

Gold standard for the global goals
Monitoring report



June 2017, version 1

Title of the project	GS1247 Zoba Anseba Community Safe Water
Gold Standard project id	VPA 122 – GS 5951 VPA 123 – GS 5952 VPA 124 – GS 5953 VPA 125 – GS 5954 VPA 126 – GS 5955
Version number of the monitoring report	Version 4
Completion date of the monitoring report	09/04/2019
Date of project design certification	04/04/2018
Start date of crediting period	GS5951: 03/11/2017 GS5952: 05/11/2017 GS5953: 04/11/2017 GS5954: 31/10/2017 GS5955: 09/11/2017
Duration of this monitoring period	GS5951: (03/11/2017) to (30/11/2018) MP1 GS5952: (05/11/2017) to (30/11/2018) MP1 GS5953: (04/11/2017) to (30/11/2018) MP1 GS5954: (31/10/2017) to (30/11/2018) MP1 GS5955: (09/11/2017) to (30/11/2018) MP1
Duration of previous monitoring period	N/A
Project representative(s)	Ilona Coulson-Ashworth
Host Country	Eritrea
Certification pathway (activity certification/impact certification)	Activity Certification
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.)	GSVER
Selected methodology(ies)	TPDDTEC v.1
Estimated amount of annual average certified SDG impact (as per approved PDD)	1 – SDG 3: 80% decrease in household smoke (All VPAs) 2 - SDG 5: 0.5 hours per household per day saved on firewood collection time (All VPAs) 3 - SDG 6: 17,183 additional people gain access to safe water: GS5951: 3,416 GS5952: 3,475

	GS5953: 3,376 GS5954: 3,472 GS5955: 3,444 4 – SDG 13: 10,000 tCO2e per VPA (All VPAs)
Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	1 – SDG 3: 100% decrease in household smoke (All VPAs) 2 - SDG 5: 0.28 hours per household per day decrease in firewood collection time (All VPAs) 3 - SDG 6: 17,183 additional people gain access to safe water: GS5951: 3,416 GS5952: 3,475 GS5953: 3,376 GS5954: 3,472 GS5955: 3,444 4 – SDG 13: 10,000 tCO2e/y per VPA GS5951: 9,812 GS5952: 9,811 GS5953: 9,766 GS5954: 10,039 GS5955: 10,123

SECTION A. Description of project

A.1. Purpose and general description of project

In Eritrea over 45% of the rural population do not have access to safe water and rely exclusively on unprotected wells, lakes and other open water sources that are highly susceptible to contamination. Annexed from Ethiopia in 1962, the country has experienced periodic conflict and continuing tensions in the region.

Armed conflict, mandatory military service and external migration, takes men away from their villages and means that many rural families are headed by women, often widows. Female headed households in Eritrea face several disadvantages and as a result they cultivate less land and have fewer assets. These women then bear the burden of producing food as well as providing care for their families, including travelling to collect firewood and water.

Many existing boreholes in Eritrea have fallen into disrepair because maintenance programmes have been poorly managed, or proven too expensive leaving people without access to clean water. CO2balance's project partner Vita has worked to identify broken down boreholes, renovate them and supply a maintenance programme to ensure that clean, safe water is delivered as a result of this project. The boreholes included under the project are entirely human operated and fitted with hand pump models that are commonly used in the area such as Afridev, U3 Modified and India Mark II pumps.

Zoba Anseba is a largely rural district in which many 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 which can be avoided if a technology that does not require fuel (wood or fossil) supplies clean water desired by households. By providing safe water this project ensures that households consume less firewood during the process of water purification and therefore reduce greenhouse gas emissions from the combustion process. In total 42 boreholes were rehabilitated as part of this project between the 30th October 2017 and 21st December 2017. The date, location and number of people served by each borehole are given in the table below, which forms the project database:

VPA ID	GS ID	Borehole ID	Village name	Date of rehab	Latitude	Longitude	Number of People
122	5951	ZA002	Etharewyatat	02/11/2017	16.26033	38.40542	278
122	5951	ZA003	Kedhat	03/11/2017	16.17030	38.42163	371
122	5951	ZA012	Balwa	10/11/2017	15.67374	38.69865	621
122	5951	ZA017	Aditafla	17/11/2017	15.61317	38.62729	228
122	5951	ZA020	Bekushemnuk	18/11/2017	15.59462	38.64577	206
122	5951	ZA021	Wasdemba 1	21/11/2017	15.65963	38.57862	243
122	5951	ZA035	Kush	08/12/2017	16.14950	38.05349	281
122	5951	ZA037	Orota	12/12/2017	16.17624	37.95590	499
122	5951	ZA039	Shirara 2	16/12/2017	15.81786	38.86357	338
122	5951	ZA041	Weledteshim	19/12/2017	16.15750	38.07294	351
123	5952	ZA005	Karibosa	04/11/2017	15.80716	38.38365	222
123	5952	ZA010	Jertem	09/11/2017	15.68129	38.61430	337
123	5952	ZA027	Ghergher	26/11/2017	15.77427	38.68305	881

