Gold standard for the global goals
Monitoring report

Gold Standard®

Title of the project	GS1247 VPA 142 Manicaland Safe Water GS1247 VPA 143 Manicaland Safe Water GS1247 VPA 144 Manicaland Safe Water GS1247 VPA 145 Manicaland Safe Water GS1247 VPA 146 Manicaland Safe Water GS1247 VPA 147 Manicaland Safe Water
Gold Standard project id	GS6518-23
Version number of the monitoring report	1
Completion date of the monitoring report	04/07/2019
Date of project design certification	11/12/2018
Start date of crediting period	GS6518: 21/6/2018 GS6519: 10/6/2018 GS6520: 9/6/2018 GS6521: 29/6/2018 GS6522: 8/6/2018 GS6523: 21/6/2018
Duration of this monitoring period	GS6518: 21/6/2018 to 7/6/2019 GS6519: 10/6/2018 to 7/6/2019 GS6520: 9/6/2018 to 7/6/2019 GS6521: 29/6/2018 to 7/6/2019 GS6522: 8/6/2018 to 7/6/2019 GS6523: 21/6/2018 to 7/6/2019
Duration of previous monitoring period	N/A – 1st Monitoring Period.
Project representative(s)	Thomas Urry
Host Country	Republic of Zimbabwe
Certification pathway (activity certification/impact certification)	Impact Certification
SDG Contributions targeted (as per approved PDD)	SDG 3 – Good Health and Wellbeing SDG 5 – Gender Equality SDG 6 – Clean Water and Sanitation SDG 13 – Climate Action
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 waterborne and smoke-related illnesses per year: 50% (applies equally to all VPAs under review) SDG 5 – 40% reduction in time spent collecting water (applies equally to all VPAs under review) SDG 6 – Number of additional persons with access to safe water: GS6518: 2,210 GS6519: 2,210 GS6520: 2,210 GS6521: 2,210 GS6522: 2,210 GS6523: 2,210 SDG 13- 60,000 tCO2e per year. GS6518: 10,000 tCO2e GS6519: 10,000 tCO2e GS6520: 10,000 tCO2e GS6521: 10,000 tCO2e

	GS6522: 10,000 tCO2eGS6523: 10,000 tCO2e
Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	SDG 3 – Reduction in waterborne and smoke-related illnesses per year: 72% (applies equally to all VPAs under review) SDG 5 – 18.31% reduction in time spent collecting water (applies equally to all VPAs under review) SDG 6 – Number of additional persons with access to safe water: GS6518: 1,967 GS6519: 1,922 GS6520: 1,937 GS6521: 1,996 GS6522: 1,931 GS6523: 1,907 SDG 13 – 58,630 tCO2e. Breakdown: GS6518: 9,644 tCO2e GS6519: 9,945 tCO2e GS6520: 9,973 tCO2e GS6521: 9,425 tCO2e GS6522: 10,000 tCO2e GS6523: 9,644 tCO2e

Gold Standard

SECTION A. Description of project

A.1. Purpose and general description of project

CO2balance is implementing 6 micro-scale VPAs in Manicaland Province, Zimbabwe, under the Gold Standard methodology *Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 1*. 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 30 boreholes were rehabilitated between the 7th June 2018 and 20th July 2018. The crediting periods for each VPA are given in section A.4 and have a lifetime is 5 years, renewable.

