-3: 22/12/2015 GS6786-90: 12/10/2018 (date of design change)
Start date of crediting period	GS3306: 06/11/2014 GS3430: 05/11/2014 GS3431: 02/6/2015 GS3432: 03/6/2016 GS3433: 15/6/2016 GS4202: 20/8/2015 GS4203: 19/8/2015 GS6786: 05/2/2017 GS6787: 05/2/2017 GS6788: 05/2/2017 GS6789: 05/2/2017 GS6790: 05/2/2017
Duration of this monitoring period	GS3306 MP4: 06/02/2019 – 05/02/2020 GS3430 MP4: 06/02/2019 - 05/02/2020 GS3431 MP4: 06/02/2019 - 05/02/2020 GS3432 MP4: 06/02/2019 - 05/02/2020 GS3433 MP4: 06/02/2019 - 05/02/2020 GS4202 MP4: 06/02/2019 - 05/02/2020 GS4203 MP4: 06/02/2019 - 05/02/2020 GS6786 MP4: 06/02/2019 - 05/02/2020 GS6787 MP4: 06/02/2019 - 05/02/2020 GS6788 MP4: 06/02/2019 - 05/02/2020 GS6789 MP4: 06/02/2019 - 05/02/2020 GS6790 MP4: 06/02/2019 - 05/02/2020
Duration of previous monitoring period	GS3306 MP3: 06/02/2017 – 05/02/2019 GS3430 MP3: 06/02/2017 - 05/02/2019

	GS3431 MP3: 06/02/2017 - 05/02/2019 GS3432 MP3: 06/02/2017 - 05/02/2019 GS3433 MP3: 06/02/2017 - 05/02/2019 GS4202 MP3: 06/02/2017 - 05/02/2019 GS4203 MP3: 06/02/2017 - 05/02/2019 GS6786 MP3: 06/02/2017 - 05/02/2019 GS6787 MP3: 06/02/2017 - 05/02/2019 GS6788 MP3: 06/02/2017 - 05/02/2019 GS6789 MP3: 06/02/2017 - 05/02/2019 GS6790 MP3: 06/02/2017 - 05/02/2019
Project representative(s)	James Walker, CO2Balance.
Host Country	Republic of Rwanda
Certification pathway (activity certification/impact certification)	Impact Certification
SDG Contributions targeted (as per approved PDD)	SDG 3 – Good Health and Wellbeing By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. SDG 5 – Gender Equality Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate. SDG 6 – Clean Water and Sanitation By 2030, achieve universal and equitable access to safe and affordable drinking water for all. SDG 13 – Climate Action 13.B: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities
Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)	GSVER
Selected methodology(ies)	TPDDTEC v.1

Estimated amount of annual average certified SDG impact (as per approved PDD)	SDG 3- Reduction in exposure to Household Air Pollution due to boiling water: 80% SDG 5- at least 0.5 hours per trip per household time saved SDG 6 – Number of additional persons with access to safe water: 31,047 (GS3306, GS3430-33 &GS4202-3, pre-design change). SDG 13- 120,000 tCO2e per year. GS3306: 10,000 tCO2e GS3430: 10,000 tCO2e GS3431: 10,000 tCO2e GS3432: 10,000 tCO2e GS3433: 10,000 tCO2e GS4202: 10,000 tCO2e GS4203: 10,000 tCO2e GS6786: 10,000 tCO2e GS6787: 10,000 tCO2e GS6788: 10,000 tCO2e GS6789: 10,000 tCO2e GS6790: 10,000 tCO2e
Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	SDG 3- Reduction in exposure to Household Air Pollution due to boiling water: 100% (to all VPAs) SDG 5 – 57.33 minutes reduction in time spent collecting water (to all VPAs) SDG 6 – 31,047 additional persons with access to safe water Breakdown: GS3306: 2676 additional persons with access to safe water GS3430: 2676 additional persons with access to safe water GS3431: 2680 additional persons with access to safe water GS3432: 2597 additional persons with access to safe water GS3433: 2676 additional persons with access to safe water GS4202: 2679 additional persons with access to safe water GS4203: 2673 additional persons with access to safe water GS6786: 1869 additional persons with access to safe water GS6787: 2647 additional persons with access to safe water GS6788: 2580 additional persons with access to safe water GS6789: 2609 additional persons with access to safe water GS6790: 2684 additional persons with access to safe water SDG 13 – 118,203 tCO2e Breakdown: GS3306: 9,967 tCO2e GS3430: 9,967 tCO2e GS3431: 9,984 tCO2e GS3432: 9,674 tCO2e GS3433: 9,967 tCO2e GS4202: 9,980 tCO2e GS4203: 9,957 tCO2e GS6786: 9,522 tCO2e GS6787: 9,859 tCO2e GS6788: 9,610 tCO2e GS6789: 9,717 tCO2e GS6790: 9,997 tCO2e

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SECTION A. Description of project

A.1. Purpose and general description of project

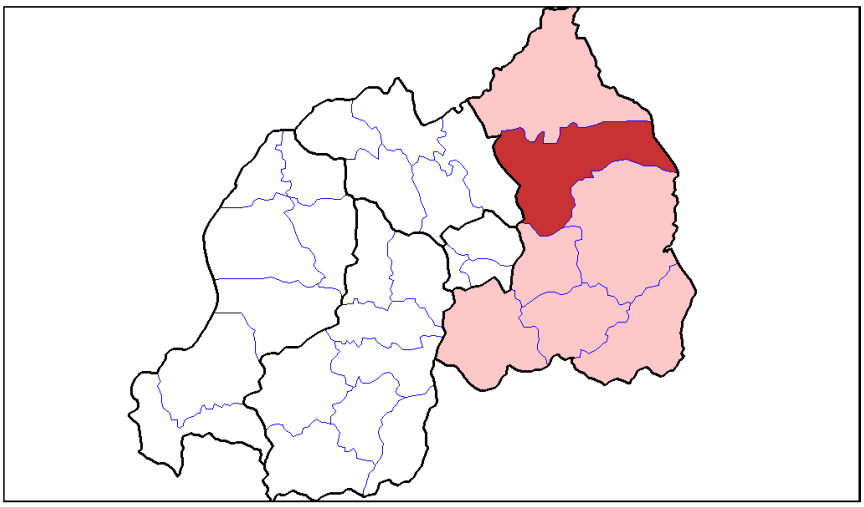
CO2balance is implementing 12 micro-scale VPAs in Gatsibo District, Rwanda, under the Gold Standard methodology *Technologies and Practices to Displace Decentralized Thermal Energy Consumption*. The project activity involves rehabilitating non-functioning boreholes to provide villages with a source of safe water. This displaces the baseline method of water treatment, which involves boiling water using solid fuel. The project activity removes the need of households to rely on firewood and coal to boil water and therefore reduces CO2 emissions.

The 63 boreholes were rehabilitated between the 31st October 2014 and 1st September 2015. The crediting periods for each VPA are given in section A.4 and have a lifetime of 7 years. This monitoring period covers 06/02/2019 - 05/02/2020 and as part of the requirements, all boreholes were checked on a monthly basis during the period. All boreholes can be confirmed as operational with only a few minor problems, that needed maintenance and or repairs. Common problems were low water discharge, disconnected rods and broken pump head, all which could be repaired without detriment to the water supply.

A.2. Location of project

This project is located in Gatsibo District, Eastern Province of Rwanda. Below is the geographic reference to allow unique identification of the project boundary. The target area and the fuel collection area are defined as being contained within project boundary, with the outer limits of the project boundary being clearly defined below. As the majority of beneficiaries collect their wood fuel locally in close proximity to their homesteads, the wood fuel collection area and target area are considered the same.

Map 1 Country map of Rwanda



Continent	Country	Region	District	Sector	Sub-Location	Geographical Reference	
Africa	Rwanda	Eastern Province	Gatsibo	N/A	N/A	-1.62	30.20

Please see section B2 for details of specific geo-coordinates of the project location and the villages involved in each VPA.

A.3. Reference of applied methodology

The applied methodology is Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1 (TPDDTEC).

A.4. Crediting period of project

The start date of the crediting periods for each VPA are:
GS3306: 6/11/2014
GS3430: 5/11/2014
GS3431: 2/6/2015
GS3432: 3/6/2016
GS3433: 15/6/2016
GS4202: 20/8/2015
GS4203: 19/8/2015
GS6786: 5/2/2017
GS6787: 5/2/2017
GS6788: 5/2/2017
GS6789: 5/2/2017
GS6790: 5/2/2017
Each crediting period has a length of 7 years, as approved in the PDDs.