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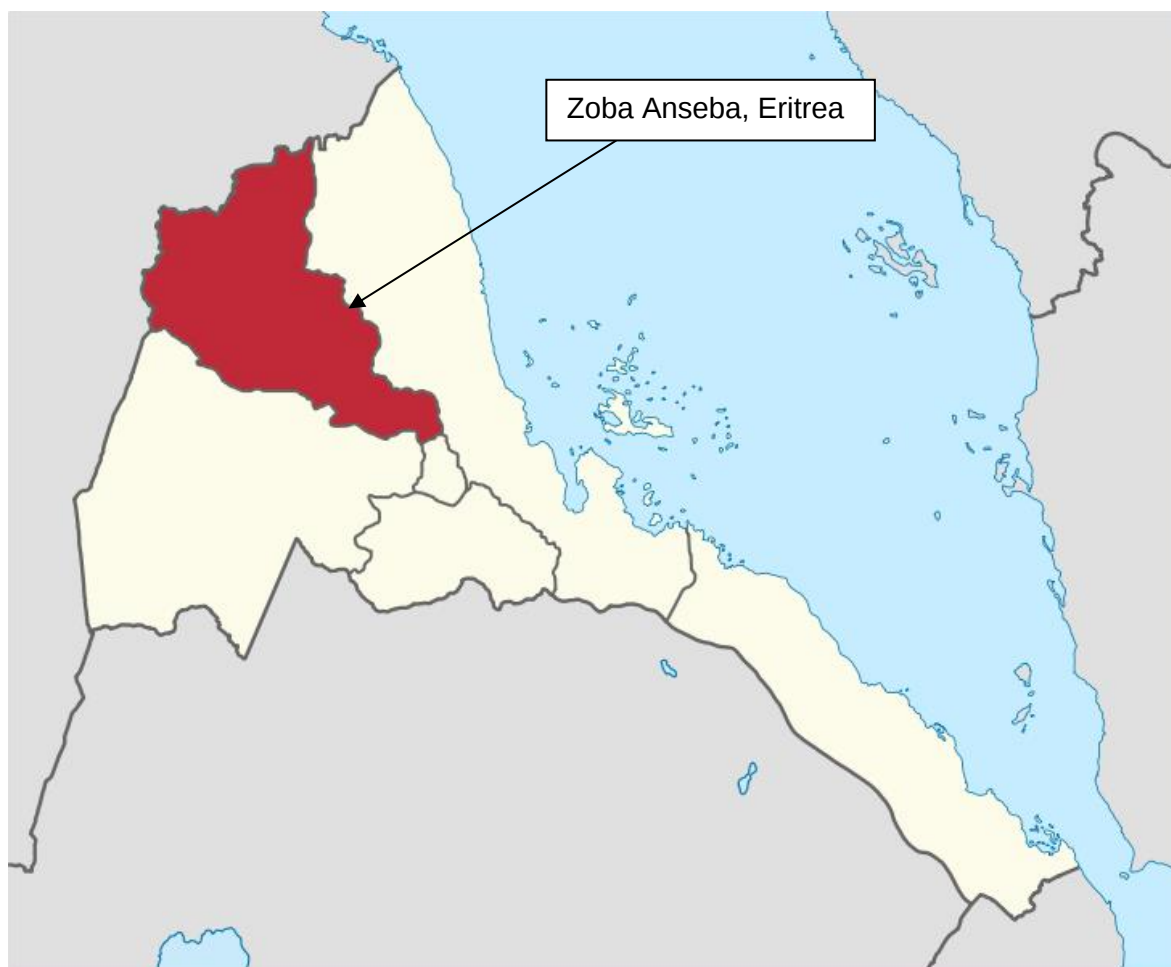
123	5952	ZA030	Deghedeg	28/11/2017	15.58268	38.77090	106
123	5952	ZA031	Glass	30/11/2017	15.71860	38.31357	270
123	5952	ZA033	Asmat	08/12/2017	16.15725	38.07292	959
123	5952	ZA038	Shirara 1	16/12/2017	15.81800	38.86359	356
123	5952	ZA042	Dighi	21/12/2017	15.75369	38.48991	344
124	5953	ZA004	Guluy	03/11/2017	16.19030	38.41542	205
124	5953	ZA006	Robto	07/11/2017	15.74029	38.66324	174
124	5953	ZA007	Garalebu	07/11/2017	15.73062	38.67674	118
124	5953	ZA009	Jemberek	08/11/2017	15.75284	38.66217	207
124	5953	ZA015	Hamrehamareb 1	17/11/2017	15.62318	38.62206	1320
124	5953	ZA019	Firkutu	18/11/2017	15.628	38.65469	289
124	5953	ZA029	Marat	27/11/2017	15.86812	38.67113	288
124	5953	ZA036	Embelday	09/12/2017	16.35044	37.96735	215
124	5953	ZA040	Shindwa	18/12/2017	15.61528	38.71335	560
125	5954	ZA001	Hashela	30/10/2017	15.76470	38.48162	234
125	5954	ZA013	Haddishadi 1	11/11/2017	15.64937	38.57620	832
125	5954	ZA018	Tuumkofa	17/11/2017	15.62773	38.62445	291
125	5954	ZA024	Iratahtai 2	22/11/2017	15.6922	38.73472	208
125	5954	ZA025	Hashishay 1	24/11/2017	15.78612	38.14242	417
125	5954	ZA028	Gherbet	27/11/2017	15.83531	38.74289	497
125	5954	ZA032	Golagul	05/12/2017	15.57881	38.79442	573
125	5954	ZA034	Hawish	08/12/2017	16.19937	38.06788	420
126	5955	ZA008	Adkom	08/11/2017	15.75306	38.64642	441
126	5955	ZA011	Habrenkeka	09/11/2017	15.64808	38.70981	230
126	5955	ZA014	Haddishadi 2	13/11/2017	15.64992	38.62321	524
126	5955	ZA016	Hamrehamareb 2	17/11/2017	15.62401	38.62231	1318
126	5955	ZA022	Wasdemba 2	21/11/2017	15.66615	38.57717	276
126	5955	ZA023	Iratahtai 1	22/11/2017	15.69231	38.73512	220
126	5955	ZA026	Hashishay 2	24/11/2017	15.78612	38.14242	435

