Gold standard for the global goals
Monitoring report

June 2017, version 1

Title of the project	GS1247 VPA 190 -Zambia Eastern Province Safe Water Project (GS7456) GS1247 VPA 191 Zambia Eastern Province Safe Water Project (GS7457) GS1247 VPA 192 Zambia Eastern Province Safe Water Project (GS7458) GS1247 VPA 193 Zambia Eastern Province Safe Water Project (GS7459)GS1247 VPA 194 Zambia Eastern Province Safe Water Project (GS7460)
Gold Standard project id	VPA 190/GS7456 VPA 191/GS7457 VPA 192/GS7458 VPA 193/GS7459 VPA 194/GS7460
Version number of the monitoring report	2
Completion date of the monitoring report	15/08/2020
Date of project design certification	14/04/2020
Start date of crediting period	VPA 190/GS 7456: 16/08/2019 VPA 191/ GS7457: 16/08/2019 VPA 192/ GS7458: 15/08/2019 VPA 193/ GS7459: 21/09/2019 VPA 194/ GS7460: 15/09/2019
Duration of this monitoring period	VPA 190/GS 7456: 16/08/2019 - 15/08/2020 VPA 191/ GS7457: 16/08/2019 – 15/08/2020 VPA 192/ GS7458: 15/08/2019 – 15/08/2020 VPA 193/ GS7459: 21/09/2019 – 15/08/2020 VPA 194/ GS7460: 15/09/2019 – 15/08/2020
Duration of previous monitoring period	N/A
Project representative(s)	Emma Donnachie, CO2balance UK Limited.
Host Country	Republic of Zambia
Certification pathway (activity certification/impact certification)	Impact Statement and Products
SDG Contributions targeted (as per approved PDD)	1 – SDG 3 – Good Health and Well-being 2– SDG 5 - Gender Equality 3 – SDG 6 - Clean Water and Sanitation 4 – SDG 13 - Climate Action
Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)	GSVERs
Selected methodology(ies)	TPDDTEC v.1
Estimated amount of annual average certified SDG impact (as per approved PDD)	Per VPA: 1 – SDG 3 – 2166 additional people consuming safe water 2 – SDG 5 – Reduction of 0.5 hours (22.7%) spent collecting water. 3 – SDG 6 – 2041 additional people gain access to safe water 4 – SDG 13 – Estimated at 9414 tCO2e per VPA
Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	VPA 190/ GS7456 1 – SDG 3 – 2358 additional people consuming safe water 2 – SDG 5 – 0.6 hours 56%) decrease in time spent collecting water 3 – SDG 6 – 2470 additional people gain access to safe water

	4 – SDG 13 – 905 tCO2e VPA191/GS7457 1 – SDG 3 – 2361 additional people consuming safe water 2 – SDG 5 – 0.6 hours 56%) decrease in time spent collecting water 3 – SDG 6 – 2473 additional people gain access to safe water 4 – SDG 13 – 674 tCO2e VPA192/GS7458 1 – SDG 3 – 2335 additional people consuming safe water 2 – SDG 5 – 0.6 hours 56%) decrease in time spent collecting water 3 – SDG 6 – 2447 additional people gain access to safe water 4 – SDG 13 – 987 tCO2e VPA193/GS7459 1 – SDG 3 – 2403 additional people consuming safe water 2 – SDG 5 – 0.6 hours 56%) decrease in time spent collecting water 3 – SDG 6 – 2517 additional people gain access to safe water 4 – SDG 13 – 1651 tCO2e VPA194/GS7460 1 – SDG 3 – 2402 additional people consuming safe water 2 – SDG 5 – 0.6 hours 56%) decrease in time spent collecting water 3 – SDG 6 – 2516 additional people gain access to safe water 4 – SDG 13 – 836 tCO2e

SECTION A. Description of project

A.1. Purpose and general description of project

>> (Provide a brief summary of the detailed description given in section B.1 including purpose of the project, brief description of the installed technology and equipment and relevant dates for the project (e.g. construction start/end, commissioning, continued operation periods, etc.)

The Micro-Scale VPA Zambia Eastern Province Community Safe Water project is eligible under the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0. By providing safe water, the project will ensure that households consume less firewood during the process of water purification and as a result there shall be a reduction of carbon dioxide emissions from the combustion process.

Lundazi District in Eastern Province, Zambia is a largely rural district in which local people typically use wood fuel on inefficient three stone fires to boil their drinking water for purification. 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 clean water desired by households. The Micro-Scale VPA Zambia Eastern Province Safe Water project is eligible under the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0. By providing safe water, the project will ensure that households consume less firewood during the process of water purification and as a result there shall be a reduction of carbon dioxide emissions from the combustion process.

Many existing safe water sources in Lundazi District have fallen into disrepair because maintenance programmes have been poorly managed or proven too expensive. In this project local NGO, Reformed Open Community Schools (ROCS), will work with British company CO2balance to rehabilitate and maintain water points so that they deliver clean, safe water. The project will ensure that the quality of the water delivered by the safe water sources is fit for human consumption for the entire length of the project, which will be a minimum of five years.

In agreement with ROCS and the communities, CO2balance have legal ownership of the carbon credits produced as a result of the project. On the time rehabilitation of each borehole, a Carbon Transfer Form (CTF) is signed by a representative of the village Water Resource Committee signing over the rights to the carbon credits to CO2balance. A full explanation was given to ROCS and elected representatives of water point users that CO2balance have committed to provide them with a rehabilitated and fully maintained borehole on the basis that the emission reductions will be transferred to CO2balance.

Water points are managed by communities, who are recognised as the main users of the water points in the project. In line with Section A.2.1 of the PoA, communities are encouraged to contribute funds for use of the borehole, to encourage community ownership of the borehole and long-term sustainability of the project. This is determined by the Water Resource Committees on a borehole by borehole basis depending on the capacity of the community to contribute. ROCs created a mechanism incorporated into the project design to encourage empowerment of the communities through the project to ensure they are not wholly dependent on CO2balance throughout the lifetime of the project (a minimum for 5 year) and after the project is complete. By encouraging households to contribute funds within their means for use of the borehole, it ensures communities can maintain the boreholes themselves within reason. The money they can contribute are paid to the communities Water Resource Committees to form a fund that can be used to pay for minor maintenance and cleaning equipment to maintain the area around the borehole. This ensures that the communities are not entirely dependent on CO2balance for conducting minor maintenance. This ensures that the project prepares the communities with a self-sufficient, sustainable model to maintain their safe water source without relying on CO2balance.

The number of water points per VPA will be limited by the amount of pure water supplied by each unit. Based on ex-ante calculations, the maximum number of water points that can be rehabilitated in one VPA to achieve 10,000 tCO2e is approximately 7. Following the collection of the user numbers of each borehole following their rehabilitation, they were much lower than estimated. Therefore, the maximum number of water points that can be rehabilitated in one VPA to achieve 10,000 tCO2e is approximately 10

The project is funded by marketing the anticipated carbon credits from the wood savings to ethical investors, so water point owners must agree to transfer the emissions reductions over to CO2balance in return for them supplying the work to renovate the water points. This project will be developed under the Gold Standard carbon credit body, which in addition to checking that the carbon credits from this project are real, also measures local social, environmental and economic impact.

A summary of each VPA is shown below. The dates provided are when household users started using the water from the borehole (the day after rehabilitation). For the purpose of calculating the emission reductions, the borehole users are capped at 300 per technology unit.