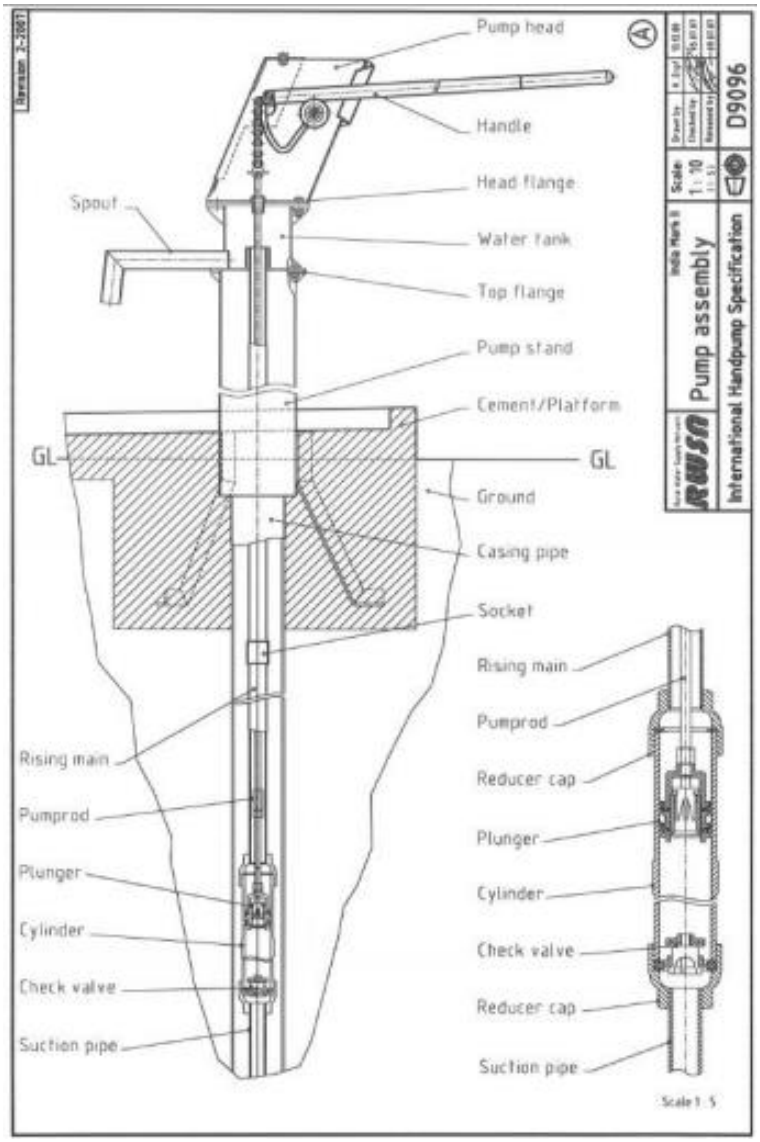
The vast majority of pumps to be fixed are common models, of which some example specifications are given below. Other hand pump models that utilize the same basic design may also be included in the project. The depth of the boreholes will be limited to 100m or less. Images and technical specifications of different types of pumps are given below:

	Arfidev	India Mark II	U3 Modified
Cylinder diameter (mm):	63.5	50	50
Maximum Stroke (mm):	125	225	125
Approx. discharge at about 75 watt input m3/h:	at 10 m head 1.4	at 10 m head 1.8	at 10 m head 1.2
	at 15 m head 1.1	at 15 m head 1.3	at 15 m head 1.0
	at 20 m head 0.9	at 20 m head 1.0	at 20 m head 0.8
	at 30 m head 0.7	at 30 m head 0.8	at 30 m head 0.6
Pumping lift (m):	10-50	10-45	20-45
Water consumption (lpcd):	15-20	15-20	15-20

The following is a more detailed diagram of the India Mark 2 pump[1]:

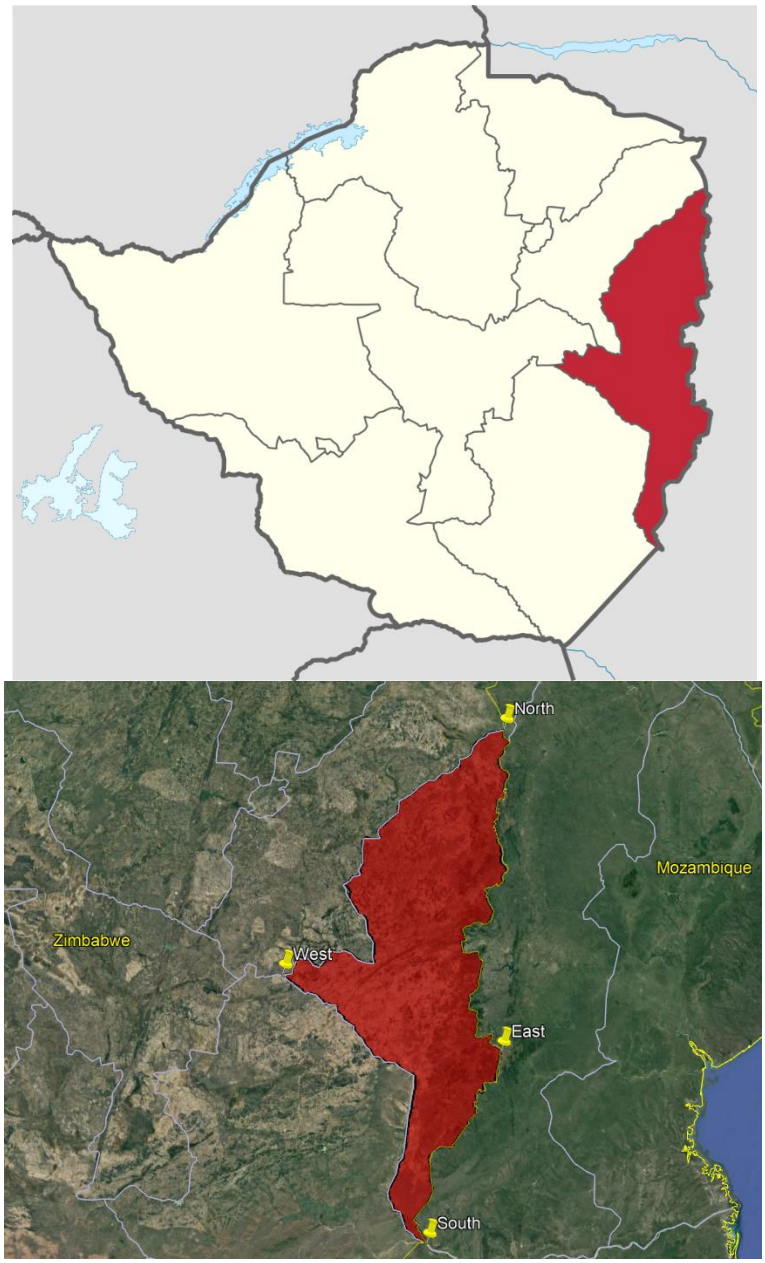
[1] Rural Water Supply Network (2018) 'India Mark II'