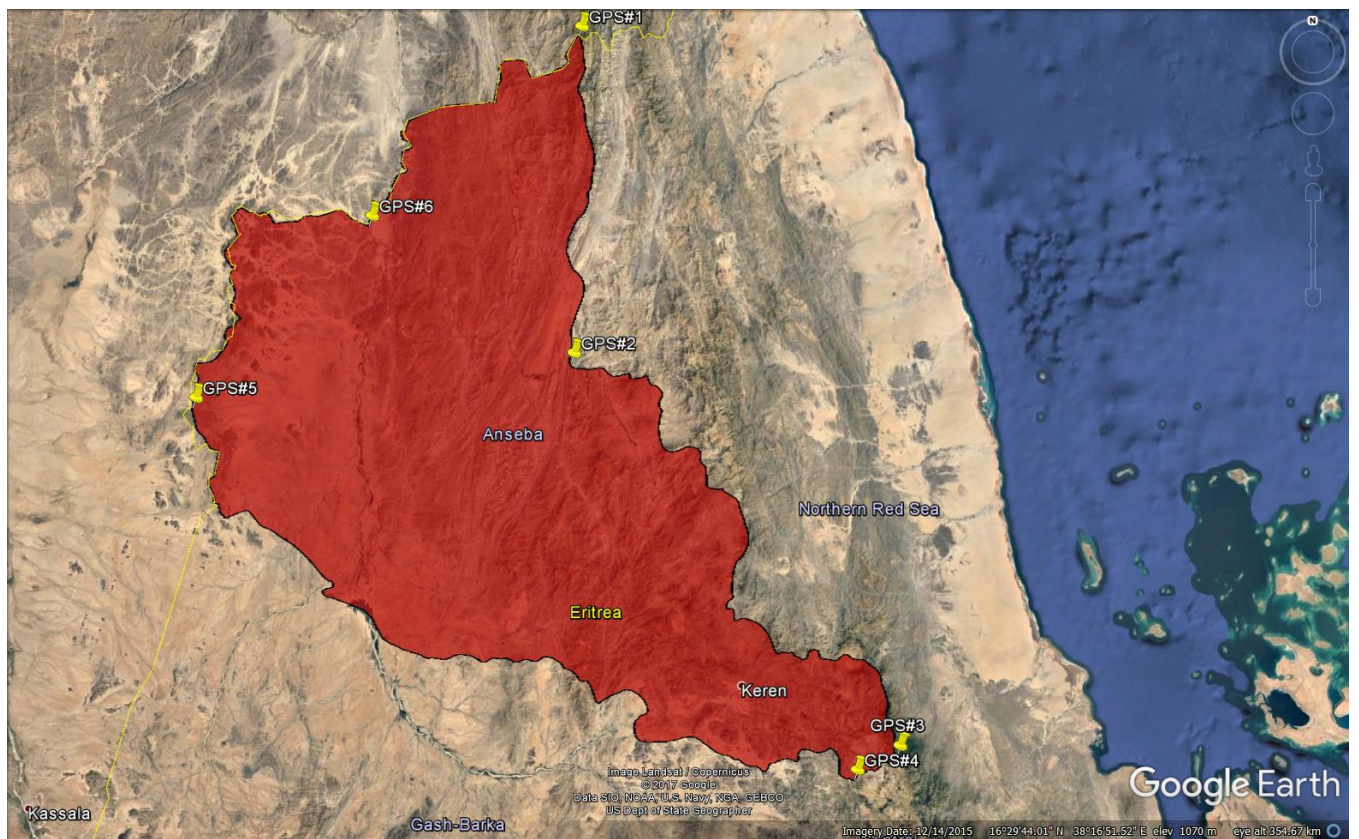
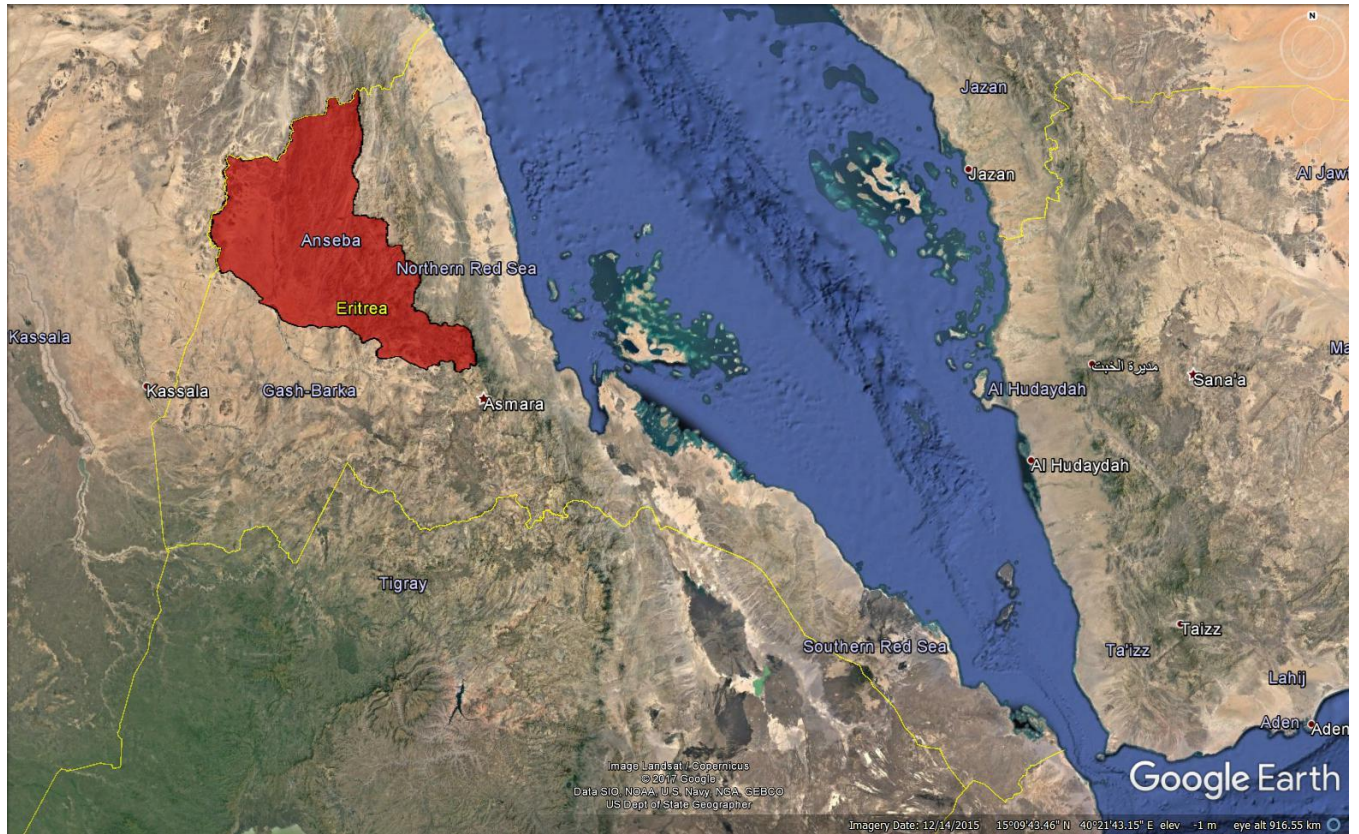
The date of rehabilitation was confirmed by a Repair Confirmation Form which was signed by the mechanic carrying out the repair along with a village administrator from the local community. The date of rehabilitation was used as the start date of operation and crediting for each borehole; we have conservatively 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 totaled to give the total number of project technology days for this monitoring period.