GS ID	Borehole ID	Village	Lat	Long	Date	No. HHs	No. People	Capped People
VPA 190/ GS 7456	LUN005	Chambuzi	-11.77972	33.22667	15/08/2019	25	153	153
	LUN006	Chipakala	-11.60694	33.20027	15/08/2019	29	158	158
	LUN009	Juma	-13.00944	32.96083	13/09/2019	38	163	163
	LUN014	Chauluma	-12.95456	33.00836	14/09/2019	38	214	214
	LUN023	Bila	-12.15769	33.06002	25/09/2019	74	460	300
	LUN024	Nyalubanga	-12.23387	33.0784	25/09/2019	81	465	300
	LUN030	Chinthenga	-12.70158	32.12208	17/11/2019	31	175	175
	LUN032	Zokwe	-12.31322	32.32203	18/11/2019	44	320	300
	LUN034	Chinkwamba	-12.48213	32.41831	19/11/2019	26	137	137
	LUN044	Kunkhe	-11.79619	33.20388	13/12/2019	57	271	271
				VPA start date	**16/08/2019**	**Total**	**2516**	**2171**

GS ID	Borehole ID	Village	Lat	Long	Date	No. HHs	No. People	Capped People
VPA 191/ GS 7457	LUN 003	Sude	-11.97444	33.20000	16/08/2019	56	352	300
	LUN 007	Chinyumba	-12.27139	33.19194	19/08/2019	71	485	300
	LUN 008	Kasasa	-13.06476	32.90964	12/09/2019	34	195	195
	LUN 010	Njoka 01	-12.20250	32.76778	16/09/2019	18	114	114
	LUN 018	Chawerelo	-12.37314	33.33733	24/09/2019	75	425	300
	LUN 019	Matimba	-12.41144	33.37275	24/09/2019	30	170	170
	LUN 027	Chinyanta	-12.83169	32.02934	15/11/2019	26	133	133
	LUN 033	Kafurira	-12.31473	32.31746	18/11/2019	43	359	300
	LUN 035	Kabendama	-12.4625	32.41194	20/11/2019	34	149	149
	LUN 037	Lukanthika	-12.43914	32.28191	21/11/2019	29	137	137
				VPA start date	**17/08/2019**	**Total**	**2519**	**2098**

GS ID	Borehole ID	Village	Lat	Long	Date	No. HHs	No. People	Capped People
VPA 192/ GS 7458	LUN 001	Chipengu	-11.90389	33.08639	14/08/2019	46	223	223
	LUN 002	Chibungu	-11.76611	33.23278	16/08/2019	32	179	179
	LUN 004	Chinthaka	-11.93639	33.16028	17/08/2019	26	133	133
	LUN 011	Njoka 02	-12.20397	32.79280	17/09/2019	59	402	300
	LUN 012	Chitala (Katambalala)	-12.33139	32.98533	18/09/2019	32	179	179
	LUN 017	Kapumbulu	-12.36287	33.28559	23/09/2019	70	341	300
	LUN 022	Lobi	-12.27982	33.29128	25/09/2019	33	197	197
	LUN 031	Shabani	-12.70928	32.12344	17/11/2019	43	238	238
	LUN 040	Kabizubizu	-11.72127	33.29287	12/12/2019	36	174	174
	LUN 046	Mzgatama	-12.41861	33.13926	06/12/2019	69	426	300

VPA start date	15/08/2019	Total	2492	2223

GS ID	Borehole ID	Village	Lat	Long	Date	No. HHs	No. People	Capped People
VPA 193/ GS 7459	LUN 015	Kanyonge	-12.35821	33.21725	20/09/2019	85	412	300
	LUN 016	Wadilika	-12.36287	33.28559	20/09/2019	38	185	185
	LUN 020	Chikhumbi	-12.41948	33.27960	24/09/2019	73	374	300
	LUN 026	Mukasanga	-12.8366	32.02718	15/11/2019	52	447	300
	LUN 028	Chongo	-12.84402	32.02395	16/11/2019	50	325	300
	LUN 036	Chikuba	-12.42986	32.2813	21/11/2019	26	134	134
	LUN 038	Chaguza	-12.44631	32.25183	22/11/2019	34	181	181
	LUN 039	Jenda	-12.31866	33.11455	07/12/2019	23	132	132
	LUN 043	Janalume	-12.20835	33.14246	13/11/2019	39	175	175
	LUN 048	Chaska	-12.22989	33.2561	10/12/2019	39	199	199
				VPA start date	21/09/2019	Total	2564	2206

GS ID	Borehole ID	Village	Lat	Long	Date	No. HHs	No. People	Capped People
VPA 194/ GS 7460	LUN 013	Zumwanda	-12.42419	33.05091	19/09/2019	30	158	158
	LUN 021	Kapilimutiwa	-12.565	33.5757	14/09/2019	58	329	300
	LUN 025	Kapichila	-12.3771	33.27855	26/09/2019	31	183	183
	LUN 029	Mulolo	-12.82601	32.03146	16/11/2019	27	136	136
	LUN 041	Kauka	-11.71691	33.26299	12/12/2019	43	237	237
	LUN 042	Malekano	-11.70998	33.2238	12/12/2019	30	173	173
	LUN 045	Papilo	-12.24386	33.14652	10/12/2019	31	164	164
	LUN 047	Kasuku	-12.36626	33.2543	09/12/2019	85	455	300
	LUN 049	Chiwe	-12.3003	33.31404	09/12/2019	47	291	291
	LUN 050	Chidesa	-12.38586	33.19906	09/01/2020	84	437	300
				VPA start date	20/09/2019	Total	2563	2242

The dates of the borehole rehabilitations were confirmed by a Repair Confirmation Form which were signed by the technicians carrying out the repair along with a village administrator from the local community. The day after the rehabilitations were used as the start dates of operation and crediting period for each borehole; we have conservatively not included the day of rehabilitation.

The number of days each borehole credits 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 the monitoring period.

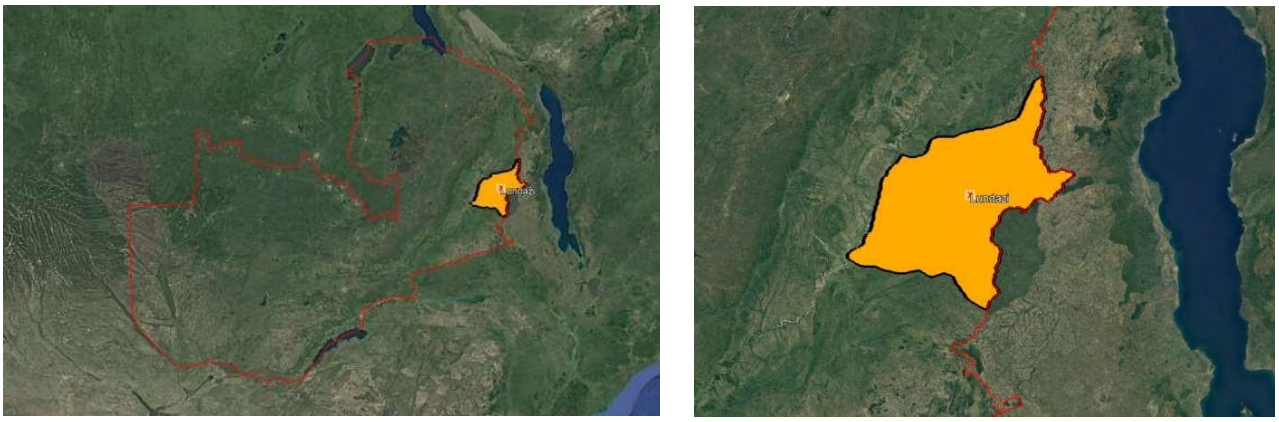
A.2. Location of project

>> (Provide host country, state/province, city/town details along with GPS co-ordinates.)

Republic of Zambia (outlined in red), and the project area, Lundazi District (including Lundazi, Lumezi and Chasefu) in Eastern Zambia. The target area and the fuel collection area are defined as being contained within the 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.

Project Area Coordinates		
	Latitude	**Longitude**
North	11.6783°	33.3046°
East	12.3683°	33.5489°
South	13.3160°	32.9194°
West	12.9658°	31.9010°

The physical delineating of the project boundary, Lundazi District is displayed below in Figure 1. All boreholes included within this VPA lie within the area marked, within the provided coordinates.