http://www.rural-water-supply.net/en/implementation/public-domain-handpumps/india-mark-ii



A.2. Location of project

This project is located in Manicaland Province, the easternmost province of Zimbabwe. 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 - Provincial map of Manicaland Province, Zimbabwe

Project Area Coordinates		
	Latitude	Longitude
North	17°14'47.24"S	32°59'39.30"E
South	21°19'41.42"S	32°28'47.67"E
East	19°47'49.71"S	33° 3'15.79"E
West	19°14'8.05"S	31°12'55.35"E

A.3. Reference of applied methodology

The applied methodology is Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1 (TPDDTEC v1).

A.4. Crediting period of project

The start date of the crediting periods for each VPA are:
GS6518: 21/6/2018
GS6519: 10/6/2018
GS6520: 9/6/2018
GS6521: 29/6/2018
GS6522: 8/6/2018
GS6523: 21/6/2018

Each crediting period has a length of 5 years, as approved in the PDDs.

SECTION B. Implementation of project

B.1. Description of implemented project

CO2balance UK Ltd is implementing six Micro-Scale Voluntary Project Activities under PoA 1247 in the Province of Manicaland, Zimbabwe, 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.

Manicaland is a largely rural province 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. work with community groups and a local NGO partner, Diocese of Mutare Community Care Programme (DOMCCP), 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 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 project technology days for each borehole were totalled to give the total number of project technology days for this monitoring period. In total 30 boreholes were rehabilitated as part of six VPAs between the 7th June 2018 and 20th July 2018.