A.2. Location of project

Below is the geographic reference to allow unique identification of the project boundary for the project. The district Zoba Anseba, Eritrea is marked in red on the Google Earth images. 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 woodfuel collection area and target area are considered the same.





Project Area Coordinates		
	Latitude	Longitude
GPS1	17°33'14.79"N	38° 0'28.27"E
GPS2	16°39'54.06"N	37°58'31.30"E
GPS3	15°35'2.36"N	38°53'15.55"E
GPS4	15°31'10.73"N	38°45'57.03"E
GPS5	16°33'6.39"N	36°53'18.85"E
GPS6	17° 2'46.75"N	37°23'56.05"E

A.3. Reference of applied methodology

This project utilises the Gold Standard Methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption V.01'.

A.4. Crediting period of project

The date of rehabilitation was used as the start date 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 length of the crediting period is to be 7 years, twice renewable totaling 21 years as per the approved PDD.

Please find the start dates for the projects below (crediting period begins the following day):

Project ID	Start Date	Crediting period start date
5951	02/11/2017	03/11/2017
5952	04/11/2017	05/11/2017
5953	03/11/2017	04/11/2017
5954	30/10/2017	31/10/2017
5955	08/11/2017	09/11/2017

SECTION B. Implementation of project

B.1. Description of implemented project

Vita has rehabilitated 42 boreholes as part of these projects and all boreholes under the VPAs are in good working order and have been crediting since the beginning of their crediting period. All boreholes undergo annual water quality testing to ensure the water is safe for human consumption as per national water standards. The water quality is approved by the Ministry of Land, Water and Environment in Zoba Anseba.

Furthermore, grievance expression process books placed at all boreholes have not received any feedback and Vita field staff have not received any feedback during this monitoring period from the borehole users on damage or breaking of boreholes therefore it can be assumed that the project is running as planned.

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

N/A

B.2.2. Corrections

N/A

B.2.3. Changes to start date of crediting period

N/A

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

N/A

B.2.5. Changes to project design of approved project

N/A

SECTION C. Description of monitoring system applied by the project

All surveys are administered by trained staff 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 ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in the Eritrean office and are available scanned upon request of the UK team.

In accordance with the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, the survey samples are randomly selected from the borehole user record and are determined in accordance with the required confidence/precision. The size of the sample is dependent on the methodological requirements and variance of the parameter being monitored to ensure the parameters measured satisfy 90/10 precision (90% confidence interval and 10% margin of error). The sample is reselected for every monitoring period to ensure the selection remains random.

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

Borehole database

The borehole installation/rehabilitation record includes the following information:

- Date of installation/rehabilitation
- Quantity of boreholes installed
- The total number of people obtaining their water from each borehole

The total number of households using each borehole has been determined through the lists supplied by the community group and or district water officer responsible for that borehole. Using this method, the total number of people using each borehole has been determined 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 $Q_{p,y}$ and $Q_{p,rawboil,y}$) - Completed prior to first verification and then biennially after first verification
- **Quality of the treated water** - The quality of the treated water will be assessed to ensure that it is fit for human consumption. The parameters used to assess the water quality will be in line with Eritrean standards for potable water and all parameters will be shown to be within levels considered acceptable for domestic human consumption.
- **Usage Survey** - As all boreholes have been installed within 1 year of the start of the crediting period and are expected to last the lifetime of the project, minimum samples of 30 for different aged technologies will not be necessary. Therefore the annual usage survey will be conducted using a minimum sample size of 100. The results from the usage survey are used to determine the proportion of beneficiaries that use the borehole which is factored into the emission reduction calculations.
- **Project Survey** – Conducted on 100 households, surveying end users currently using project technologies to explore changes in project scenario over time. 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.
- **Leakage** - The PDD has described which sources of leakage detailed within the methodology are relevant to this project and which have been discounted.

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.