Location of Project Boundary, Lundazi District in Eastern District.

A.3. Reference of applied methodology

>>(Indicate title and version number of the methodology.)

Gold Standard Methodology: Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0.

A.4. Crediting period of project

>> (Provide start date and length of the crediting period as given in approved PDD.)

The date after the date of rehabilitation were used as the start dates of operation. It was conservatively assumed that the first day of crediting is not counted and the crediting period begins the following day after the borehole is rehabilitated. The crediting periods began:

VPA 190/GS 7456: 16/08/2019

The length of the crediting period is 5 years as per the approved PDD.

SECTION B. Implementation of project

B.1. Description of implemented project

>> (*Provide information on the implementation status of the project during this monitoring period. Specify any deviations / delays compared to information in approved project.)*

CO2balance and Reformed Open Community Schools (ROCS) have rehabilitated 50 boreholes as part of the project. All 50 boreholes were technically assessed to determine the parts and workmanship required for the borehole to be in good working order and deliver clean water. Rehabilitations were carried out between 14/08/2019 and 09/01/2020. These entailed certified borehole technicians doing an initial visit to technically assess each borehole, listing the materials and workmanship required to make the borehole function. After acquiring the materials, the technicians revisit the boreholes to conduct the rehabilitation, with the communities Water Resource Committee (or representative) and ROCS field staff present. The rehabilitation involved taking apart the boreholes, and replacing the items that were broken. Once reassembled, begin pumping water from the borehole to ensure the functioning is good. Following the successful rehabilitation of each borehole and agreement from the technician and Water Resource Committee member, a Carbon Transfer Form was signed to certify the repair.

21/50 boreholes were experiencing poor water quality and required professional flushing which was conducted 13/01/2020 and 08/02/2020 on the following boreholes:

Borehole ID	VPA ID	Village	Flushing Date
LUN 006	190	Chipakala	07/02/2020
LUN 009	190	Juma	13/01/2020
LUN 014	190	Chauluma	13/01/2020
LUN 030	190	Chinthenga	28/01/2020
LUN 007	191	Chinyumba	30/01/2020
LUN 008	191	Kasasa	13/01/2020
LUN 027	191	Chinyanta	27/01/2020
LUN 033	191	Kafurira	05/02/2020
LUN 035	191	Kabendama	06/02/2020
LUN 037	191	Lukanthika	05/02/2020
LUN 001	192	Chipengu	01/02/2020
LUN 004	192	Chinthaka	01/02/2020
LUN 011	192	Njoka 02	08/02/2020

LUN 022	192	Lobi	02/02/2020
LUN 028	193	Chongo	27/01/2020
LUN 038	193	Chaguza	06/02/2020
LUN039	193	Jenda	30/01/2020
LUN043	193	Janalume	31/01/2020
LUN 029	194	Mulolo	27/01/2020
LUN045	194	Papilo	02/02/2020
LUN047	194	Kasuku	31/01/2020

A delay was experienced in testing the boreholes for water quality, due to the rainy season delaying the rehabilitation of some boreholes, the need to professionally flush 21/50 boreholes and then the restrictions imposed by the COVID-19 pandemic. This meant water quality testing was not conducted in the first 6 months of the project.

Full water quality of all 50 boreholes were tested 27th April – 10th May 2020, in line with the Zambian National Requirements for Drinking Water with the Zambian Ministry of Health. The boreholes which failed to meet any requirements were treated during June 2020 accordingly and retested in July and August 2020 to ensure they were meeting the national standards and delivering safe water to the communities. The downtime for the applicable boreholes has been accounted for within the calculation of the emission reductions to ensure non-functioning days have been discounted and a breakdown have been provided in the accompanying Emission Reductions documents for each VPA.

Summary of non-functioning days:

VPA 190
Total non-functioning days: 2180

Borehole ID	Non-functioning Days
LUN005	335
LUN006	335
LUN009	306
LUN014	305
LUN023	294
LUN024	294
LUN030	72
LUN034	239

VPA 191
Total non-functioning days: 1606

Borehole ID	Non-functioning Days
LUN 003	334
LUN 007	164
LUN 008	338
LUN 010	303
LUN 027	73
LUN 033	79
LUN 035	78
LUN 037	237

VPA 192
Total non-functioning days: 2174

Borehole ID	Non-functioning Days
LUN 001	336
LUN 002	334
LUN 004	333
LUN 011	302
LUN 012	301
LUN 022	130
LUN 040	216
LUN 046	222

VPA 193
Total non-functioning days: 1075

Borehole ID	Non-functioning Days
LUN 026	243
LUN 028	72
LUN 038	76
LUN 039	221
LUN 043	245
LUN 048	218

VPA 194
Total non-functioning days: 1867

Borehole ID	Non-functioning Days
LUN 013	300
LUN 021	305
LUN 025	293
LUN 029	242
LUN 041	216
LUN 042	216
LUN 045	54
LUN 047	53
LUN 050	188

The ongoing maintenance strategy for water quality means annual water quality testing will ensure the water is tested regularly and is safe for human consumption as per Zambian National Water Standards and treated accordingly to ensure they deliver safe water. The main uses of water from purified boreholes are drinking, basic personal hygiene and food preparation, in line with eligible water uses which the project can generate carbon credits for. The borehole is also commonly used for washing clothes, utensils and providing water for animals but these uses are not included in carbon emission reduction calculations.

Furthermore, grievance expression process books placed at all boreholes have received positive feedback from community members. ROCS field staff have not received any feedback during this monitoring period from the borehole users on major damage or breakdowns. During the follow-up visits conducted minor maintenance was conducted where required to ensure the boreholes continue functioning well, this ranged from replacing rubber heads and bears and reconnecting rods. Therefore, it can be assumed that the project is running as planned.

Rehabilitations

The borehole technology in Zambia that has been rehabilitated as part of this project is the India Mark II Hand Pumps, Afridev, the U3 modified pump and similar models that utilise the same basic design (see photograph of India Mark II model in the photograph below).

The technicians identified by ROCS were through the District Water, Sanitation and Hygiene Education Committee (DWASHE), as competent and experts in WASH issues.

India Mark II Borehole Sign

Functioning borehole Post-rehabilitation:

Jerry cans and containers (with sealed lids) used by households for the purposing of collecting/storing water:

Professionally-informed literature supports the lifetime of the boreholes models included in this project is 10-15 years[1][2][3]. As part of this project, all borehole parts that are replaced are new and an ongoing maintenance programme is in place to ensure that all parts that need further repair or replacement are identified and carried out for the lifetime of the project.

1 https://www.pseau.org/outils/ouvrages/rwsn_the_2019_rwsn_directory_of_rural_water_supply_services_tariffs_management_models_and_lifecycle_costs_2019.pdf

2 https://www.engineeringforchange.org/solutions/product/afridev-hand-pump/

3 https://www.engineeringforchange.org/solutions/product/india-mark-ii-handpump/

ROCS staff who were involved in addressing the maintenance and breakdown of the boreholes were Eneless Chipandwe, Asten Nyau, Peter Nyirenda, Jacob Phiri and Robson Mumbuna.

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

>> (Indicate whether any temporary deviations have been applied during this monitoring period. If applied, provide a description of the deviation(s). Include the reasons for the deviation(s), how it deviates from the monitoring plan, applied methodology(ies) and/or applied approaches, the duration for which the deviation(s) is(are) applicable and justification on the conservativeness of the approach. Also indicate if prior approval from GS-TAC have been sought on the deviation.)

N/A

B.2.2. Corrections

>> (Indicate whether any corrections to project information or parameters fixed at validation have been applied.)

N/A

B.2.3. Changes to start date of crediting period

>> (Indicate whether any changes to the start date of the crediting period have been approved by Gold Standard that is relevant for this monitoring period.)