SECTION B. Implementation of project

B.1. Description of implemented project

In partnership with Likano Project Development GmbH and Open Circle Investments Pty Ltd, CO2balance UK Ltd is implementing a number of Micro-Scale Voluntary Project Activities under PoA 1247 in the districts of Gatsibo which are eligible under the Gold Standard methodology *Technologies and Practices to Displace Decentralized Thermal Energy Consumption*. Local people typically use wood fuel on inefficient three stone fires for cooking and water purification, which results in the release of greenhouse gas emissions from the combustion of wood. This can be avoided if a technology that does not require fuel (wood or fossil) supplies clean water desired by households.

Gatsibo is a largely rural District in which local people typically use wood fuel on inefficient three-stone fires to purify their drinking, cleaning and washing water. This process results in the release of greenhouse gas emissions from the combustion of wood. This can be avoided if a technology that does not require fuel (wood or fossil), supplies the clean water desired by households. Many existing boreholes are owned by community groups and have fallen into disrepair because maintenance programmes have been poorly managed, or proven too expensive. In this project CO2balance UK Ltd., Likano Project Development GmbH and Open Circle Investments Pty Ltd work with community groups and a local NGO partner, Rwandans4Water in Gatsibo District, to identify broken down boreholes and renovate them so that they deliver clean, safe water and breakdowns are fixed rapidly.

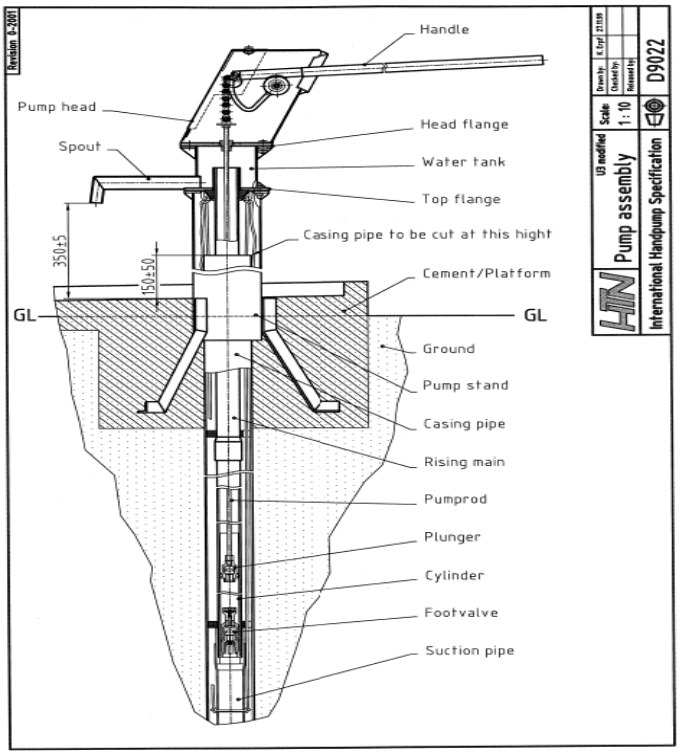
The date of rehabilitation was confirmed by a Repair Confirmation Form, which was signed by the mechanic employed by the local NGO partner, carrying out the repair along with an elected representative of the community group owners of the borehole. The date of rehabilitation was used as the start date of operation and crediting for each borehole; we have conservatively assumed that the first day of crediting is not counted.

The boreholes included under the project are entirely human operated and fitted with hand pump model U3 Modified or Afridev models. The depth of the boreholes are limited to 100m or less.

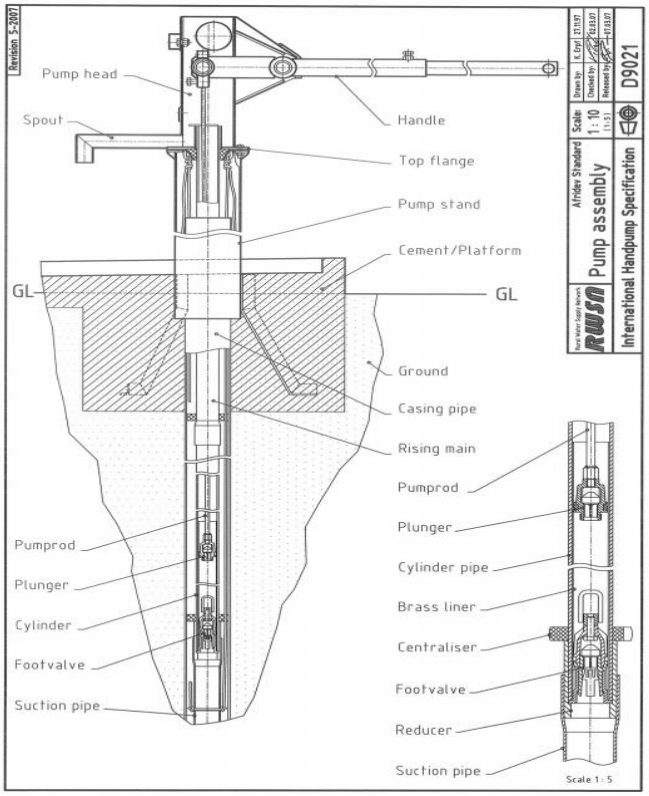
An example of a U3 modified pump in action, from a well maintained waterpoint.

	Arfidev	U3 Modified
Cylinder diameter (mm):	63.5	50
Maximum Stroke (mm):	125	125
Approx. discharge at about 75 watt input m3/h:	at 10 m head 1.4	at 10 m head 1.2
	at 15 m head 1.1	at 15 m head 1.0
	at 20 m head 0.9	at 20 m head 0.8
	at 30 m head 0.7	at 30 m head 0.6
Pumping lift (m):	10-50	20-45
Water consumption (lpcd):	15-20	15-20

U3 modified Specification[1]:



Afridev Specification[2]:



The number of days each borehole credited for in this monitoring period was multiplied by the number of people using the borehole to give the total number of project technology days for that borehole. The individual

[1]ERPF, K. (2001) *Uganda U3 Modified Deepwell Handpump Specification.* , Skat , Rural Water Supply Network , St Gallen, Switzerland

[2]ERPF, K. (2001) *Afridev Handpump Specification.* Skat , Rural Water Supply Network , St Gallen, Switzerland

project technology days for each borehole were totalled to give the total number of project technology days for this monitoring period. In total 63 boreholes were rehabilitated as, initially, part of seven VPAs between the 31st October 2014 and 1st September 2015. Following a subsequent design change (see Section B.2.5.), 25 boreholes were redistributed, and five additional VPAs created, to make a total of twelve VPAs.

The project ID, location and number of people served by each borehole is given in the table below, which forms the project database.

Borehole ID	Start of MP4	Village	Pump Model	Number of people using borehole	Mode of use
GS3306					
GAT002	06/02/2019	Gashya I	U3 modified	768	Domestic
GAT003	06/02/2019	Nyabisindu	U3 modified	668	Domestic
GAT004	06/02/2019	Isangano	U3 modified	510	Domestic
GAT005	06/02/2019	Kabane	U3 modified	494	Domestic
GAT007	06/02/2019	Cyibumba	U3 modified	520	Domestic
			Total	**2960**	
GS3430					
GAT010	06/02/2019	Gahorawe (Gashya2)	Afridev	726	Domestic
GAT011	06/02/2019	Bushenyi	Afridev	583	Domestic
GAT012	06/02/2019	Rebero	Afridev	503	Domestic
GAT017	06/02/2019	Kabeza	Afridev	627	Domestic
GAT018	06/02/2019	Kabezall	Afridev	521	Domestic
			Total	**2960**	
GS3431					
GAT023	06/02/2019	Kimironkoll	Hand Pump	519	Domestic
GAT024	06/02/2019	Kimironko	Hand Pump	427	Domestic
GAT025	06/02/2019	Kiyovu	Afridev	882	Domestic
GAT026	06/02/2019	Munagol	Afridev	623	Domestic
GAT027	06/02/2019	Munagoll	Afridev	514	Domestic
			Total	**2965**	
GS3432					
GAT028	06/02/2019	Munagolll	Afridev	526	Domestic
GAT030	06/02/2019	Ngarama	Afridev	438	Domestic
GAT031	06/02/2019	Ngaramall	Afridev	545	Domestic
GAT032	06/02/2019	Nyabikiri	Afridev	857	Domestic
GAT034	06/02/2019	Nyamata	Afridev	507	Domestic
			Total	**2873**	
GS3433					
GAT037	06/02/2019	Rebero lll	Hand Pump	589	Domestic
GAT039	06/02/2019	Rutembo	Afridev	556	Domestic
GAT042	06/02/2019	Simbwa	Afridev	921	Domestic
GAT043	06/02/2019	Akabagendo	Afridev	655	Domestic
GAT044	06/02/2019	Bushenyi I	Afridev	239	Domestic
			Total	**2960**	
GS4202					
GAT046	06/02/2019	Bymana I	Afridev	185	Domestic
GAT047	06/02/2019	Bymana II	Afridev	188	Domestic