Cross Sampling

The project proponent has elected to cross-sample technologies across all its homogenous borehole VPAs located within Zoba Anseba (GS 5951-55). The samples for the survey listed 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. Cross sampling will be applied to the following surveys;

- Project Surveys- Completed annually,
- Usage Surveys- Completed annually,
- Water Consumption Field Tests- Completed biennially

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), SDG 6 (Safe Water and Sanitation)
Data/parameter:	C_j
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)	0.00%
Choice of data or measurement methods and procedures	The portion of safe water users is determined through the baseline project survey and refers to the number of users that already use safe water from water sources such as boreholes. Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions and SDG 6 impact.
Additional comments	-

Relevant SDG Indicator	SDG 13 (Climate Action)
Data/parameter:	EF_{b,CO_2}
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 ₂ e/TJ																							
Description	Non-CO ₂ (CH ₄ and N ₂ O) emission factor arising from use of wood fuel in baseline scenario																							
Source of data	Default emissions factor: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14 Global Warming Potential: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14																							
Value(s) applied)	8.692																							
Choice of data or measurement methods and procedures	Deemed valid by Methodology <table border="1"> <thead> <tr> <th></th><th>Default Emissions factor (kg_{gas}/TJ_{NCV})</th><th>GWP of gas</th><th>Default Emissions factor (kg_{CO₂e}/TJ_{NCV})</th><th>Default Emissions factor (t_{CO₂e}/TJ_{NCV})</th></tr> </thead> <tbody> <tr> <td>CH₄</td><td>300</td><td>25</td><td>7,500</td><td>7.5000</td></tr> <tr> <td>N₂O</td><td>4</td><td>298</td><td>1,192</td><td>1.1920</td></tr> <tr> <td></td><td></td><td></td><td>Total</td><td>8.692</td></tr> </tbody> </table>					Default Emissions factor (kg _{gas} /TJ _{NCV})	GWP of gas	Default Emissions factor (kg _{CO₂e} /TJ _{NCV})	Default Emissions factor (t _{CO₂e} /TJ _{NCV})	CH ₄	300	25	7,500	7.5000	N ₂ O	4	298	1,192	1.1920				Total	8.692
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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}																							
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Value(s) applied)	8.692																							
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			Total	8.692																				
Purpose of data	Calculation of emission reductions.																							
Additional comments	-																							

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	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf Table 1.2			
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	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf Table 1.2
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:	$f_{NRB,i,y}$
Unit	Fractional non-renewability
Description	Non-renewability status of woody biomass fuel in scenario i during year y
Source of data	CDM Default stated in following document: https://cdm.unfccc.int/Panels/ssc_wg/meetings/037/ssc_37_an14.pdf
Value(s) applied)	0.97
Choice of data or measurement methods and procedures	Default values of fraction of non-renewable biomass as outlined by the UNFCCC CDM.
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)	0.000577
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: <i>Technologies and Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
Purpose of data	Calculation of emission reductions and impact on SDG 3.
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)	0.000577
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: <i>Technologies and Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
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)	2%

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, 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	Baseline time spent collecting firewood per household per day
Source of data	Baseline survey
Value(s) applied)	2.26
Choice of data or measurement methods and procedures	Established through questions in the baseline on a representative sample of the end users.
Purpose of data	To measure the % decrease in hours spent collecting firewood, a responsibility falling disproportionately on women, as an indicator of reduced time poverty of women. For SDG 5 target.
Additional comments	-

Relevant SDG Indicator	SDG 3 (Good Health and Well-Being)
Data/parameter:	$P_{b,y}$
Unit	Kg/household
Description	Quantity of fuel that is consumed in the baseline scenario b during year y (kg/household-day)
Source of data	Baseline Survey
Value(s) applied)	4.328
Choice of data or measurement methods and procedures	Baseline Water Boiling Test Result.
Purpose of data	Calculating quantity of fuel used in the baseline scenario.
Additional comments	-

D.2. Data and parameters monitored

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	N/A
Source of data	Borehole Project Database
Value(s) of monitored parameter	GS5951: 1,264,371 GS5952: 1,264,368 GS5953: 1,258,522 GS5954: 1,293,577 GS5955: 1,304,488
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:	N/A
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 13 (Climate Action), SDG 6 (Safe Water and Sanitation)
Data/parameter:	$U_{p,y}$
Unit	Percentage
Description	Usage rate in project scenario p through year y
Measured/calculated/default	N/A
Source of data	Usage Survey
Value(s) of monitored parameter	100%
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:	N/A
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	7.5
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	7.5
Monitoring equipment	WCFT Survey
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. 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:	N/A
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	N/A
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	0
Monitoring equipment	WCFT Survey
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 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:	N/A
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 13 (Climate Action)
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	N/A
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	0
Monitoring equipment	WCFT Survey
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 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:	N/A
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 national standards
Description	Performance of the treatment technology
Measured/calculated/default	N/A
Source of data	Laboratory Tests
Value(s) of monitored parameter	Pass

Monitoring equipment	Laboratory equipment
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	The Water Resource Department from the Ministry of Land, Water & Environment has certified each water supply as in line with national standards.
QA/QC procedures:	N/A
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	0
Source of data	Baseline and Monitoring surveys
Value(s) of monitored parameter	0
Monitoring equipment	Desk based research
Measuring/reading/recording frequency:	Biennial
Calculation method (if applicable):	Assessed every two years using baseline and monitoring surveys.
QA/QC procedures:	N/A
Purpose of data:	Calculation of leakage.
Additional comments:	-