N/A

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

>> (Indicate whether any permanent changes from the approved monitoring plan, applied methodologies or applied approaches have been approved by GS-TAC that is relevant for this monitoring period.)

N/A

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.)

N/A

SECTION C. Description of monitoring system applied by the project

>>

All surveys are administered by trained CO2balance staff and in country partner NGO, ROCS, 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. These are then sent to the UK head office for data analysis. The documentation procedure that CO2balance has devised ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in ROCS Zambian 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" (TPDDTEC), survey samples are randomly selected from the user record using a random sample group (RSG). A random number generator ranks the unique serial numbers of the boreholes in the project, generating the RSG which satisfies 90/30 precision. Each user in the RSG is assigned a unique random number from which survey participants are selected in accordance with the minimum sample size and confidence requirement for each survey. The RSG and survey participants are reselected for every monitoring period to ensure the selection remains random.

The surveys will be conducted to ensure that they are within the end date of the respective monitoring periods for each VPA.

Database

The borehole installation/rehabilitation record includes the following information:

- Date of installation/rehabilitation
- 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 installation record will be backed up electronically, with original documentation being stored in the appropriate office for the respective VPAs.

The project database will be derived from the Installation Record, with project technologies differentiated by different project scenarios (if required).

All data collected in relation to the project will be held in the local office and/or on the Project Database for the entire life cycle of the project and a period of 2 years afterwards. The data may be archived during the project in order to maintain clarity and security.

Ongoing Monitoring Studies

The following ongoing monitoring studies were conducted; the results are given in the parameter boxes tables in Section D.2.

- **Water Consumption Field Test (WCFT):** The WCFT is used to determine 3 key parameters: $Q_{p,y}$ – quantity of safe water in litres supplied in the project scenario using the clean water supply technology; $Q_{p,rawboil,y}$ – quantity of raw or unsafe water that is still boiled after installation of the water supply technology; $Q_{p,cleanboil,y}$ – quantity of safe water boiled in the project scenario after installation of the water supply technology. WCFT is completed biennially, prior to first verification and then every other year subsequently. The measurement method used is similar to the Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days (using digital scales). The WCFT is carried out by staff trained by co2balance 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 co2balance UK Ltd.

- **Water Quality Test (WQT)**: The quality of the treated water will be assessed to ensure that it is fit for human consumption. It is assessed in accordance with Zambian national standards for drinking water. The parameters used to assess the water quality will be in line with Zambian National standards for potable water and all parameters will be shown to be within levels considered acceptable for domestic human consumption.

- **Usage Survey:** Usage Survey is used to determine the $U_{p,y}$ (usage rate in the project scenario p through year y) parameter. As all boreholes will be rehabilitated 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. The annual usage survey is conducted using a minimum sample size of 100 for each technology.

- **Project Survey** – Conducted annually to survey end users currently using project technologies to explore changes in project scenario over time. The annual project survey is conducted using a minimum sample size of 100 for each technology. Data collected during the project surveys explores the following characteristics:

    - General information – Name, address, telephone number etc
    - Household socio-demographic information
    - Water use and purification characteristics
    - Sources and availability of fuel
    - Time use and time saved information

- **Leakage –** The potential sources of leakage will be investigated (LEp,y). If the assessment quantifies an increase in fuel consumption by the non-project households attributable to the project activity, then calculations will be adjusted to account for this.

  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. As solar purification devices are not used, 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 (defined as Lundazi District).

  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.

Therefore, a value of 0 is applied for leakage.

- **Project Technology Days (Np,y)-** Number of persons consuming water supplied by project scenario p through year y. Sum of the total number of people using each borehole in the project multiplied by the number of days crediting each borehole earns in this monitoring period. The total number of households using each borehole will be determined through information supplied by our NGO partner. Using this method, the total number of people using each borehole will be known and hence a figure for person days can be calculated. All monitoring tasks will be selected at random

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

Annual Monitoring – Usage and Project Surveys and WCFT

In the case of MP1, as per 90/30 precision and random sample group, 7 of the 50 homogenous boreholes were randomly selected for inclusion in the annual monitoring surveys.

Selected boreholes for annual monitoring (including the buffer community):

Borehole	Village	Random Number
LUN025	Kapichila	1
LUN035	Kabendama	2
LUN024	Nyalubanga	3
LUN039	Jenda	4
LUN017	Kapumbulu	5
LUN018	Chawerelo	6
LUN048	Chaska	7
LUN002	Chibungu	8

The user lists of these boreholes were combined into a separate list and assigned a random number. A random sample (in line with 90/30) precision was conducted on the list. The first 120 households selected underwent the Usage Survey and Project Survey (20 buffer households were selected should any of the first 120 households be unable to be surveyed); whilst the first 50 households selected underwent the WCFT. The selected households exceeded the minimum survey requirements for each of the surveys.

The usage and project surveys were conducted 20/06/2020- 23/06/2020, whilst the WCFT was conducted 23/06/2020- 26/06/2020.

Survey outcomes –

Project survey – The results of the project survey revealed that all respondents used the borehole as their main source of water and did not to treat water to make it safe as it is not necessary. The prevalence of stomach related illnesses/ water-borne diseases had decreased since the baseline study with 95% of respondents stating that they never suffered from problems, compared to only 5% in the baseline survey.

All respondents stated that the project had saved them time, through the shorter distance to the water source (32%), less time spent waiting at the water source (59%) and less time spent to purify water (10%). Time saved was spent on income generating activities (55%) and unpaid domestic work (32%).

Usage survey – The results of the Usage Survey revealed that the borehole was the main source of water for drinking, basic personal hygiene and food preparation for all respondents and that the water collected was sufficient for these uses. Water was also used to wash clothes and utensils by all respondents.

WCFT - The results of the WCFT showed that the average amount of water used by respondents was 7.44L per person per day. The maximum amount used was 7.94L and the minimum used was 6.99L. The survey showed that communities use only water collected from the boreholes included in this VPA for drinking water, basic personal hygiene, and food preparation and they do not boil the water for these uses.

Water Quality Testing

During MP1 all 50 boreholes underwent water quality testing to ensure the boreholes were delivering clean water in line with national standards, with testing undertaken by the Zambian Ministry of Health. During MP1, a number of the boreholes were reported to have to failed to meet all requirements within the national standards and underwent professional treatment and retesting to improve and verify the good water quality. The outcome of MP1 is all 50 boreholes delivering clean, safe water in line with Zambian national standards for drinking water.

Cross Sampling

The project proponent has elected to cross-sample boreholes across all its homogenous VPAs located within the project area (VPA 190, 191, 192, 193 and 194). Homogenous VPAs are defined as those that share a common baseline. Boreholes considered different technologies are cross-samples and monitored separately. The samples for the survey listed below are randomly selected from the borehole information databases in line with the minimum sample size requirements as defined by the methodology. Cross sampling will be applied to the following surveys;

- Project Surveys- Completed annually,
- Usage Surveys- Completed annually,
- Water Consumption Field Tests- Completed every two years.

Surveys are conducted through use of a Random Sample Group (RSG). The size of the sample group is selected so the number of borehole to be sampled satisfies the 90/30 precision rule. A random number generator ranks the unique serial numbers of the boreholes in the project, generating a RSG. The sample group is reselected for every monitoring period to ensure the selection remains random. In this Monitoring Period, the minimum recommended sample size of the RSG to meet 90/30 precision was 7 boreholes. The individual participants surveyed from the RSG are selected at random from the project database using the same random number generator process, in accordance with the minimum sample size requirement for each survey, detailed in section D.3.