GAT050	06/02/2019	Kiburara	Afridev	529	Domestic
GAT051	06/02/2019	Kigabiro	Afridev	463	Domestic
GAT052	06/02/2019	Maya I	Afridev	595	Domestic
GAT053	06/02/2019	Maya II	Afridev	519	Domestic
GAT054	06/02/2019	Munini	Afridev	485	Domestic
			Total	**2964**	
GS4203					
GAT055	06/02/2019	Nyamwiza	Afridev	823	Domestic
GAT057	06/02/2019	Rebero I	Afridev	434	Domestic
GAT058	06/02/2019	Rebero II	Afridev	388	Domestic
GAT059	06/02/2019	Rebero	Afridev	445	Domestic
GAT062	06/02/2019	Rwagashyaba	Afridev	431	Domestic
GAT063	06/02/2019	Tungiro	Afridev	436	Domestic
			Total	**2957**	
GS6786					
GAT001	06/02/2019	Akabingo	U3 modified	760	Domestic
GAT006	06/02/2019	Rwabirenge	U3 modified	265	Domestic
GAT008	06/02/2019	Kiyovu	U3 modified	451	Domestic
GAT009	06/02/2019	Kimironko	U3 modified	405	Domestic
GAT021	06/02/2019	Kidugudull	Afridev	479	Domestic
GAT049	06/02/2019	Karambi	Afridev	468	Domestic
			Total	**2068**	
GS6787					
GAT029	06/02/2019	Mutarama	Afridev	626	Domestic
GAT033	06/02/2019	Nyakagarama	Afridev	1058	Domestic
GAT035	06/02/2019	Nyamatetell	Afridev	725	Domestic
GAT036	06/02/2019	Nyamatetel	Afridev	519	Domestic
			Total	**2928**	
GS6788					
GAT013	06/02/2019	Agakiri	Afridev	325	Domestic
GAT015	06/02/2019	Businde	Hand Pump	824	Domestic
GAT019	06/02/2019	Kagugu	Afridev	600	Domestic
GAT020	06/02/2019	Kamamesa	Afridev	605	Domestic
GAT022	06/02/2019	Kidugudul	Afridev	500	Domestic
			Total	**2854**	
GS6789					
GAT016	06/02/2019	Kabarondo	Afridev	583	Domestic
GAT038	06/02/2019	Rugando	Afridev	506	Domestic
GAT040	06/02/2019	Rutenderi	Afridev	444	Domestic
GAT060	06/02/2019	Rubiri	Afridev	533	Domestic
GAT061	06/02/2019	Rukomo	Afridev	820	Domestic
			Total	**2886**	
GS6790					
GAT014	06/02/2017	Akajevuba	Afridev	692	Domestic
GAT041	06/02/2017	Rwimbogo	Afridev	524	Domestic
GAT045	06/02/2017	Bushenyi II	Afridev	252	Domestic
GAT048	06/02/2017	Gakiri	Afridev	1013	Domestic

GAT056	06/02/2017	Rambura	Afridev	488	Domestic
			Total	**2969**	

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

No temporary deviations have been made during this monitoring period.

B.2.2. Corrections

No corrections to project information or fixed parameters have been applied.

B.2.3. Changes to start date of crediting period

No changes have been made to the start date of the crediting period for this monitoring period.

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

No permanent changes have been made for this monitoring period.

B.2.5. Changes to project design of approved project

>> (Indicate whether any changes to the design of the project have been approved by GS-TAC that is relevant for this monitoring period.)

A design change was conducted to the overall Gatsibo boreholes programme during MP3. Following on from the observation at MP2 verification that several VPAs in the programme were crediting significantly over the annual cap of 10,000 tCO2e, the decision was taken to conduct a design change to register five additional VPAs (GS6786, GS6787, GS6788, GS6789 and GS6790) and redistribute a total of 25 boreholes into them from existing over-crediting VPAs. The design change was submitted to GS on 17th October 2018 and the review was completed on 7th December 2018.

The boreholes in the newly registered VPAs are listed below, with the origin VPA for each borehole indicated:

Borehole ID	Date of rehabilitation	Start of MP4	Village	Number of people using borehole	Original VPA
GS6786					
GAT001	05/11/2014	06/02/2019	Akabingo	760	GS3306
GAT006	31/10/2014	06/02/2019	Rwabirenge	265	GS3306
GAT008	11/11/2014	06/02/2019	Kiyovu	451	GS3306
GAT009	12/11/2014	06/02/2019	Kimironko	405	GS3306
GAT021	08/06/2015	06/02/2019	KidugudulI	479	GS3431
GAT049	19/08/2015	06/02/2019	Karambi	468	GS4202

GS6787					
GAT029	10/06/2015	06/02/2019	Mutarama	626	GS3432
GAT033	12/06/2015	06/02/2019	Nyakagarama	1058	GS3432
GAT035	13/06/2015	06/02/2019	NyamatetelI	725	GS3432
GAT036	13/06/2015	06/02/2019	NyamatetelI	519	GS3432

GS6788					
GAT013	04/06/2015	06/02/2019	Agakiri	325	GS3430
GAT015	01/06/2015	06/02/2019	Businde	824	GS3430
GAT019	06/06/2015	06/02/2019	Kagugu	600	GS3431
GAT020	08/06/2015	06/02/2019	Kamamesa	605	GS3431
GAT022	09/06/2015	06/02/2019	KidugudulI	500	GS3431

GS6789					
GAT016	05/06/2015	06/02/2019	Kabarondo	583	GS3430
GAT038	16/06/2015	06/02/2019	Rugando	506	GS3433
GAT040	17/06/2015	06/02/2019	Rutenderi	444	GS3433
GAT060	24/08/2015	06/02/2019	Rubiri	533	GS4203
GAT061	18/08/2015	06/02/2019	Rukomo	820	GS4203

GS6790					
GAT014	04/06/2015	06/02/2019	Akajevuba	692	GS3430
GAT041	18/06/2015	06/02/2019	Rwimbogo	524	GS3433
GAT045	21/08/2015	06/02/2019	Bushenyi II	252	GS3433
GAT048	26/08/2015	06/02/2019	Gakiri	1013	GS4202
GAT056	26/08/2015	06/02/2019	Rambura	488	GS4203

SECTION C. Description of monitoring system applied by the project

All surveys are administered by trained CO2balance staff and partner NGOs that are local to the area and conversant in the local dialects to ensure that the responses are consistent and not biased by any regional language barriers. Each participant is provided with a briefing on the purpose of the survey and is assured that no individual names are used in the analysis.

The results of the surveys are collated in excel spreadsheets and stored on a central server in an electronic format then is sent to the UK head office for data analysis. The documentation procedure devised ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in the Kigali office and are available scanned upon request of the UK team.

In accordance with the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, the survey samples are randomly selected from the borehole user record. Each borehole user is assigned a unique random number which is then sorted in order from lowest to highest; the first nth HHs are selected for the survey. The size of the RSG is dependent on the methodological requirements and variance of the parameter being monitored to ensure the parameters measured satisfy 90/30 precision (90% confidence interval and 30% margin of error). The RSG is reselected for every monitoring period to ensure the selection remains random.

Below is a summary of the key information that has been collected and monitored as part of this project:

Borehole database
The borehole installation/rehabilitation record includes the following information:

- Date of installation/rehabilitation
- GPS location of the borehole
- Model of the borehole
- Quantity of boreholes installed
- The total number of people obtaining their water from each borehole
- Mode of use: commercial/domestic

The total number of households using each borehole has been determined through the lists supplied by the community group and district officials. Rwandans4Water further conducts studies to screen and determine the exact number of people the rehabilitated boreholes. Using this method, the total number of people using each borehole has been fixed and hence a figure for person days can be calculated.

Ongoing Monitoring Studies
The following ongoing monitoring studies were conducted; the results are given in the parameter boxes tables in Section 6.

- **Water consumption field test** (Equation parameters Qp,y and Qp,rawboil,y) – Completed prior to first verification and then biennially on a minimum sample of 40 households.

- **Quality of the treated water** - The quality of the treated water will be assessed to ensure that it is fit for human consumption. The parameters used to assess the water quality will be in line with WHO standards for potable water and all parameters will be shown to be within levels considered acceptable for domestic human consumption as per the WHO guidelines. The Rwandan national government adopts these standards. Tests are conducted by Mlab, a government accredited laboratory.