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	Borehole Name	Date of Rehabilitation	Start of crediting	Village	Pump Model	Lat	Long	Telephone Number	of people using borehol	Mode of use
GS6518										
CHI006	Mujeke	20/06/2018	21/06/2018	Zamchiya	B-Model	-20.44	32.295	078751575	552	Domestic
CHI008	Gezahle	07/07/2018	08/07/2018	Mubuyay	B-Model	-20.34	32.271	07855685	253	Domestic
CHI012	Kubiri 3	19/07/2018	20/07/2018	Vadzimu	B-Model	-20.06	32.386		617	Domestic
CHI009	Zambangom	08/07/2018	09/07/2018	Takunda	B-Model	-20.34	32.271		410	Domestic
MUT006	Mukuni Sout	27/06/2018	28/06/2018	Mvurach	B-Model	-19.26	32.113	07898902	170	Domestic
							Total		**2002**	
GS6519										
CHI004	Moodies Res	09/06/2018	10/06/2018	Jopa / Mc	B-Model	-20.06	32.386	07882464	572	Domestic
CHI003	Hanganyi	09/06/2018	10/06/2018	Hangany	B-Model	-20.08	32.372	078305019	530	Domestic
CHI007	Ngatitonge 3	20/06/2018	21/06/2018	Ngatitong	B-Model	-20.46	32.254	078304171	264	Domestic
MUT005	Mutepfa	26/06/2018	27/06/2018	Mvurach	B-Model	-19.26	32.101	07222994	306	Domestic
MUT015	Gurumidzo	09/07/2018	10/07/2018	Machira	B-Model	-19.41	32.144	072552117	284	Domestic
							Total		**1956**	
GS6520										
CHI002	Singizi	08/06/2018	09/06/2018	Singizi	B-Model	-20.1	32.403	07877503	652	Domestic
CHI005	Zamchiya	19/06/2018	20/06/2018	Zamchiya	B-Model	-20.42	32.283	078217669	553	Domestic
MUT004	Chinyamago	22/06/2018	23/06/2018	Nyangan	B-Model	-19.34	32.114		341	Domestic
MUT008	Mbabvu	28/06/2018	29/06/2018	Zvirongol	B-Model	-19.27	32.055	078457158	145	Domestic
MUT003	Chinyudze	21/06/2018	22/06/2018	Mvurach	B-Model	-19.3	32.109	078305019	281	Domestic
							Total		**1972**	
GS6521										
CHI010	Mutii	10/07/2018	11/07/2018	Bako	B-Model	-20.48	32.254		663	Domestic
CHI011	Gogodo / Bo	17/07/2018	18/07/2018	Muheji B	B-Model	-20.51	32.246		478	Domestic
MUT012	Kwaedza Ma	06/07/2018	07/07/2018	Nyamadz	B-Model	-19.45	32.169		461	Domestic
MUT011	Muroti Junct	05/07/2018	06/07/2018	Chipiro	B-Model	-19.36	32.215		293	Domestic
MUT009	Musara Dipt	28/06/2018	29/06/2018	Zvirongol	B-Model	-19.26	32.073		137	Domestic
							Total		**2032**	
GS6522										
MUT013	Warehouse	06/07/2018	07/07/2018	Nyamadz	B-Model	-19.44	32.161		585	Domestic
CHI001	Mbire Boreh	07/06/2018	08/06/2018	Mbire	B-Model	-20.11	32.338	07255329	544	Domestic
MUT016	Mutandati	18/07/2018	19/07/2018	Torera	B-Model	-19.38	32.151	078156778	350	Domestic
MUT007	Mukuni Sout	27/06/2018	28/06/2018	Mvurach	B-Model	-19.26	32.11		311	Domestic
MUT002	Masinga	21/06/2018	22/06/2018	Nyangan	B-Model	-19.33	32.1		176	Domestic
							Total		**1966**	
GS6523										
MUT010	Zvebocha	05/07/2018	06/07/2018	Chipiro	B-Model	-19.35	32.206	Domestic	664	Domestic
CHI014	Rukangare 1	20/07/2018	21/07/2018	Rukanga	B-Model	-20.47	32.234	Domestic	407	Domestic
CHI013	Matosi	19/07/2018	20/07/2018	Muheji	B-Model	-20.51	32.258	Domestic	469	Domestic
MUT014	Mudzere	09/07/2018	10/07/2018	Machira	B-Model	-19.41	32.141	Domestic	310	Domestic
MUT001	Chitora	20/06/2018	21/06/2018	Nyangan	B-Model	-19.34	32.097	Domestic	92	Domestic
							Total		**1942**	

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

Complete information on crediting period start dates was not available at the time of registration, but these can now be confirmed as follows:

GS6518: 21/6/2018 – 20/6/2023
GS6519: 10/6/2018 – 9/6/2023

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.)

No changes have been made to the project design.

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 Mutare 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 Version 1, 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.

In the case of this monitoring, 7 of the 30 homogenous boreholes were selected for inclusion in the random sample as per 90/30 precision, and then a random sample was run on the user lists of those boreholes. The first 120 of the random sample list were selected to be targeted for the project survey and usage survey in order to ensure that a minimum of 100 households could be reached. For the water consumption field test, 40 were selected to ensure that the minimum of 30 households could be reached.

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. DOMCCP 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) – In total, the WCFT was conducted on 38 households between 15th May and 4th June 2019.

- **Quality of the treated water** - The quality of the treated water is assessed in each MP to ensure that it is fit for human consumption. The parameters used to assess the water quality arein line with Zimbabwean standards for potable water and all parameters must be shown to be within levels considered acceptable for domestic human consumption as per the WHO guidelines. The submitted WQT certificates for each VPA show that the water delivered by each borehole meets the standards required.

- **Usage Survey** - In total, 105 usage surveys were conducted between 13th May and 1st June 2019.

- **Project Survey** – The PS surveys end users currently using project technologies to explore changes in project scenario over time. In total, 105 project surveys were conducted between 13th May and 1st June 2019.