Relevant SDG Indicator	SDG 5 (Gender Equality)
Data/parameter:	T _{p,y}
Unit	hours
Description	Project time spent collecting firewood per household per day (hours)
Measured/calculated/default	0
Source of data	Project Survey
Value(s) of monitored parameter	1.98
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual

Calculation method (if applicable):	Assessed every year using Project Survey
QA/QC procedures:	N/A
Purpose of data:	Calculation of SDG 5.
Additional comments:	-

Relevant SDG Indicator	SDG 5 (Gender Equality)
Data/parameter:	TR _y
Unit	percentage
Description	Total reduction in time spent collecting firewood for project activity in year y (hours)
Measured/calculated/default	0
Source of data	Project Survey and baseline survey.
Value(s) of monitored parameter	0.28
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey. Calculate the average amount of time spent collecting firewood in the project scenario and compare to the pre-project scenario
QA/QC procedures:	N/A
Purpose of data:	To quantify whether the project has contributed to a reduction in the amount of time spent collecting firewood compared to the pre-project scenario towards SDG 5 target.
Additional comments:	-

Relevant SDG Indicator	SDG 3 (Good Health and Well-Being)
Data/parameter:	HARP _y
Unit	percentage
Description	Total reduction in Household Air Pollution for project activity in year y (%)
Measured/calculated/default	0
Source of data	Project Survey and baseline survey
Value(s) of monitored parameter	100%
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual

Calculation method (if applicable):	Review the number of people using the borehole according to the household lists for each VPA and multiply by the usage rate to calculate the number of people now using a safe water source in order to calculate the amount of biomass that would have been burnt to purify the water in the baseline scenario. Deduct from this any individuals that still boil water in the project scenario.
QA/QC procedures:	N/A
Purpose of data:	To calculate the additional number of persons who have access to safe water in the project activity compared to the baseline scenario and to calculate from that the percentage decrease in biomass used to purify water through boiling for SDG 3 target.
Additional comments:	-

Relevant SDG Indicator	SDG 3 (Good Health and Well-Being)
Data/parameter:	Pp,y
Unit	Kg/household
Description	Quantity of fuel that is consumed in the project scenario p during year y (kg/household-day)
Measured/calculated/default	0
Source of data	Baseline and Project Surveys
Value(s) of monitored parameter	0
Monitoring equipment	Baseline Water Boiling Test
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using usage survey determining the number of people boiling water in the project scenario.
QA/QC procedures:	N/A
Purpose of data:	Calculation of SDG 3
Additional comments:	-

Relevant SDG Indicator	SDG 6 (Clean Water and Sanitation)
Data/parameter:	P _{access}
Unit	Number of people
Description	Number of additional persons having access to safe water in the project activity compared to the baseline scenario
Measured/calculated/default	0
Source of data	Project Survey and baseline survey

Value(s) of monitored parameter	GS5951: 3,416 GS5952: 3,475 GS5953: 3,376 GS5954: 3,472 GS5955: 3,444
Monitoring equipment	Project Survey, Usage Survey and Household list
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey, Usage Survey and Household list. Review the number of people using the borehole according to the household lists for each VPA and multiply by the usage rate to calculate the number of people now using a safe water source.
QA/QC procedures:	N/A
Purpose of data:	To calculate the additional number of persons having access to safe water in the project activity compared to the baseline scenario for SDG 6 target.
Additional comments:	-

Relevant SDG Indicator	SDG 6 (Clean Water and Sanitation)
Data/parameter:	P,y
Unit	Number of people
Description	Number of persons having access to safe water in the project activity
Measured/calculated/default	0
Source of data	Project Survey and Usage Survey
Value(s) of monitored parameter	GS5951: 3,416 GS5952: 3,475 GS5953: 3,376 GS5954: 3,472 GS5955: 3,444
Monitoring equipment	Project Survey, Usage Survey and 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:	N/A
Purpose of data:	Calculation of SDG 6
Additional comments:	-

D.3. Implementation of sampling plan

For the surveys, households were selected at random from the household lists. First, the hand pumps were randomly selected for monitoring; secondly, households served by those hand pumps were randomly selected for surveying.

Sample sizes were chosen to meet the minimum requirements set in the methodology requirements.

8.2 Water Consumption Field Test

The Water Consumption Field Test was carried out on a randomly selected sample of 40 households from the borehole user list. 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. Between 2-3 staff carried out the test over a period of four days (1 day preparation and 3 days measurement) following a similar method as the Kitchen Performance Test, and all tests were conducted between 06/11/2018 – 09/11/2018. 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 11.05 litres of non boiled clean water used only for drinking, hand washing and food preparation (capped at 7.5l) 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 (7.5l), minus the average amount of boiled clean water consumed per person per day (0).