- **Usage Survey** - As all boreholes have been installed within 1 year of the start of the crediting period and are expected to last the lifetime of the project, minimum samples of 30 for different aged technologies will not be necessary. Therefore the annual usage survey will be conducted using a minimum sample size of 100.

- **Project Survey** – Conducted on a minimum sample of 100 households, surveying end users currently using project technologies to explore changes in project scenario over time.

- **Leakage assessment -** Sources of leakage detailed within the methodology relevant to this project have been reviewed.

Individual participants were selected from the borehole user data base using the random sampling process outlined in the monitoring plan. Sample sizes are in line with the Gold Standard requirements.

Leakage Assessment

In line with the monitoring requirements, a leakage assessment is conducted biennially and has therefore been included in this report. The potential sources of leakage listed in the methodology have been investigated, and addressed below:

a) 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.

In all cases the baseline technologies displaced are three stones; these have no market value and are not a product as such. There is nothing limiting the use of three stone cooking across the country (the technology is lowest rung on the energy ladder and the price is zero), which is why this cooking method is so widespread. In any case the primary purpose of these three rocks is for cooking so they will not be replaced/displaced in their entirety as a result of this project - which means they will not be reused outside the project boundary. This leakage source can therefore be discounted.

b) 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.

There is no evidence to suggest significant (if any) use of renewable energy for purifying water in the project region as found in the Baseline Water Surveys. Renewable energy used for purifying water would likely be animal dung or crop residues which will be used due to ease of availability/proximity to the home rather than due to a shortage of wood fuel, therefore it is an independent factor. This leakage source can therefore be discounted.

c) 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.

As the majority of participants collect wood from within the project boundary, it is not expected that the NRB in other areas will be affected. There are currently no other CDM or VER projects in the project area.

d) 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.

The space heating effect of boiling water for purification purposes will be minimal, as the predominant use of baseline technology is for cooking. Therefore, it is highly unlikely that another technology will be used for heating when users no longer boil water.

e) By virtue of promotion and marketing of 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.

This project is not marketing efficient technology; it is eliminating the need for a fuel based technology to deliver pure water. Lower emission technology substitution within households is therefore not possible and this leakage source can therefore be discounted.

SECTION D. Data and parameters

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

(Copy this table for each piece of data and parameter)

Relevant SDG Indicator	**SDG 3, 6 & 13**
Data/parameter:	C_i
Unit	Percentage
Description	Portion of users of project safe water supply who were already in baseline using a non- boiling safe water supply.
Source of data	Baseline study. Credible literature, studies, survey, reports, relevant to the project target area
Value(s) applied)	9.6%

Choice of data or measurement methods and procedures	The portion of safe water users is determined though the baseline project survey and refers to the number of users that already use safe water from water sources such as boreholes.
Purpose of data	Calculate ERs, SDG 3 & 6
Additional comments	SDG 3: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination SDG 5: Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate. SDG 6: By 2030, achieve universal and equitable access to safe and affordable drinking water for all SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 13**
Data/parameter:	$EF_{b,co2}$
Unit	tco_2/TJ
Description	co_2 emission factor arising from use of fuels in baseline scenario
Source of data	IPCC default value
Value(s) applied)	112
Choice of data or measurement methods and procedures	Deemed valid by Methodology
Purpose of data	Calculate ERs
Additional comments	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 13**
Data/parameter:	$EF_{b,non\ co2}$
Unit	tco_2/TJ
Description	Non-co_2 emission factor arising from use of fuels in baseline scenario
Source of data	IPCC default value
Value(s) applied)	8.692
Choice of data or measurement methods and procedures	Deemed valid by Methodology
Purpose of data	Calculate ERs
Additional comments	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 13**
Data/parameter:	NCV_b /NCV_p
Unit	TJ/ton
Description	Net calorific value of the fuels used in the project

Source of data	IPCC default value
Value(s) applied)	0.0156
Choice of data or measurement methods and procedures	Deemed valid by Methodology
Purpose of data	Calculate ERs
Additional comments	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 13**
Data/parameter:	$f_{NRB,i,y}$
Unit	Fractional non-renewability
Description	Non-renewability status of woody biomass fuel in scenario i during year y
Source of data	CDM Default National Figure
Value(s) applied)	0.98
Choice of data or measurement methods and procedures	$f_{NRB,i,y}$
Purpose of data	Calculate ERs
Additional comments	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 3 &13**
Data/parameter:	$W_{p,y}$
Unit	T/litre
Description	Quantity of fuel that is used to treat 1 litre of water in the project scenario p during year y
Source of data	Baseline Water Boiling Test
Value(s) applied)	0.0007363
Choice of data or measurement methods and procedures	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: *Technologies and Practices to Displace Decentralized Thermal Energy Consumption* Version 1*, Draft General Guidelines On Sampling And Surveys*; EB37 Annex 27; and *Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities* (Version 02); EB65 Annex 2
Purpose of data	Calculate ERs
Additional comments	SDG 3: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 13**
Data/parameter:	Non Suppressed demand
Unit	Percentage
Description	Percentage of premises that in the absence of the project activity would have used non-GHG emitting technologies like chlorine treatment techniques (if available) in the project boundary,
Source of data	Baseline study. Credible literature, studies, survey, reports, relevant to the project target area
Value(s) applied)	0
Choice of data or measurement methods and procedures	Suppressed demand will be determined through a set of questions in the project survey that establish the method households use to purify their water, if any, and how they would choose to purify if they were not subject to monetary and access barriers. This is in line with the Gold Standard principles of suppressed demand outline in annex 2. A fixed suppressed demand baseline has been opted for.
Purpose of data	Calculate ERs
Additional comments	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter)

Relevant SDG Indicator/Safeguarding Principle	SDG 3 (Good Health and Wellbeing)
Data / Parameter	$HAPR_y$
Unit	%
Description	Total reduction in Household Air Pollution from boiling water for project activity in year y (%)
Measured/calculated/default	Measured
Source of data	Household lists; Usage Survey; Water Consumption Field Test
Value(s) of monitored parameter	100% (All VPAs)
Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Review the number of people using the borehole according to the household lists for each VPA and multiply by the usage rate to calculate the number of people now using a safe water source in order to calculate the amount of biomass that would have been burnt to purify the water in the baseline scenario. Deduct from this any individuals that still boil water in the project scenario.
QA/QC procedures:	-
Purpose of data	To calculate the additional number of persons who have access to safe water in the project activity compared to the baseline scenario and to calculate from that the percentage decrease in biomass used to purify water through boiling.

Additional comments:	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator/Safeguarding Principle	SDG 5
Data / Parameter	TRy
Unit	Percentage
Description	Total reduction time spent collecting water for project activity in year y (%)
Measured/calculated/default	Measured
Source of data	Project Survey
Value(s) of monitored parameter	59.90% (All VPAs)
Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Calculate the average amount of time spent collecting water in the project scenario and compare to the pre-project scenario
QA/QC procedures:	-
Purpose of data	To quantify whether the project has contributed to a reduction in the amount of time spent collecting water compared to the pre-project scenario
Additional comments:	SDG 5: Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.

Relevant SDG Indicator/Safeguarding Principle	SDG 5
Data / Parameter	Usage of time saved on water collection
Unit	Percentage
Description	Uses of time saved which was previously spent on water collection
Measured/calculated/default	Measured
Source of data	Project Survey

Value(s) of monitored parameter	1. (Unpaid) Domestic work (includes cooking and caring for family members): 26% 2. Income generating activities: 36% 3. Religious activities: 4% 4. Social and leisure activities: 20% 5. Voluntary activities: 0% 6. Education and training: 15% 7. Other (Specify): 0%
Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Ask users how time saved on water collection in the project scenario, as opposed to the baseline scenario, is now being used.
QA/QC procedures:	-
Purpose of data	To quantify how time which was previously spent on water collection is now being used
Additional comments:	SDG 5: Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.