- **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 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)	1.76%
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
Additional comments	-

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	-

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	-

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	

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)	0.97
Choice of data or measurement methods and procedures	$f_{NRB,i,y}$
Purpose of data	Calculate ERs
Additional comments	

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)	0.0013600

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	

Relevant SDG Indicator	**SDG 13**
Data/parameter:	Non Suppressed demand (X_{boil})
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	

Relevant SDG Indicator	**SDG 5**
Data/parameter:	tb
Unit	Hours/minutes
Description	Time spent collecting water per household per day prior to project
Source of data	Baseline Survey, question 15
Value(s) applied)	1.2 hours/72 minutes
Choice of data or measurement methods and procedures	Measured by question 15 in the baseline survey
Purpose of data	Calculate time saved in water collection in the project
Additional comments	

D.2. Data and parameters monitored

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

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	18.31% (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:	

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): 71% 2. Income generating activities: 11% 3. Religious activities: 3% 4. Social and leisure activities: 5% 5. Voluntary activities: 8% 6. Education and training: 2% 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:	

Relevant SDG Indicator	SDG 6
Data/parameter:	P_y
Unit	Number
Description	Number of persons consuming safe water
Source of data	Household lists
Value(s) applied)	GS6518: 2002 GS6519: 1956 GS6520: 1972 GS6521: 2032 GS6522: 1966 GS6523: 1942
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	-

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	GS6518: 1967 GS6519: 1922 GS6520: 1937 GS6521: 1996 GS6522: 1931 GS6523: 1908
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:	

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	GS6518: 671,938 GS6519: 691,446 GS6520: 698,426 GS6521: 674,199 GS6522: 675,625 GS6523: 639,981
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:	-

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 DOMCCP 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:	-

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*
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 DOMCCP 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*

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:	-

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:	-

Relevant SDG Indicator	**SDG 6**
Data/parameter:	Quality of Treated Water
Unit	Parameters as per national 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 national standards which also adheres to the WHO guidelines.

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:	-

D.3. Implementation of sampling plan

The project proponent has elected to cross-sample technologies across all its homogenous borehole VPAs located within Manicaland Province. 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 7 of the 30 boreholes in Manicaland Province would need to be selected for inclusion in the surveys. 7 boreholes were selected by generating a random list of numbers on the Research Randomizer online resource. An aggregate list was then generated of the users of the 7 selected boreholes, 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 6th January 2019 and 28th May 2019, and the first 60 selected for the WCFT, conducted between 6th January 2019 and 24th May 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)

$I_{b,y}$ = Percentage of the population experiencing water-related illnesses in the baseline scenario.

To establish $I_{b,y}$ the Project Survey asks the following:

17	Do you or your family ever suffer from stomach related illnesses and how often does this occur?	**1.** Never	**2.** Once every few months
		3. Once per month	**4.** Several times per month
		5. Weekly	**6.** Everyday

SDG 5 (Gender Equality)

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

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

13	Who usually goes to this source to collect water for your household?	**1.** Male Adult	**2.** Female Adult
		3. Male Child	**4.** Female Child
15	How long do you spend collecting water per day (if applicable)?	**1.** 0-30min	**2.** 31-60min
		3. 1-2hrs	**4.** 2-3hrs
		5. 3-4hrs	**6.** >4hrs
16	How many days per week do you spend collecting water on average?	*Please specify on answer sheet*	

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.

X_{boil} The percentage of premises that in the absence of the project activity would have used non-GHG emitting technologies (like chlorine treatment techniques) in the project boundary.

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)

$I_{p,y}$ Percentage of the population experiencing water-related illnesses in the project scenario

$SI_{p,y}$ Reduction in smoke-related illnesses noticed in the project scenario

SDG 5 (Gender Equality)

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

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

14	Who usually goes to this source to collect water for your household?	**1.** Male Adult	**2.** Female Adult
		3. Male Child	**4.** Female Child
16	How long do you spend collecting water per day (minutes)?	*Please specify on answer sheet*	
17	How many days per week do you spend collecting water on average?	*Please specify on answer sheet*	
18	Has the borehole project saved you time?	1. Yes	2. No (skip to question 22)
19	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)	
20	How much time do you think the borehole project has saved you on average per day?	*Please specify on answer sheet*	
21	What do you do with the time saved from the project?	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 (Clean Water and Sanitation)

P_y Number of persons having access to safe water in the project activity.

SDG 13 (Climate Action)
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 (Good Health and Wellbeing)

$P_{safe} = 0.72 = (((0.88 – 0) / 0.88) + 0.44)/2$

Where:

$P_{safe} = (((I_{b,y} – I_{p,y}) / I_{b,y}) + SI_{p,y})/2$

P_{safe} Total reduction in negative health effects for the project activity in year y (%)

$I_{b,y}$ Percentage of the population experiencing water-related illnesses in the baseline scenario

$I_{p,y}$ Percentage of the population experiencing water-related illnesses in the project scenario

$SI_{p,y}$ Reduction in smoke-related illnesses noticed in the project scenario

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

SDG 5 (Gender Equality)