SECTION D. Data and parameters

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

Relevant SDG Indicator	SDG 13 (Climate Action)
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	Calculation of baseline emissions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	$EF_{b,non\ co2}$
Unit	tCO_2e/TJ
Description	Non-CO_2 (CH_4 and N_2O) emission factor arising from use of wood fuel in baseline scenario
Source of data	IPCC Default emissions factor
Value(s) applied)	8.692
Choice of data or measurement methods and procedures	Deemed valid by Methodology

Gas	Default Emissions factor (kg_gas/TJ_{NCV})	GWP of gas	Default Emissions factor (kg_CO_2e/TJ_{NCV})	Default Emissions factor (t_CO_2e/TJ_{NCV})
CH_4	300	25	7,500	7.5000
N_2O	4	298	1,192	1.1920
			Total	**8.692**

Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	$EF_{p,co2}$
Unit	tCO_2/TJ
Description	CO_2 emission factor arising from use of wood fuel in project scenario
Source of data	Volume 2: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2, Table 2.5
Value(s) applied)	112
Choice of data or measurement methods and procedures	Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	$EF_{p,non\ co2}$
Unit	tCO2e/TJ
Description	Non-CO2 (CH4 and N2O) emission factor arising from use of wood fuel in project scenario
Source of data	IPCC Default emissions factor
Value(s) applied)	8.692
Choice of data or measurement methods and procedures	Deemed valid by Methodology
Purpose of data	Calculation of emission reductions.
Additional comments	-

Gas	Default Emissions factor (kg_gas/TJ_{NCV})	GWP of gas	Default Emissions factor (kg_CO_2e/TJ_{NCV})	Default Emissions factor (t_CO_2e/TJ_{NCV})
CH_4	300	25	7,500	7.5000
N_2O	4	298	1,192	1.1920
			Total	**8.692**

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	NCV_b
Unit	TJ/ton
Description	Net calorific value of the wood fuel used in the baseline
Source of data	IPCC Default emissions factor
Value(s) applied)	0.0156
Choice of data or measurement methods and procedures	Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	NCV_p
Unit	TJ/ton
Description	Net calorific value of the wood fuel used in the project
Source of data	IPCC Default emissions factor
Value(s) applied)	0.0156
Choice of data or measurement methods and procedures	Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Clean Water and Sanitation)
Data/parameter:	$W_{b,y}$
Unit	T/litre
Description	Quantity of wood fuel that is used to treat 1 litre of water in the baseline scenario b during year y
Source of data	Baseline Water Boiling Test
Value(s) applied)	0.0004
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. This value is capped at 0.0004 in line with the BAMG report published 2020.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Clean Water and Sanitation)
Data/parameter:	$W_{p,y}$
Unit	T/litre
Description	Quantity of wood 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)	0.0004
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. This value is capped at 0.0004 in line with the BAMG report published 2020.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Safe Water and Sanitation)
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.
Value(s) applied)	1.82%
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 and protected springs. Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	Xboil 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)	1.8%
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 outlined in annex 2. A fixed suppressed demand baseline has been opted for, however, in the event the project surveys show a substantial change in fuel use characteristics, a new baseline shall be conducted.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 5 (Gender Equality)
Data/parameter:	$T_{b,y}$
Unit	Hours
Description	Time spent collecting water per household per day prior to project
Source of data	Baseline survey
Value(s) applied)	1.08
Choice of data or measurement methods and procedures	Measured by question in the baseline survey.
Purpose of data	Calculating time saved collecting water by project.
Additional comments	-

D.2. Data and parameters monitored

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	$fNRB_{i,y}$
Unit	Fractional non-renewability
Description	Non-renewability status of woody biomass fuel in scenario i during year y
Measured/calculated/default	N/A
Source of data	CDM Default stated in following document: https://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf and later reviewed in https://iopscience.iop.org/1748-9326/12/11/115002/media/ERL_12_11_115002_suppdata.pdf
Value(s) applied)	0.81
Monitoring Equipment	N/A

Measuring/reading/recording frequency:	Annual
Calculation method (if applicable)	Default values of fraction of non-renewable biomass as outlined by the UNFCCC CDM
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Safe Water and Sanitation)
Data/parameter:	$N_{p,y}$
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 Database
Value(s) of monitored parameter	GS7456 – 227,141 GS7457 – 170,034 GS7458 – 247,379 GS7459 – 413,619 GS7460 – 209,927
Monitoring equipment	Project Database
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Sum of the total number of people using each borehole in the project multiplied by the number of days crediting each borehole earns in a given monitoring period.
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Safe Water and Sanitation), SDG 3 (Good Health and Well-Being)
Data/parameter:	$U_{p,y}$
Unit	Percentage
Description	Usage rate in project scenario p through year y
Measured/calculated/default	Measured
Source of data	Usage Survey MP1
Value(s) of monitored parameter	90%
Monitoring equipment	Usage Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	The usage survey has been carried out by trained local staff 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 CO2balance UK Ltd.

QA/QC procedures:	Extensive training with ROCS field staff, including video calls and provision of Survey Guidance document and comprehensive field sheets. Transparent data analysis and reporting. Hard copies of Usage surveys cross referenced and kept.
Purpose of data:	Calculation of usage.
Additional comments:	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Safe Water and Sanitation)
Data/parameter:	$Q_{p,y}$
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) MP1
Value(s) of monitored parameter	7.44
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency:	Completed every two years
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. Volume is capped at 7.5 litres per person per day as per the methodology. The WCFT will be carried out by trained local staff 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 CO2balance UK Ltd.
QA/QC procedures:	Extensive training with ROCS field staff, including video calls and provision of Survey Guidance document and comprehensive field sheets. Transparent data analysis and reporting. Hard copies of WCFT surveys cross referenced and kept.
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Safe Water and Sanitation)
Data/parameter:	$Q_{p,cleanboil,y}$
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	Water Consumption Field Test (WCFT) MP1
Value(s) of monitored parameter	0
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency:	Completed every two years

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 trained local staff 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 CO2balance UK Ltd.
QA/QC procedures:	Extensive training with ROCS field staff, including video calls and provision of Survey Guidance document and comprehensive field sheets. Transparent data analysis and reporting. Hard copies of WCFT surveys cross referenced and kept.
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 6 (Clean Water and Sanitation)
Data/parameter:	$Q_{p,rawboil,\ y}$
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	Water Consumption Field Test (WCFT) MP1
Value(s) of monitored parameter	0
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency:	Completed every two years
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 trained local staff 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 CO2balance UK Ltd.
QA/QC procedures:	Extensive training with ROCS field staff, including video calls and provision of Survey Guidance document and comprehensive field sheets. Transparent data analysis and reporting. Hard copies of WCFT surveys cross referenced and kept.
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 6 (Safe Water and Sanitation)
Data/parameter:	Quality of Treated Water
Unit	Parameters as per Zambian national standards
Description	Performance of the treatment technology
Measured/calculated/default	Measured
Source of data	Laboratory Tests certified by Republic of Zambia Ministry of Health Lundazi District Health Office
Value(s) of monitored parameter	Pass

Monitoring equipment	Laboratory equipment
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Water quality testing was conducted in partnership with Ministry of Health through the Monze District Heath Office (WHO), Lundazi District Health Office (DHO) and Lundazi District Council through the WASH unit. Testing wascertified in line with national standards. Water samples are taking at the point of source, directly from the boreholes.
QA/QC procedures:	Transparent data reporting
Purpose of data:	To test water quality for safety of human consumption.
Additional comments:	-

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	$LE_{p,y}$
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	Desk based research
Measuring/reading/recording frequency:	Completed every two years
Calculation method (if applicable):	Assessed every two years using baseline and monitoring surveys.
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of leakage.
Additional comments:	Find detailed leakage assessment in Section C;

Relevant SDG Indicator	SDG 5 (Gender Equality)
Data/parameter:	$TP_{,y}$
Unit	hours
Description	Project time spent collecting water per household per day (hours)
Measured/calculated/default	Measured
Source of data	Project Survey MP1
Value(s) of monitored parameter	Time spent collecting water per trip – 0.48 hrs
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of SDG 5
Additional comments:	-