Relevant SDG Indicator	SDG 6
Data/parameter:	P_y
Unit	Number
Description	Number of persons consuming safe water
Source of data	Baseline study.
Value(s) applied)	GS3306: 2960 GS3430: 2965 GS3431: 2680 GS3432: 2873 GS3433: 2960 GS4202: 2964 GS4203: 2673 GS6786: 2068 GS6787: 2928 GS6788: 2854 GS6789: 2886 GS6790: 2969

Choice of data or measurement methods and procedures	Sum of the total number of people using each borehole in the project. The total number of households using each borehole will be established through lists supplied by the water resource committee and/or community group and/or district officer responsible for that borehole. Using this method, the total number of people using each borehole will be known.
Purpose of data	Determination of number of persons using safe water.
Additional comments	SDG 6: By 2030, achieve universal and equitable access to safe and affordable drinking water for all

Relevant SDG Indicator/Safeguarding Principle	SDG 6
Data / Parameter	P_{access}
Unit	Number
Description	Number of additional persons having access to safe water in the project activity compared to the baseline scenario.
Measured/calculated/default	Measured
Source of data	Household lists; Usage Survey
Value(s) of monitored parameter	GS3306: 2676 GS3430: 2676 GS3431: 2680 GS3432: 2597 GS3433: 2676 GS4202: 2679 GS4203: 2673 GS6786: 1869 GS6787: 2647 GS6788: 2580 GS6789: 2609 GS6790: 2684
Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Borehole users * Usage rate
QA/QC procedures:	-
Purpose of data:	To calculate the additional number of persons having access to safe water in the project activity compared to the baseline scenario
Additional comments:	SDG 6: By 2030, achieve universal and equitable access to safe and affordable drinking water for all

Relevant SDG Indicator	**SDG 13**
Data/parameter:	Np,y
Unit	Project Technology Days
Description	Number of persons consuming water supplied by project scenario p through year y

Measured/calculated/default	Measured
Source of data	Borehole Project Database
Value(s) of monitored parameter	GS3306: 1080400 GS3430: 1080400 GS3431: 1082225 GS3432: 1048645 GS3433: 1080400 GS4202: 1081860 GS4203: 1079305 GS6786: 1032220 GS6787: 1068720 GS6788: 1041710 GS6789: 1053390 GS6790: 1083685
Monitoring equipment	Borehole Project Database
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Borehole users * Total crediting days
QA/QC procedures:	-
Purpose of data:	Calculate ERs
Additional comments:	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 3, 6 & 13**
Data/parameter:	Up,y
Unit	Percentage
Description	Usage rate in project scenario p through year y
Measured/calculated/default	Measured
Source of data	Annual Usage Survey
Value(s) of monitored parameter	100%
Monitoring equipment	The usage survey has been carried out by staff trained by CO2balance and local in- country partner Rwandans 4 Water to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Calculate ERs

Additional comments:	SDG 3: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination SDG 6: By 2030, achieve universal and equitable access to safe and affordable drinking water for all SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 3 & 13**
Data/parameter:	Qp,y
Unit	Litres per person per day
Description	Quantity of safe water supplied in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	Measured
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	7.5 (Capped), 12.23 (WCFT result value)
Monitoring equipment	-
Measuring/reading/recording frequency:	Biennial
Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT is carried out by staff trained by CO2balance and local in- country partner Rwandans 4 Water to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
QA/QC procedures:	-
Purpose of data:	Calculate ERs
Additional comments:	Value capped at 7.5 SDG 3: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 3 & 13**
Data/parameter:	Qp,cleanboil,y
Unit	Litres per person per day
Description	Quantity of safe water boiled in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	Measured
Source of data	WCFT
Value(s) of monitored parameter	0
Monitoring equipment	-
Measuring/reading/recording frequency:	Biennial

Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by staff trained by CO2balance and local in-country partner FAPDR to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by project developers.
QA/QC procedures:	-
Purpose of data:	Calculate ERs
Additional comments:	SDG 3: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 3 & 13**
Data/parameter:	Qp,rawboil,y
Unit	Litres per person per day
Description	The raw of unsafe water that is still boiled after installation of the water treatment technology
Measured/calculated/default	Measured
Source of data	WCFT
Value(s) of monitored parameter	0
Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by staff trained by CO2balance and local in-country partner FAPDR to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by project developers.
QA/QC procedures:	
Purpose of data:	Calculate ERs
Additional comments:	SDG 3: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Relevant SDG Indicator	**SDG 6**
Data/parameter:	Quality of Treated Water
Unit	Parameters as per WHO standards
Description	Laboratory Tests
Measured/calculated/default	Measured
Source of data	Water quality tests
Value(s) of monitored parameter	Pass

Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	
QA/QC procedures:	
Purpose of data:	Ensure water is safe for human consumption without treatment using the baseline technology
Additional comments:	The Kigali based recognised laboratory has certified each water supply in line with WHO guidelines, which the Rwandan national government adopts.. SDG 6: By 2030, achieve universal and equitable access to safe and affordable drinking water for all

Relevant SDG Indicator	**SDG 13**
Data/parameter:	LEp,y
Unit	tCO2e per year
Description	Leakage in project scenario p during year y
Measured/calculated/default	Measured
Source of data	Baseline and monitoring surveys
Value(s) of monitored parameter	0
Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Calculate ERs
Additional comments:	SDG 13: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

D.3. Implementation of sampling plan

The project proponent has elected to cross-sample technologies across all its homogenous borehole VPAs located within Gatsibo district. The samples for the surveys analysed below are randomly selected from the borehole information databases using the RSG procedure previously explained in line with the minimum sample size requirements as defined by the methodology, and cover VPA, borehole and household levels. The random sampling procedure is as follows. Following 90/30 precision, achieved using Raosoft Sample Size Calculator, it was found that 5 sectors of the 9 sectors in Gatsibo district which contain boreholes in the VPAs would need to be selected for inclusion in the surveys. 5 sectors were selected by generating a random list of numbers on the Research Randomizer online resource. An aggregate list was then generated of the borehole users in the 5 selected sectors, and these were ordered according to a new random list of numbers, again generated using Research Randomizer. The aggregate list was then reordered according to random number and the first 120 users selected for the Project Survey and Usage Survey, which were conducted between 09/12/2019 and 12/12/2019. The first 60 of these users were selected for the WCFT, which was also conducted between 09/12/2019 and 12/12/2019.

The surveys have been conducted so as to ensure that they are within the end date of the respective monitoring periods for the VPAs.

SECTION E. Calculation of SDG outcomes

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

SDG 3 (Good Health and Wellbeing)

$P_{b,y} = W_{b,y} * Q_{p,y}$

Where :

$P_{b,y}$ Quantity of fuel that is consumed in the baseline scenario b during year y (kg/household-day)

$W_{b,y}$ Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representative of baseline scenario b during year y

$Q_{p,y}$ Quantity of safe water supplied in the project scenario p during year y, using the "zero or low" emissions' clean water supply technology

SDG 5 (Gender Equality)

$T_{b,y}$ Time spent collecting water per household per day prior to project (hours)

To establish $T_{b,y}$, $Trips_b$ and that the burden of collecting water falls on females, the Project Survey asks the following:

13	Before this project, who would usually go to this source to collect water for your household?	**1.** Male Adult	**2.** Female Adult
		3. Male Child	**4.** Female Child
14	How much time did it take to collect water?	*Please specify*	
15	How many trips were made per day?	*Please specify*	

SDG 6 (Clean Water and Sanitation)

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

SDG 13 (Climate Action)

Baseline Emissions ($BE_{b,y}$)

$$BE_{b,y} = B_{b,y} * \left(\left(NRB * EF_{b,fuel,co2} \right) + EF_{b,fuel,nonco2} \right) * NCV_{b,fuel}$$

Where:

$B_{b,y}$ = Quantity fuel consumed in the baseline scenario.

NRB = Country-specific default value for the fraction of non-renewable biomass.

$EF_{b,fuel,co2}$ = Emissions factor of fuel consumed in the baseline scenario (CO_2).

$EF_{b,fuel,nonco2}$ = Emissions factor of fuel consumed in the baseline scenario (non- CO_2).

$NCV_{b,fuel}$ = Net calorific value of fuel consumed in the baseline scenario.

E.2. Calculation of project value or estimation of project situation of each SDG outcome

>> (*Provide details of equations and approaches used to calculate/estimate project values.*)

SDG 3 (Good Health and Wellbeing)

$P_{p,y}$ Quantity of fuel that is consumed in the project scenario p during year y (kg/household-day)
$U_{p,y}$ Usage rate in project scenario p during year y

Where:

$P_{p,y} = W_{b,y} * Q_{p,cleanboil,y}$

Where:

$W_{b,y}$ Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representative of baseline scenario b during year y
$Q_{p,cleanboil,y}$ Quantity of safe water boiled in the project scenario p during year y, after installation of the project technology

SDG 5

$T_{p,y}$ Time spent collecting water per household per day in project (hours)

The project survey asks the following questions in order to establish $T_{p,y}$, $Trips_p$ and to show what use is made of the time used.