$TR_y = 18.31\% = (72.00 - 58.82) / 72.00$

$TR_y = (T_{b,y}) - (T_{p,y}) / (T_{b,y})$

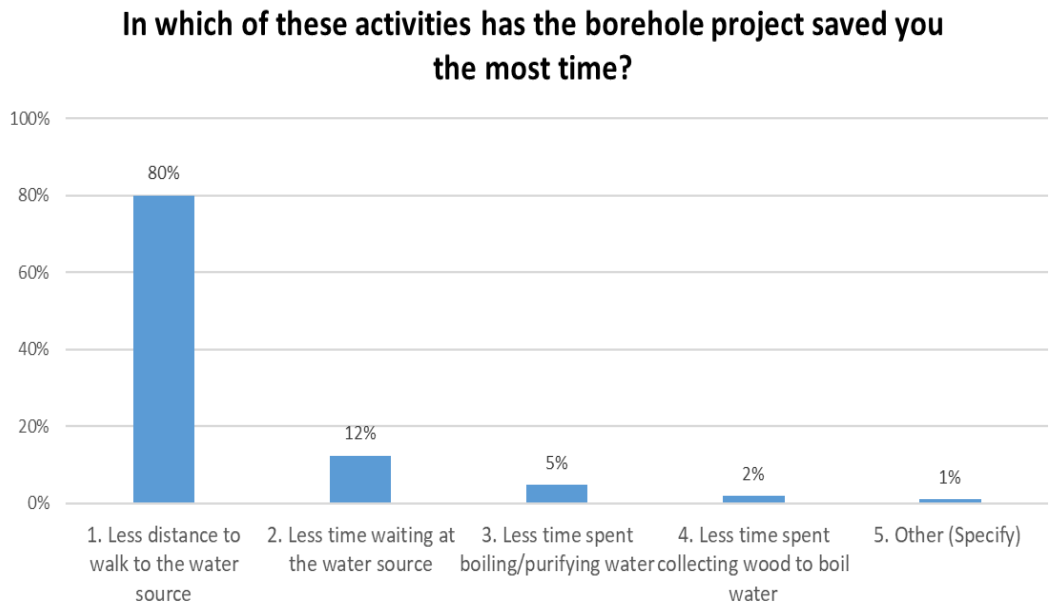
Where:

TR_y Total reduction time spent collecting water for project activity in year y (%)

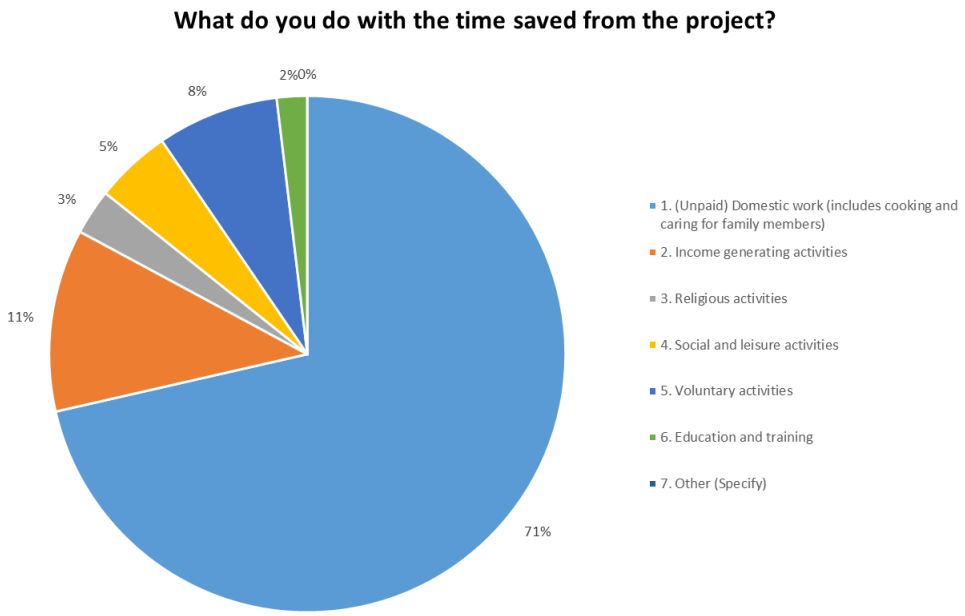
$T_{b,y}$ Time spent collecting water per household per day prior to project (hours)

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

The project has saved households 122.4 minutes (2.04 hours) per day by reducing the distance needed to walk to the water source (80%), reducing the time waiting at the water source (12%), removing the need to treat the water (5%) and collect firewood (2%).