Relevant SDG Indicator	SDG *5* (Gender Equality)
Data/parameter:	T_{usage}
Unit	Number of people
Description	Usage of time saved by the project activity
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) – 32% 2. Income generating activities – *55*% 3. Religious activities – *5*% 4. Social and leisure activities – *5*% 5. Voluntary activities – 3% 6. Education and training – 0% *7*. Other (Specify) – 0%
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Ask users how time saved by project in the project scenario (on water and firewood collection), as opposed to the baseline scenario, is now being used.
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of SDG *5* impact
Additional comments:	-

Relevant SDG Indicator/ Safeguarding Principle	Safeguarding Principle: Corruption
Data/parameter:	Reported cases of corruption arising from project activity
Unit	Reported cases
Description	Report on any cases of corruption arising from the project activity communicated by communities
Measured/calculated/default	Measured
Source of data	Continuous input mechanism
Value(s) of monitored parameter	GS7456 - 0 GS7457 - 0 GS7458 - 0 GS7459 - 0 GS7460 - 0
Monitoring equipment	The communities are able to communicate any cases of corruption through the continuous input mechanism. The continuous input mechanism is monitored and any reports of corruption are acted on.
Measuring/reading/recording frequency:	Continuous
Calculation method (if applicable):	
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	To monitor 'Corruption' safeguarding principle.
Additional comments:	-

Relevant SDG Indicator/ Safeguarding Principle	Safeguarding Principle: Negative Economic Consequences
Data/parameter:	Community maintenance trainings
Unit	
Description	To ensure long term sustainability of the water points, and avoid unexpected breakdowns and spending
Measured/calculated/default	
Source of data	Training Reports
Value(s) of monitored parameter	
Monitoring equipment	Training carried out by trained ROCS staff
Measuring/reading/recording frequency:	Training will be conducted at the beginning of the project on conducting minor maintenance.
Calculation method (if applicable):	
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	To monitor 'Negative Economic Consequences' safeguarding principle.
Additional comments:	-

Relevant SDG Indicator/ Safeguarding Principle	Safeguarding Principle: Community Health, Safety and Working Conditions
Data/parameter:	WASH trainings
Unit	
Description	Community WASH trainings conducted to promote hygiene and sanitation practices for the reduction of cases of water borne diseases
Measured/calculated/default	Measured
Source of data	Training reports, Monitoring Project Survey
Value(s) of monitored parameter	Prevalence of stomach related illnesses/ water-borne diseases Baseline Survey 1. Never - 5% 2. Once every few months - 35% 3. Once per month - 12% 4. Several times per month - 37% 5. Weekly - 9% 6. Everyday - 1% Project Survey 1. Never - 95% 2. Once every few months - 5% 3. Once per month - 1% 4. Several times per month - 0% 5. Weekly - 0% 6. Everyday - 0%

Monitoring equipment	For each borehole rehabilitated within this project a WASH programme will be carried out by the project including WASH training at the beginning of the project, as well as subsequent WASH follow-up trainings. Each training will follow an agenda and have a participation list collected. The trainings will involve introducing the concept of WASH, duties of village WASH and provide hands-on demonstrations with the community group. Incidences of water borne illnesses will also be monitored through the annual Monitoring Project Survey
Measuring/reading/recording frequency:	Carried out at beginning of project and effectiveness monitored through annual Project Survey
Calculation method (if applicable):	
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	To monitor 'Community Health, Safety and Working Conditions' safeguarding principle.
Additional comments:	-

Relevant SDG Indicator	SDG 6 (Clean Water and Sanitation), SDG 3 (Good Health and Well-Being)
Data/parameter:	P,y
Unit	Number of people
Description	Number of persons having access to a safe water point in the project activity
Measured/calculated/default	Measured
Source of data	Project Database
Value(s) of monitored parameter	GS7456 - 2516 GS7457 – 2519 GS7458 – 2492 GS7459 – 2564 GS7460 - 2563
Monitoring equipment	Project Database/Household list
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey, Usage Survey and Household list
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of SDG 6 and SDG 3
Additional comments:	-

D.3. Implementation of sampling plan

>> (If data and parameters monitored described in section D.2 above are determined by a sampling approach, provide a description on how project participants implemented the sampling plan and surveys for those data and parameters according to the approved PDD.)

In accordance with the Gold Standard methodology "Technologies and Practices to Displace Decentralised Thermal Energy Consumption" (TPDDTEC), survey samples are randomly selected from the user record using a random sample group (RSP). A random number generator ranks the unique serial numbers of the boreholes in the project, generating the RSG which satisfies 90/30 precision. Each user in the RSG is assigned a unique random number from which survey participants are selected in accordance with the minimum sample size and

confidence requirement for each survey. The RSG and survey participants are reselected for every monitoring period to ensure the selection remains random.

In this monitoring period, the minimum recommended sample size of the RSG to meet 90/30 precision was 7 boreholes. The individual participants surveyed from the RSG were selected at random from the project database, in accordance with the methodology's minimum sample size requirement for each survey, as detailed in Section D.3.1, D.3.2, and D.3.3 below.

D.3.1 Water Consumption Field Test

The Water Consumption Field Test was carried out on a randomly selected sample of 30 households for each technology from the project database. This complies with the recommended minimum sample size of 30 in the Gold Standard requirements. Furthermore, the sample confidence interval is within 10% of the mean.

ROCS staff carried out the test over a period of four days (1day preparation and 3 days measurement) following a similar method as the Kitchen Performance Test. All tests were conducted between 23/06/2020 – 26/06/2020. The total litres of water consumed each day was measured and divided by the number of people consuming water in that day – this measurement was repeated over 3 consecutive days and an overall average per household was calculated. The results showed that on average 7.44 litres of non-boiled clean water used only for drinking, hand washing and food preparation and 0 litres of boiled clean water is consumed per person per day.

The total amount of water credited for in this monitoring period is equal to the average amount of clean non-boiled water consumed per person per day (7.44l), minus the average amount of boiled clean water consumed per person per day (0).

D.3.2 Usage Survey

The usage survey establishes the proportion of beneficiaries that use the boreholes, a key parameter in the emission reduction calculations. As all the boreholes were 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 are not necessary. Therefore, the annual usage survey has been conducted using a minimum sample size of 100 for each technology.

The usage surveys in this monitoring period were carried out by field staff between the 20/06/2020 – 23/06/2020. The households that participated in the survey were randomly selected from the borehole user lists. The results confirmed that 100% of the respondents and their family members use the boreholes that were rehabilitated by CO2balance and ROCS.

D.3.3 Project Survey

Project surveys were conducted between 20/06/2020 – 23/06/2020, on 100 randomly selected households from each technology, to explore changes in the project scenario demographics, water use and purification practices etc. over time.

Data collected during the project surveys includes the following:

- General information - Name, address, telephone number etc.
- Household socio-demographic information.
- Water use and purification characteristics.
- Sources and availability of fuel
- Time use and time saved information

SECTION E. Calculation of SDG outcomes

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

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

Details of equations and indicators used to estimate baseline values for SDG outcomes are explained below

SDG 3 (Good Health and Wellbeing):

The outcome for SDG 3 is quantified as the additional number of persons consuming safe water in the project activity compared to the baseline scenario (P_{safe}). The percentage of users who were already consuming safe water in the baseline without boiling it (C_j) is determined through the baseline survey and deducted. Additionally, the percentage of users who consumed safe water by boiling it in the baseline ($P_{b,\,boil}$) is deducted. The baseline indicators are detailed in Section D.1 and are as follows:

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.
$P_{b,\,boil}$	Percentage of persons boiling water for purification in the baseline scenario.