37	Who usually goes to this source to collect water for your household?	**1.** Male Adult	**2.** Female Adult
		3. Male Child	**4.** Female Child
38	How much time does a trip to and from the borehole take?	*Please specify*	
39	How many trips are made per day to the borehole?	*Please specify*	
40	Has the borehole project saved you time?	1. Yes	2. No (skip to question 44)
41	In which of these activities has the borehole project saved you the most time?	1. Less distance to walk to the water source	2. Less time waiting at the water source
		3. Less time spent boiling/purifying water	4. Less time spent collecting wood to boil water
		5. Other (Specify)	
42	How much time do you think the borehole project has saved you on average per day?	1. 0-30min	2. 31-60min
		3. 1-2hrs	4. 2-3hrs
		5. 3-4hrs	6. >4hrs
43	What do you do with the time saved from the project? *Select all that apply*	1. (Unpaid) Domestic work (*includes cooking and caring for family members*)	2. Income generating activities
		3. Religious activities	4. Social and leisure activities
		5. Voluntary activities	6. Education and training
		7. Other (Specify)	

SDG 6

P_y	Number of persons having access to safe water in the project activity.
$U_{p,y}$	Usage rate in project scenario p during year y

SDG 13

Project Emissions ($PE_{b,y}$)

$$PE_{p,y} = B_{p,y} * \left(\left(NRB * EF_{p,fuel,co2}\right) + EF_{p,fuel,nonco2}\right) * NCV_{p,fuel}$$

Where:

$B_{p,y}$	= Quantity fuel consumed in project scenario.
NRB	= Country-specific default value for the fraction of non-renewable biomass.
$EF_{p,fuel,co2}$	= Emissions factor of fuel used in the project scenario (CO_2).
$EF_{p,fuel,nonco2}$	= Emissions factor of fuel used in the project scenario (non- CO_2).
$NCV_{p,fuel}$	= Net calorific value of fuel used in the project scenario.

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

>>

SDG 3

$HAPR_y = 100\% = ((5.52 - 0) / 5.52) * 1$

Where:

$HAPR_y = ((P_{b,y} – P_{p,y}) / P_{b,y}) * U_{p,y}$

$HAPR_y$	Total reduction in Household Air Pollution from boiling water for project activity in year y (%)
$P_{b,y}$	Quantity of fuel that is consumed in the baseline scenario b during year y (kg/person-day)
$P_{p,y}$	Quantity of fuel that is consumed in the project scenario p during year y (kg/person-day)
$U_{p,y}$	Usage rate in project scenario p during year y

The project has reduced household air pollution related to boiling water by 100% by removing the need to boil water to make it safe to consume.

SDG 5

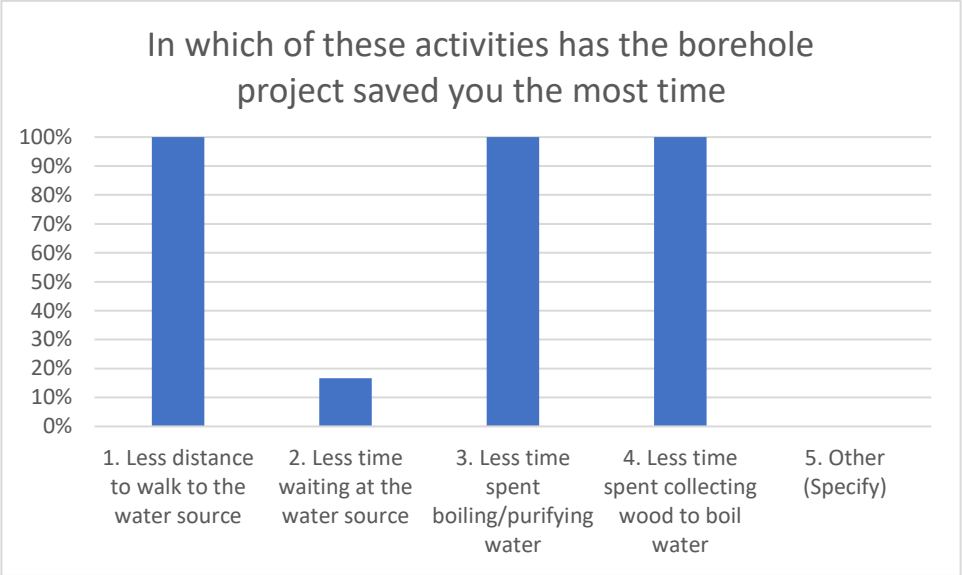
$TR_y = 59.90\% = (95.71*2.75 – 38.38*2.75) / (95.71*2.75)$

$TR_y = (T_{b,y}*Trips_b) – (T_{p,y}*Trips_p) / (T_{b,y}*Trips_b)$

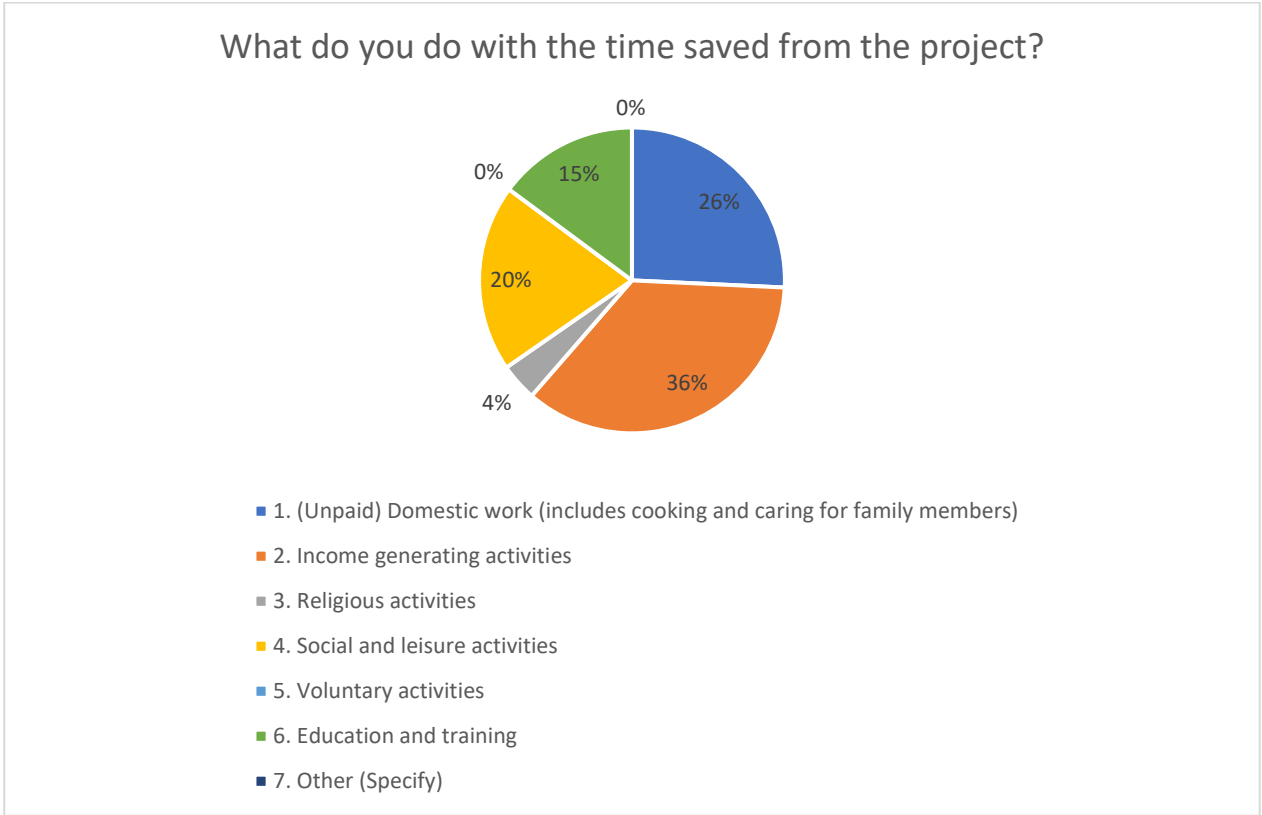
Where:

TR_y	Total reduction time spent collecting water for project activity in year y (%)
$T_{b,y}$	Time spent collecting water per household per day prior to project (hours)
$Trips_b$	Number of water collection trips made per household per day prior to the project
$T_{p,y}$	Time spent collecting water per household per day in project (hours)
$Trips_p$	Number of water collection trips made per household per day in the project

The project has saved households 57.33 minutes per day and for all households has reduced the distance needed to the water source (100%), removed the need to treat the water (100%) and collect firewood (100%).



The 59.90% reduction in time spent collecting and treating water is used in the following ways:



SDG 6

$P_{access} = 31,047 = 34,344 * (1 – 0.096) * 1$

Where:

$$P_{access} = P_y * (1 - C_j) * U_{p,y}$$

Using the above values for parameters Cj and Up,y, SDG was calculated for each VPA. The total number of additional persons having access to safe water in the project activity compared to the baseline scenario is 31,047.