The 18.31% reduction in time spent collecting and treating water is used in the following ways:



SDG 6 (Clean Water and Sanitation)

P_{access} = 11,661 = 11,870 * (1 – 0.0176) * (1-0)

Where:

$$P_{access} = P_y * (1 - C_j) * (1 - X_{boil})$$

Using the above values for parameters Cj and Xboil, the contribution towards SDG 6 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 11,661.

SDG 6 Impacts	
GS ID	Paccess
GS6518	1967
GS6519	1922
GS6520	1937
GS6521	1996
GS6522	1931
GS6523	1908
Total	11661

SDG 13 and emission reductions

In MP2 the project achieved a total capped ERs of 58,630 tCO2e. Below is a summary of the ERs by VPA and vintage.

Gold Standard

GS ID	PTD Total	ER Total	Capped ERs Total
GS6518	671,938	12,321	9,644
GS6519	691,446	12,679	9,945
GS6520	698,426	12,807	9,973
GS6521	674,199	12,362	9,425
GS6522	675,625	12,389	10000
GS6523	639,981	11,735	9,644
TOTAL	**4,051,615**	**74,292**	**58,630**

GS6518

Emission Reductions Vintage 2018			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		355622
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3564
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		355622
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	6,523
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**	**6523**
	ERs claimed		**5315**

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		314314
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3150

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		314314
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	5,765
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**	**5765**
	ERs claimed		**4329**

Gold Standard

Total Emission Reductions for Monitoring Period 1			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		669936
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	6713

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		669936
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.001360
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	0.97
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	12,287
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**	**12287**
	ERs claimed		**9,644**

GS6519

Emission Reductions Vintage 2018			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		382398
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3832
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		382398
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, nor	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	7,014
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**	**7014**
	ERs claimed		**5616**

Gold Standard

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		307092
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3077

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		307092
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	5,632
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**	**5632**
	ERs claimed		**4329**

Total Emission Reductions for Monitoring Period 1			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		689490
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	6909

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		689490
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.001360
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	0.97
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	12,646
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**	**12646**
	ERs claimed		**9,945**

GS6520

Gold Standard

Emission Reductions Vintage 2018			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		386850
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3876
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		386850
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	7,095
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**	**7095**
	ERs claimed		**5644**

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		309604
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3102

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		309604
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	5,679
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**	**5679**
	ERs claimed		**4329**

Gold Standard

Total Emission Reductions for Monitoring Period 1			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		696454
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	6979

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		696454
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.001360
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	0.97
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	12,774
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**	**12774**
	ERs claimed		**9,973**

GS6521

Emission Reductions Vintage 2018			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		353143
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3539
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		353143
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	6,477
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**	**6477**
	ERs claimed		**5096**

Gold Standard

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		319024
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3197

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		319024
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	5,851
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**	**5851**
	ERs claimed		**4329**

Total Emission Reductions for Monitoring Period 1			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		672167
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	6735

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		672167
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.001360
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	0.97
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	12,328
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**	**12328**
	ERs claimed		**9,425**

GS6522

Gold Standard

Emission Reductions Vintage 2018			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		364997
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3657
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		364997
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	6,695
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**	**6695**
	ERs claimed		**5671**

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		308662
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3093

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		308662
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	5,661
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**	**5661**
	ERs claimed		**4329**

Gold Standard

Total Emission Reductions for Monitoring Period 1			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		673659
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	6750

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		673659
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.001360
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	0.97
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	12,356
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**	**12356**
	ERs claimed		**10000**

GS6523

Emission Reductions Vintage 2018			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		333145
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3338
Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		333145
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	6,110
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**	**6110**
	ERs claimed		**5315**

Gold Standard

Emission Reductions Vintage 2019			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		304894
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	3055

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		304894
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0013600
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	0.97
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	5,592
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**	**5592**
	ERs claimed		**4329**

Total Emission Reductions for Monitoring Period 1			
Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	1.76%
Person Days	Njy		638039
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.001360
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	6393

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	1.76%
Person Days	Njy		638039
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.001360
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	0.97
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	11,702
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**	**11702**
	ERs claimed		**9,644**