SDG 5 (Gender Equality):

The average % decrease per household in time spent gathering water and firewood for the purpose of water purification ($T_{b,y}$) will be taken as a proxy contribution towards the SDG target. The baseline parameter for time spent collecting water and firewood per household per day is monitored in the baseline project survey. The baseline indicators are detailed in Section D.1 and are as follows:

$T_{b,y}$	Time spent collecting firewood per household for the purpose of water purification per day prior to project (minutes)

SDG 6 (Clean Water and Sanitation):

The outcome for SDG 6 is quantified as the additional number of persons having access to safe water in the project activity compared to the baseline scenario. The percentage of users who were already consuming safe water in the baseline without boiling it (C_j) was determined through the baseline survey. The baseline indicators are detailed in Section D.1 and are as follows:

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)

CO2 emission reductions are the indicator to demonstrate that the project has raised capacity for effective climate change-related planning and management. This outcome is measured using the emission reduction calculations. The baseline indicators are detailed in Section D.1 and are as follows:

Baseline Emissions:

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

Where:

$$B_{p,y} = (1 - C_j) * N_{j,y} * W_{i,y} * (Q_{j,y} + Q_{j,rawboil,y}) \quad (11)$$

Where:

$N_{j,y}$	Number of person.days consuming water supplied by project scenario p through year y[47]
C_j	Expressed as a percentage, this is the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it
$B_{b,y}$	Quantity of fuel consumed in baseline scenario b during the year y in tons
$Q_{p,y}$	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day
$Q_{p,rawboil,y}$	Quantity of raw water boiled in the project scenario p per person per day
$W_{b,y}$	Quantity of fuel in tons required to treat 1 litre of water using technologies representative of baseline scenario b during project year y, as per Baseline Water Boiling Test.

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.*)

Details of equations used to calculate project value for SDG outcomes appear below. Calculation is provided in the corresponding Emission Reductions calculations in the 'SDG Calculations' Sheet and shown in section E.3.

Outcomes for SDG 3 (Good Health and Wellbeing):

The VPAs are premised on generating Emission Reductions by ensuring that borehole users have safe water, thereby removing the need for them to burn non-renewable biomass in order to boil water to purify it. Emission reductions are also claimed through the principle of suppressed demand, meaning that some users lacked the resources, time or information necessary to purify their water prior to the project. Therefore, the users for whom ERs are claimed through suppressed demand were forced to use unsafe water for drinking, food preparation and basic personal hygiene prior to the project.

This usage of unsafe water can be taken as a proxy cause of Disability Adjusted Life Years (DALYs) in Zambia, as using unsafe water is deemed a significant cause of illness and death in the country

The outcome for SDG 3 is quantified as the additional number of persons consuming safe water in the project activity compared to the baseline scenario (P_{safe}). Calculations are as follows:

$$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$$

Where:

P_{safe}	Number of additional persons consuming safe water in the project activity compared to the baseline scenario.
P_y	Number of persons having access to safe water in the project activity.
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.
$P_{b,\ boil}$	Percentage of persons boiling water for purification in the baseline scenario.

Outcomes for SDG 5 (Gender Equality):

The overall percentage reduction in time spent collecting water and firewood for the purpose of water purification by the project activity is calculated as follows:

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

Where:

TR_y	Total reduction time spent collecting water for project activity in year y (%)
$T_{b,y}$	Baseline time spent collecting water per household per day (hours)
$T_{p,y}$	Project time spent collecting water per household per day (hours)

Outcomes for SDG 6 (Clean Water and Sanitation):

The outcome for SDG 6 is quantified as the additional number of persons having access to safe water in the project activity compared to the baseline scenario. Calculations are as follows:

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

Where:

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

Outcomes for SDG 13 (Climate Action):

CO2e emission reductions are the indicator to demonstrate that the project has raised capacity for effective climate change-related planning and management contributing to SDG 13. The overall reduction in CO2 emission reductions is calculated as follows:

$$ERy = ((BEb,y - PEp,y) * Up,y - LEp,y)*(1-Xboil)$$

Where:

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

And:

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

Where

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

And:

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

Where:

$BE_{b,y}$	Baseline emissions in baseline scenario b per year y
$PE_{p,y}$	Project emissions in project scenario p per year y
$U_{p,y}$	Usage rate in project scenario p during year y
$LE_{p,y}$	Leakage in project scenario p during year y
X_{boil}	Expressed as a percentage, the portion of premises that in the absence of the project activity would have used non-GHG emitting technologies if they were available in the project boundary

The emissions reductions for the current monitoring period can be found in the corresponding Emission Reductions Calculations spreadsheet.

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

>>

Detailed calculations are provided in the corresponding Emission Reductions Calculations in the 'SDG Calculations' Sheet.

VPA 190/GS 7456:

VPA 190/ GS 7456		
SDG	**Calculation**	**Net Benefit**
SDG 3	$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$ $P_{safe} =$ 2516 * (1- 0.0182) * (1-0.0455) = 2358	2358 additional people consuming safe water in the project activity.
SDG 5	$TR_y = (T_{b,y} - T_{p,y}) / T_{b,y}$ $TR_y = (1.08 - 0.48) / 1.08 = 56\%$	0.6 hours (56%) decrease in the time spent collecting water per day as a result of the project
SDG 6	$P_{access} = P_y * (1 - C_j) * U_{p,y}$ $P_{access} = 2516 * (1- 0.0182) * 1 = 2470$	2470 additional people with access to safe water in the project activity

SDG 13: Emission Reductions - 16/08/2019 - 15/08/20

2019 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	79
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	71
Suppressed Demand Assessment			

Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**ERy**	**tCO2/y**	**69**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**69**

2020 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	947
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	852
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**Ery**	**tCO2/y**	**836**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**836**

Total Capped ERs	
Emissions Reductions	
2019	**69**
2020	**836**
Total ERs for MP1	**905**

VPA 191/GS 7457:

VPA 191/ GS 7457		
SDG	**Calculation**	**Net Benefit**
SDG 3	$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$ P_{safe} = 2519 * (1- 0.0182) * (1-0.0455) = 2361	2361 additional people consuming safe water in the project activity.
SDG 5	$TR_y = (T_{b,y} - T_{p,y}) / T_{b,y}$ TRy= (1.08 – 0.48) / 1.08 = 56%	0.6 hours (56%) decrease in the time spent collecting water per day as a result of the project
SDG 6	$P_{access} = P_y * (1 - C_j) * U_{p,y}$ P_{access} = 2519 * (1- 0.0182) * 1 = 2473	2473 additional people with access to safe water in the project activity

SDG 13: Emission Reductions - 16/08/2019 - 15/08/20

2019 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	131
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	117
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**ERy**	**tCO2/y**	**114**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**114**

2020 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	635
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	571
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**Ery**	**tCO2/y**	**560**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**560**

Total Capped ERs	
Emissions Reductions	
2019	**114**
2020	**560**
Total ERs for MP1	**674**

VPA 192 / GS 7458		
SDG	**Calculation**	**Net Benefit**
SDG 3	$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$ $P_{safe} =$ 2492 * (1- 0.0182) * (1-0.0455) = 2335	2335 additional people consuming safe water in the project activity.
SDG 5	$TR_y = (T_{b,y} - T_{p,y}) / T_{b,y}$ TRy= (1.08 – 0.48) / 1.08 = 56%	0.6 hours (56%) decrease in the time spent collecting water per day as a result of the project
SDG 6	$P_{access} = P_y * (1 - C_j) * U_{p,y}$ P_{access} = 2492 * (1- 0.0182) * 1 = 2447	2447 additional people with access to safe water in the project activity

SDG 13: Emission Reductions - 15/08/2019 – 15/08/20

2019 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	381
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	342
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**ERy**	**tCO2/y**	**335**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**335**

2020 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	1491
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	1341
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**Ery**	**tCO2/y**	**1316**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**1316**

Total Capped ERs	
Emissions Reductions	
2019	**335**
2020	**1316**
Total ERs for MP1	**1651**

VPA 193/GS 7459:

VPA 193 / GS 7459		
SDG	**Calculation**	**Net Benefit**
SDG 3	$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$ $P_{safe} =$ 2564 * (1- 0.0182) * (1-0.0455) = 2403	2403 additional people consuming safe water in the project activity.
SDG 5	$TR_y = (T_{b,y} - T_{p,y}) / T_{b,y}$ TRy= (1.08 – 0.48) / 1.08 = 56%	0.6 hours (56%) decrease in the time spent collecting water per day as a result of the project
SDG 6	$P_{access} = P_y * (1 - C_j) * U_{p,y}$ P_{access} = 2564 * (1- 0.0182) * 1 = 2517	2517 additional people with access to safe water in the project activity

SDG 13: Emission Reductions - 21/09/2019 - 15/08/20

2019 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	27
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	24
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**ERy**	**tCO2/y**	**23**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**23**

2020 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	921
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0

Emission Reductions	Ery	tCO2/y	828
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**Ery**	**tCO2/y**	**813**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**813**

Total Capped ERs	
Emissions Reductions	
2019	**23**
2020	**813**
Total ERs for MP1	**836**

VPA 194/GS 7460:

VPA 194 / GS 7460		
SDG	**Calculation**	**Net Benefit**
SDG 3	$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$ $P_{safe} =$ 2563 * (1- 0.0182) * (1-0.0455) = 2402	2402 additional people consuming safe water in the project activity.
SDG 5	$TR_y = (T_{b,y} - T_{p,y}) / T_{b,y}$ TRy= (1.08 – 0.48) / 1.08 = 56%	0.6 hours (56%) decrease in the time spent collecting water per day as a result of the project
SDG 6	$P_{access} = P_y * (1 - C_j) * U_{p,y}$ P_{access} = 2563 * (1- 0.0182) * 1 = 2516	2516 additional people with access to safe water in the project activity

SDG 13: Emission Reductions - 15/09/2019 - 15/08/20

2019 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	181
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	162
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**ERy**	**tCO2/y**	**159**

Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**159**

2020 Emission Reductions			
Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	938
Project emissions per year	PEp,y	tCO2/y	0
Usage rate	Up,y	fraction	0.9
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	844
Suppressed Demand Assessment			
Percentage of suppressed demand users			98.2%
Percentage of **non**-suppressed demand users	Xboil	Percentage	1.8%
Emission Reductions	**Ery**	**tCO2/y**	**828**
Capped ERs			
Capped Emission Reductions	**ERy**	**tCO2/y**	**828**

Total Capped ERs	
Emissions Reductions	
2019	**159**
2020	**828**
Total ERs for MP1	**987**

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	People consuming safe water GS7456: 158 GS7457: 158 GS7458: 157 GS7459: 161 GS7460: 161	People consuming safe water: GS7456: 2516 GS7457: 2519 GS7458: 2492 GS7459: 2564 GS7460: 2563	Additional people consuming safe water: GS7456: 2358 GS7457: 2361 GS7458: 2335 GS7459: 2403 GS7460: 2402
SDG 5	1.08 hours spent collecting water per day	0.48 hours spent collecting water per day	0.6 hours (56%) decrease in time spent collecting water per day
SDG 6	People with access to safe water: GS7456: 46 GS7457: 46 GS7458: 45 GS7459: 47 GS7460: 47	People with access to safe water: GS7456: 2 2516 GS7457: 2519 GS7458: 2492 GS7459: 2564 GS7460: 2563	Additional people with access to safe water: GS7456: 2470 GS7457: 2473 GS7458: 2447 GS7459: 2517 GS7460: 2516
SDG 13	GS7456: 905 tCO2e GS7457: 674 tCO2e GS7458: 1651 tCO2e GS7459: 836 tCO2e GS7460: 987 tCO2e	GS7456: 0 tCO2e GS7457: 0 tCO2e GS7458: 0 tCO2e GS7459: 0 tCO2e GS7460: 0 tCO2e	Emission Reductions estimate: GS7456: -905 tCO2e GS7457: -674 tCO2e GS7458: -1651 tCO2e GS7459: -836 tCO2e GS7460: 987 tCO2e

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

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 3	GS7456: 2166 GS7457: 2166 GS7458: 2166 GS7459: 2166 GS7460:2166	GS7456: 2358 GS7457: 2361 GS7458: 2335 GS7459: 2403 GS7460: 2402
SDG 5	0.5 hours (22.7%) reduction in time spent collecting water per day	0.6 hours (56%) decrease in time spent collecting water per day
SDG 6	GS7456: 2041 GS7457: 2041 GS7458: 2041 GS7459: 2041 GS7460: 2041	GS7456: 2470 GS7457: 2473 GS7458: 2447 GS7459: 2517 GS7460: 2516
SDG 13	Estimated Emission Reductions of: GS7456: 9,414 tCO2e GS7457: 9,414 tCO2e GS7458: 9,414 tCO2e GS7459: 9,414 tCO2e GS7460: 9,414 tCO2e (Capped tCO2e per 365 day period)	Actual Emission Reductions of: GS7456: 905tCO2e (365 day period) GS7457: 674 tCO2e (365 day period) GS7458: 1651 tCO2e (366 day period) GS7459: 813 tCO2e (329 day period) GS7460: 987 tCO2e (335 day period)

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

SDG impact targets were both exceeded and below. Analysis shows that each contributed positively to the SDG impacts.

SDG 3: Actual values exceed the estimate. All project participants now consume safe water without the need to boil. Participants are now experiencing less illnesses associated with consuming unsafe water.

SDG 5: Actual value below estimate. The combined time spent collecting water decreased by 0.6 hours (56%) per day in the project.

Breakdown of time spent collecting water and firewood in the baseline and annual monitoring results:

Time Spent Collecting Water Analysis		
Baseline Values	Annual Monitoring Values	Time Change
Time Spent Collecting Water (Q15)	Time Spent Collecting Water (Q16)	
1.08hrs	0.48hrs	0.6 hrs decrease

Analysis of the time spent collecting water alone shows a decrease of 0.6 hours following the implementation of the project activity. Between the baseline survey and annual monitoring surveys, there has been a 37% increase in the number of households reported to spend less than 60 minutes collecting water per trip (from 56% to 94%); whilst a 38% reduction in the number of households spending more than 60 minutes collecting water (from 44% to 6%). Therefore, a positive contribution to SDG 5 has been achieved by the project.

SDG 6: Actual value exceeds estimate. Estimates were conservatively based upon a 90% usage rate in the project scenario. However, in the current monitoring period, 100% of households collect their water from the water points rehabilitated as part of the project. As such, all project participants now have access to a reliable safe water source in the project

SDG 13: Actual value below estimate. As this is the first monitoring period, the different dates for borehole rehabilitation had to be taken into account and water quality issues meant boreholes had to be treated so they supplied water in line with Zambian National Standards. The non-functioning days for this has been taken into account in the ERs, combined with the GS BAMG caps applied for user numbers and the WBT which also reduced achieved ERs. As of 22/08/2020 every borehole was verified as delivering safe water to communities who did not have a safe water source prior to the project, with a combined total of 5053 tCO2e achieved. Positive contributions to SDG13 have been achieved.

SECTION F. Stakeholder inputs and legal disputes

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

During this monitoring period, positive comments have been received in the logbooks from community members, sharing their thanks for the boreholes having been fixed.

Examples of the comments received in the logbooks:

1. The water point is working effectively as compared to the time the borehole was drilled.
2. The communities are very happy to drink clean and safe water
3. The communities are saving much time using the borehole than the last time use to draw water from the scoup wells and covering long distance.
4. The time saved is used to do house work, go to church, fast, do farming In time and having funny with friends ect.
5. The raiser pipes used before could produce dirty water with last as to now quality water has been provided throughout rehabilitation.
6. The water point delivered water year around than to deep wells which its season.

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

No Stakeholder feedback or comments were received during previous monitoring period that required follow up action during this monitoring period.

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

N/A