SDG 6 Impacts	
GS ID	Paccess
GS3306	2676
GS3430	2676
GS3431	2680
GS3432	2597
GS3433	2676
GS4202	2679
GS4203	2673
GS6786	1869
GS6787	2647
GS6788	2580
GS6789	2609
GS6790	2684
Total	31047

SDG 13 and emission reductions

In MP4 the project achieved a total capped ERs of 118,202 tCO2e. Below is a summary of the ERs by VPA and vintage.

GS ID	Emissions Reductions		
	2019	2020	ER total
GS3306	8984	983	9967
GS3430	8984	983	9967
GS3431	8999	985	9984
GS3432	8720	954	9674
GS3433	8984	983	9967
GS4202	8996	984	9980
GS4203	8975	982	9957
GS6786	8583	939	9522
GS6787	8887	972	9859
GS6788	8662	948	9610
GS6789	8759	958	9717
GS6790	9011	986	9997
Total	106545	11658	118202

Gold Standard

GS3306

Emission Reductions Vintage 2019

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		973840
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4862

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		973840
Fossil fuel required to treat 1 litre for water in project scena	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wat	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,984
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**8984**
Emission Reductions claimed	ERy	tCO2/y	8,984
	ERs claimed		**8984**

Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		106560
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	532

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		106560
Fossil fuel required to treat 1 litre for water in project scen	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wa	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil,	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-c	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	983
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**983**
Emission Reductions claimed	ERy	tCO2/y	983
	ERs claimed		**983**

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Total Emission Reductions for Monitoring Period 4			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1080400
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5394
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1080400
Fossil fuel required to treat 1 litre for water in project scenari	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,967
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9967**
Emission Reductions claimed	ERy	tCO2/y	9,967
	TOTAL ERs claimed		**9,967**

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GS3430

Emission Reductions Vintage 2019

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		973840
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4862

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		973840
Fossil fuel required to treat 1 litre for water in project scenar	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wate	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,984
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8984
Emission Reductions claimed	ERy	tCO2/y	8,984

Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		106560
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	532

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		106560
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	983
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	983
Emission Reductions claimed	ERy	tCO2/y	983

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Total Emission Reductions for Monitoring Period 4			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1080400
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5394
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1080400
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,967
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9967**
Emission Reductions claimed	ERy	tCO2/y	9,967

GS3431

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		975485
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4870
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		975485
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil,	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,999
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8999
Emission Reductions claimed	ERy	tCO2/y	8,999

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Emission Reductions Vintage 2020			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		106740
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	533
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		106740
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	985
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	985
Emission Reductions claimed	ERy	tCO2/y	985

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Total Emission Reductions for Monitoring Period 4

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1082225
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5403

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1082225
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,984
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9984**
Emission Reductions claimed	ERy	tCO2/y	9,984

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GS3432

Emission Reductions Vintage 2019

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		945217
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4719

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		945217
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil,	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,720
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8720
Emission Reductions claimed	ERy	tCO2/y	8,720

Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		103428
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	516

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		103428
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	954
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	954
Emission Reductions claimed	ERy	tCO2/y	954

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Total Emission Reductions for Monitoring Period 4			

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1048645
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5235

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1048645
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,674
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9674**
Emission Reductions claimed	ERy	tCO2/y	9,674

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GS3433

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		973840
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4862
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		973840
Fossil fuel required to treat 1 litre for water in project scenar	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wate	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,984
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8984
Emission Reductions claimed	ERy	tCO2/y	8,984

Emission Reductions Vintage 2020			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		106560
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	532
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		106560
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	983
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	983
Emission Reductions claimed	ERy	tCO2/y	983

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Total Emission Reductions for Monitoring Period 4			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1080400
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5394
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1080400
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,967
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9967**
Emission Reductions claimed	ERy	tCO2/y	9,967

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GS4202

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		975156
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4868
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		975156
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil,	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,996
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8996
Emission Reductions claimed	ERy	tCO2/y	8,996

Emission Reductions Vintage 2020			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		106704
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	533
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		106704
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	984
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	984
Emission Reductions claimed	ERy	tCO2/y	984

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Total Emission Reductions for Monitoring Period 4			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1081860
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5401
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1081860
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,980
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9980**
Emission Reductions claimed	ERy	tCO2/y	9,980

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Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		972853
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4857
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		972853
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil,	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,975
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8975
Emission Reductions claimed	ERy	tCO2/y	8,975

Emission Reductions Vintage 2020			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		106452
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	531
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		106452
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	982
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	982
Emission Reductions claimed	ERy	tCO2/y	982

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Total Emission Reductions for Monitoring Period 4			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1079305
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5388
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1079305
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,957
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9957**
Emission Reductions claimed	ERy	tCO2/y	9,957

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Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		930412
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4645
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		930412
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil,	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,583
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8583
Emission Reductions claimed	ERy	tCO2/y	8,583

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Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		101808
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	508

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		101808
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	939
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	939
Emission Reductions claimed	ERy	tCO2/y	939

Total Emission Reductions for Monitoring Period 4

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1032220
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5153

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1032220
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,523
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9523**
Emission Reductions claimed	ERy	tCO2/y	9,522

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Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		963312
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4809
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		963312
Fossil fuel required to treat 1 litre for water in project scenar	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wate	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,887
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8887
Emission Reductions claimed	ERy	tCO2/y	8,887

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Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		105408
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	526

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		105408
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	972
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	972
Emission Reductions claimed	ERy	tCO2/y	972

Total Emission Reductions for Monitoring Period 4

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1068720
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5336

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1068720
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,859
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9859**
Emission Reductions claimed	ERy	tCO2/y	9,859

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Emission Reductions Vintage 2019

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		938966
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4688

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		938966
Fossil fuel required to treat 1 litre for water in project scenar	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wate	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,662
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8662
Emission Reductions claimed	ERy	tCO2/y	8,662

Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		102744
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	513

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		102744
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	948
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	948
Emission Reductions claimed	ERy	tCO2/y	948

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Total Emission Reductions for Monitoring Period 4

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1041710
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5201

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1041710
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,610
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9610**
Emission Reductions claimed	ERy	tCO2/y	9,610

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Emission Reductions Vintage 2019

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		949494
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4740

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		949494
Fossil fuel required to treat 1 litre for water in project scenar	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wate	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,759
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	8759
Emission Reductions claimed	ERy	tCO2/y	8,759

Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		103896
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	519

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		103896
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	958
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	958
Emission Reductions claimed	ERy	tCO2/y	958

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Total Emission Reductions for Monitoring Period 4			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1053390
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5259
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1053390
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,718
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9718**
Emission Reductions claimed	ERy	tCO2/y	9,717

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Emission Reductions Vintage 2019

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		976801
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4877

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		976801
Fossil fuel required to treat 1 litre for water in project scenar	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech wate	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,011
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	9011
Emission Reductions claimed	ERy	tCO2/y	9,011

Emission Reductions Vintage 2020

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		106884
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	534

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		106884
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	986
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	986
Emission Reductions claimed	ERy	tCO2/y	986

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Total Emission Reductions for Monitoring Period 4			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1083685
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	7.5
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5410
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1083685
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	0
Quantity of fuel consumed in project scenario per HH	Bp,y	T	0
Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	9,997
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	**Ery**	**tCO2/y**	**9997**
Emission Reductions claimed	ERy	tCO2/y	9,997

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

Item	Baseline estimate	Project estimate	Net benefit
SDG 3	GS3306: 5.52kgs of fuel consumed per household per day	GS3306: 0kgs of fuel consumed per household per day	GS3306: 100% reduction in household air pollution caused by boiling water
	GS3430: 5.52kgs of fuel consumed per household per day	GS3430: 0kgs of fuel consumed per household per day	GS3430: 100% reduction in household air pollution caused by boiling water
	GS3431: 5.52kgs of fuel consumed per household per day	GS3431: 0kgs of fuel consumed per household per day	GS3431: 100% reduction in household air pollution caused by boiling water
	GS3432: 5.52kgs of fuel consumed per household per day	GS3432: 0kgs of fuel consumed per household per day	GS3432: 100% reduction in household air pollution caused by boiling water
	GS3433: 5.52kgs of fuel consumed per household per day	GS3433: 0kgs of fuel consumed per household per day	GS3433: 100% reduction in household air pollution caused by boiling water
	GS4202: 5.52kgs of fuel consumed per household per day	GS4202: 0kgs of fuel consumed per household per day	GS4202: 100% reduction in household air pollution caused by boiling water
	GS4203: 5.52kgs of fuel consumed per household per day	GS4203: 0kgs of fuel consumed per household per day	GS4203: 100% reduction in household air pollution caused by boiling water
	GS6786: 5.52kgs of fuel consumed per household per day	GS6786: 0kgs of fuel consumed per household per day	GS6786: 100% reduction in household air pollution caused by boiling water
	GS6787: 5.52kgs of fuel consumed per household per day	GS6787: 0kgs of fuel consumed per household per day	GS6787: 100% reduction in household air pollution caused by boiling water
	GS6788: 5.52kgs of fuel consumed per household per day	GS6788: 0kgs of fuel consumed per household per day	GS6788: 100% reduction in household air pollution caused by boiling water
	GS6789: 5.52kgs of fuel consumed per household per day	GS6789: 0kgs of fuel consumed per household per day	GS6789: 100% reduction in household air pollution caused by boiling water
	GS6790: 5.52kgs of fuel consumed per household per day	GS6790: 0kgs of fuel consumed per household per day	GS6790: 100% reduction in household air pollution caused by boiling water