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	88% experiencing negative water-related health effects (applies equally to all VPAs)	0% experiencing negative water-related health effects. 44% fewer experiencing smoke-related health effects (applies equally to all VPAs)	72% reduction in waterborne and smoke-related illnesses per year (weighted reduction) (applies equally to all VPAs)
SDG 5	72.00 minutes collecting water (applies equally to all VPAs)	58.82 minutes collecting water (applies equally to all VPAs)	13.18 minutes /18.31% time saved (applies equally to all VPAs)
SDG 6	Persons with access to safe water: GS6518: 35 GS6519: 34 GS6520: 35 GS6521: 36 GS6522: 35 GS6523: 36	Persons with access to safe water: GS6518: 2,002 GS6519: 1,956 GS6520: 1,972 GS6521: 2,032 GS6522: 1,966 GS6523: 1,942	Additional persons with access to safe water: GS6518: 1,967 GS6519: 1,922 GS6520: 1,937 GS6521: 1,996 GS6522: 1,931 GS6523: 1,908
SDG 13	Total emissions: GS6518: 10,000 tCO2e GS6519: 10,000 tCO2e GS6520: 10,000 tCO2e GS6521: 10,000 tCO2e GS6522: 10,000 tCO2e GS6523: 10,000 tCO2e	Total emissions: GS6518: 0 tCO2e GS6519: 0 tCO2e GS6520: 0 tCO2e GS6521: 0 tCO2e GS6522: 0 tCO2e GS6523: 0 tCO2e	Emissions reductions (less than 10,000 tCO2e per VPA due to some VPAs crediting for slightly less than one year): GS6518: 9,644 tCO2e GS6519: 9,945 tCO2e GS6520: 9,973 tCO2e GS6521: 9,425 tCO2e GS6522: 10000 tCO2e GS6523: 9,644 tCO2e

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

- SDG 3: A 72% reduction in illnesses was experienced in all VPAs, compared to a 50% decrease expected in the PDD. This demonstrates that the health benefits of the boreholes have exceeded expectations and that communities have done very well to ensure that the water is safe for consumption.
- SDG 5: There has been an 18.31% time saving on water collection compared to 40% estimated in the PDD. This demonstrates that the time saving has not quite met expectations, perhaps due to some households living a distance away from boreholes, although less far than they lived from the original water source. There is nevertheless a significant time saving, and the time can now be dedicated to other activities.
- SDG 6: The number of people accessing safe water is slightly less per VPA than the 2,210 people per VPA estimated in the PDD. This is because the figure of 2,210 was an estimate, with correct household lists not having been received at the time of registration.
- SDG 13: All VPAs aside from GS6522 have fallen slightly short of 10,000 ERs because they are not being verified here for a full year. If verified for a full year, all 6 VPAs would issue 10,000 tCO2e per annum.

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 3	50% reduction in waterborne and smoke-related illnesses per year (applies equally to all VPAs)	72% reduction in waterborne and smoke-related illnesses per year (applies equally to all VPAs)
SDG 5	40% reduction in time spent collecting water (applies equally to all VPAs)	18.31% reduction in time spent collecting water (applies equally to all VPAs)
SDG 6	Estimated number of persons with access to safe water: GS6518: 2,210 GS6519: 2,210 GS6520: 2,210 GS6521: 2,210 GS6522: 2,210 GS6523: 2,210	Actual persons with access to safe water: GS6518: 1,967 GS6519: 1,922 GS6520: 1,937 GS6521: 1,996 GS6522: 1,931 GS6523: 1,908
SDG 13	Estimated emissions reductions: GS6518: 10,000 tCO2e GS6519: 10,000 tCO2e GS6520: 10,000 tCO2e GS6521: 10,000 tCO2e GS6522: 10,000 tCO2e GS6523: 10,000 tCO2e	Actual emissions reductions: GS6518: 9,644 tCO2e GS6519: 9,945 tCO2e GS6520: 9,973 tCO2e GS6521: 9,425 tCO2e GS6522: 10000 tCO2e GS6523: 9,644 tCO2e

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

The difference between estimated and actual values for SDG 13 are as follows:

VPA ID	Estimated value (tCO2e)	Actual value (tCO2e)	Comment
GS6518	10,000	9,644	Estimated value was calculated assuming a full 365 days crediting. However, many boreholes were rehabilitated up to 43 days after the first rehabilitation (7/6/18), and only began crediting after this point.
GS6519	10,000	9,945	Estimated value was calculated assuming a full 365 days crediting. However, many boreholes were rehabilitated up to 43 days after the first rehabilitation (7/6/18), and only began crediting after this point.
GS6520	10,000	9,973	Estimated value was calculated assuming a full 365 days crediting. However, many boreholes were rehabilitated up to 43 days after the first rehabilitation (7/6/18), and only began crediting after this point.
GS6521	10,000	9,425	Estimated value was calculated assuming a full 365 days crediting. However, many boreholes were rehabilitated up to 43 days after the first rehabilitation (7/6/18), and only began crediting after this point.
GS6523	10,000	9,644	Estimated value was calculated assuming a full 365 days crediting. However, many boreholes were rehabilitated up to 43 days after the first rehabilitation (7/6/18), and only began crediting after this point.

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.