SDG 5	GS3306: 95.71 minutes collecting water.	GS3306: 38.38 minutes collecting water	GS3306: 57.33 minutes/59.90% reduction in time collecting water
	GS3430: 95.71 minutes collecting water	GS3430: 38.38 minutes collecting water	GS3430: 57.33 minutes/59.90% reduction in time collecting water
	GS3431: 95.71 minutes collecting water	GS3431: 38.38 minutes collecting water	GS3431: 57.33 minutes/59.90% reduction in time collecting water
	GS3432: 95.71 minutes collecting water	GS3432: 38.38 minutes collecting water	GS3432: 57.33 minutes/59.90% reduction in time collecting water
	GS3433: 95.71 minutes collecting water	GS3433: 38.38 minutes collecting water	GS3433: 57.33 minutes/59.90% reduction in time collecting water
	GS4202: 95.71 minutes collecting water	GS4202: 38.38 minutes collecting water	GS4202: 57.33 minutes/59.90% reduction in time collecting water
	GS4203: 95.71 minutes collecting water	GS4203: 38.38 minutes collecting water	GS4203: 57.33 minutes/59.90% reduction in time collecting water
	GS6786: 95.71 minutes collecting water	GS6786: 38.38 minutes collecting water	GS6786: 57.33 minutes/59.90% reduction in time collecting water
	GS6787: 95.71 minutes collecting water	GS6787: 38.38 minutes collecting water	GS6787: 57.33 minutes/59.90% reduction in time collecting water
	GS6788: 95.71 minutes collecting water	GS6788: 38.38 minutes collecting water	GS6788: 57.33 minutes/59.90% reduction in time collecting water
	GS6789: 95.71 minutes collecting water	GS6789: 38.38 minutes collecting water	GS6789: 57.33 minutes/59.90% reduction in time collecting water
	GS6790: 95.71 minutes collecting water	GS6790: 38.38 minutes collecting water	GS6790: 57.33 minutes/59.90% reduction in time collecting water

SDG 6	GS3306: 284 persons with access to safe water	GS3306: 2,960 persons with access to safe water	GS3306: Additional 2,676persons with access to safe water
	GS3430: 284 persons with access to safe water	GS3430: 2,960 persons with access to safe water	GS3430: Additional 2,676persons with access to safe water
	GS3431: 285 persons with access to safe water	GS3431: 2,965 persons with access to safe water	GS3431: Additional 2,680 persons with access to safe water
	GS3432: 276 persons with access to safe water	GS3432: 2,873 persons with access to safe water	GS3432: Additional 2,597 persons with access to safe water
	GS3433: 284 persons with access to safe water	GS3433: 2,960 persons with access to safe water	GS3433: Additional 2,676 persons with access to safe water
	GS4202: 285 persons with access to safe water	GS4202: 2,964 persons with access to safe water	GS4202: Additional 2,679 persons with access to safe water
	GS4203: 284 persons with access to safe water	GS4203: 2,957 persons with access to safe water	GS4203: Additional 2,673 persons with access to safe water
	GS6786: 199 persons with access to safe water	GS6786: 2,068 persons with access to safe water	GS6786: Additional 1,869 persons with access to safe water
	GS6787: 281 persons with access to safe water	GS6787: 2,928 persons with access to safe water	GS6787: Additional 2,647 persons with access to safe water
	GS6788: 274 persons with access to safe water	GS6788: 2,854 persons with access to safe water	GS6788: Additional 2,580 persons with access to safe water
	GS6789: 277 persons with access to safe water	GS6789: 2,886 persons with access to safe water	GS6789: Additional 2,609 persons with access to safe water
	GS6790: 285 persons with access to safe water	GS6790: 2,969 persons with access to safe water	GS6790: Additional 2,684 persons with access to safe water

SDG 13	GS3306: 9,967 tCO2e emitted GS3430: 9,967 tCO2e emitted GS3431: 9,984 tCO2e emitted GS3432: 9,674 tCO2e emitted GS3433: 9,967 tCO2e emitted GS4202: 9,980 tCO2e emitted GS4203: 9,957 tCO2e emitted GS6786: 9,522 tCO2e emitted GS6787: 9,859 tCO2e emitted GS6788: 9,610 tCO2e emitted GS6789: 9,717 tCO2e emitted GS6790: 9,997 tCO2e emitted	GS3306: 0 tCO2e emitted GS3430: 0 tCO2e emitted GS3431: 0 tCO2e emitted GS3432: 0 tCO2e emitted GS3433: 0 tCO2e emitted GS4202: 0 tCO2e emitted GS4203: 0 tCO2e emitted GS6786: 0 tCO2e emitted GS6787: 0 tCO2e emitted GS6788: 0 tCO2e emitted GS6789: 0 tCO2e emitted GS6790: 0 tCO2e emitted	GS3306: Emissions reduced by 9,967tCO2e GS3430: Emissions reduced by 9,967tCO2e GS3431: Emissions reduced by 9,984tCO2e GS3432: Emissions reduced by 9,674tCO2e GS3433: Emissions reduced by 9,967tCO2e GS4202: Emissions reduced by 9,980tCO2e GS4203: Emissions reduced by 9,957tCO2e GS6786: Emissions reduced by 9,522tCO2e GS6787: Emissions reduced by 9,859tCO2e GS6788: Emissions reduced by 9,610tCO2e GS6789: Emissions reduced by 9,717tCO2e GS6790: Emissions reduced by 9,997 tCO2e

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

Not supplied in the PDD for SGDs 3, 5 and 6 as the project began prior to transition.

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 3	80% reduction in exposure to household air pollution caused by boiling water	100% reduction in exposure to household air pollution caused by boiling water
SDG 5	0.5 hours saved on time collecting water	0.96 hours saved on time collecting water
SDG 6	31,047 persons with access to safe water across all VPAs	31,047 persons with access to safe water across all VPAs
SDG 13*	GS3306: 10,000 tCO2e GS3430: 10,000 tCO2e GS3431: 10,000 tCO2e GS3432: 10,000 tCO2e GS3433: 10,000 tCO2e GS4202: 10,000 tCO2e GS4203: 10,000 tCO2e GS6786: 10,000 tCO2e GS6787: 10,000 tCO2e GS6788: 10,000 tCO2e GS6789: 10,000 tCO2e GS6790: 10,000 tCO2e	GS3306: 9,967 tCO2e GS3430: 9,967 tCO2e GS3431: 9,984 tCO2e GS3432: 9,674 tCO2e GS3433: 9,967 tCO2e GS4202: 9,980 tCO2e GS4203: 9,957 tCO2e GS6786: 9,522 tCO2e GS6787: 9,859 tCO2e GS6788: 9,610 tCO2e GS6789: 9,717 tCO2e GS6790: 9,997 tCO2e

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

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VPA ID	Estimated value (tCO2e)	Actual value (tCO2e)	Comment
GS3306	10,000	9,967 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS3430	10,000	9,967 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS3431	10,000	9,984 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS3432	10,000	9,674 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS3433	10,000	9,967 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS4202	10,000	9,980 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS4203	10,000	9,957 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.

GS6786	10,000	9,522 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS6787	10,000	9,859 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS6788	10,000	9,610 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS6789	10,000	9,717 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.
GS6790	10,000	9,997 tCO2e	Estimated value was calculated at initial project implementation and did not take account of final borehole distribution across VPAs, subsequent design change and usage rate of the monitoring period.

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

No inputs or grievances were received during the monitoring period.

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

No inputs or grievances were received during the previous monitoring period.

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

No legal contests or disputes arose during the monitoring period.