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.

The first usage surveys in this monitoring period were carried out by field staff between the 01/11/2018 - 08/11/2018. 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 Vita.

Project Survey Analysis

Project surveys were conducted by 2-3 staff between 01/11/2018 – 08/11/2018 on 100 randomly selected households from across the homogenous VPAs in Zoba Anseba 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.

SECTION E. Calculation of SDG outcomes

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

Details of equations used to estimate baseline values for SDG outcomes appear below. Calculation is provided in the corresponding Emission Reductions calculations in the 'SDG Calculations' Sheet.

Outcomes for SDG 3 (Good Health and Wellbeing):

Providing access to safe water and removing the need to boil, reduces the amount of non-renewable biomass burned. Therefore, the amount of safe water provided can be taken as a proxy indicator of how these VPAs contribute towards the SDG 3 target of substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.

The quantity of biomass used in the baseline is calculated as follows:

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

Where:

$P_{b,y}$	Quantity of fuel that is consumed in the baseline scenario b during year y (kg/household-day)
$W_{b,y}$	Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representative of baseline scenario b during year y
$Q_{p,y}$	Quantity of safe water supplied in the project scenario p during year y, using the "zero or low" emissions' clean water supply technology

Outcome for SDG 5 (Gender Equality):

The average time spent gathering firewood ($T_{b,y}$) per household in hours will be taken as a proxy contribution towards the SDG target. The baseline parameter for time spent collecting firewood per household per day is monitored in the baseline project survey.

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. The baseline parameter for this SDG includes C_j which is the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it (expressed as a percentage).

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

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.

Outcomes for SDG 3 (Good Health and Wellbeing):

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Providing access to safe water and removing the need to boil, reduces the amount of non-renewable biomass burned. Therefore, the amount of safe water provided can be taken as a proxy indicator of how these VPAs contribute towards the SDG 3 target of substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. Calculations are as follows:

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

Where:

$HAPR_y$ Total reduction in Household Air Pollution for project activity in year y (%)

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

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

$U_{p,y}$ Usage rate in project scenario p during year y

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

Where :

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

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

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

Where :

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

$Q_{p, \text{cleanboil}, y}$ Quantity of safe water boiled in the project scenario p during year y, after installation of the project technology

Outcome for SDG 5 (Gender Equality):

The overall reduction in time spent collecting firewood in the project activity is calculated as follows:

$$TR_y = T_{b,y} - T_{p,y}$$

Where:

TR_y Total reduction time spent collecting firewood for project activity in year y (hours)

$T_{b,y}$ Baseline time spent collecting firewood per household per day (hours)

$T_{p,y}$ Project time spent collecting firewood 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

Outcome 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 emissions reductions for the current monitoring period can be found in the corresponding Emission reductions excel document.

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):

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

$$\text{All VPAs: } ((4.328-0)/4.328) * 1 = 100\%$$

SDG 5 (Gender Equality):

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

$$\text{All VPAs: } 2.26-1.98 = 0.28$$

SDG 6 (Clean Water and Sanitation):

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

$$\text{GS5951: } 3416 * (1-0) * 1 = 3,416$$

$$\text{GS5952: } 3475 * (1-0) * 1 = 3,475$$

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GS5953: $3376 * (1-0) * 1 = 3,376$

GS5954: $3472 * (1-0) * 1 = 3,472$

GS5955: $3444 * (1-0) * 1 = 3,444$

SDG 13 (Climate Action):

Emission Reductions Calculations per VPA:

GS5951:

Emission Reductions by Vintage-Capped		
Year	MP1	Capped Ers
2017	957	957
2018	8855	8855
Total	9812	9812

GS5952:

Emission Reductions by Vintage-Capped		
Year	MP1	Capped Ers
2017	803	803
2018	9008	9008
Total	9811	9811

GS5953:

Emission Reductions by Vintage-Capped		
Year	MP1	Capped Ers
2017	1015	1015
2018	8751	8751
Total	9766	9766

GS5954:

Emission Reductions by Vintage-Capped		
Year	MP1	Capped Ers
2017	1038	1038
2018	9001	9001
Total	10039	10039

GS5955:

Emission Reductions by Vintage-Capped		
Year	MP1	Capped Ers
2017	1196	1196
2018	8927	8927
Total	10123	10123

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	0% reduction in exposure to Household Air Pollution due to boiling water	80% reduction in exposure to Household Air Pollution due to no longer boiling water	80% additional reduction in exposure to Household Air Pollution due to no longer boiling water
SDG 5	2.26 hours spent collecting firewood per household per day	1.98 hours spent collecting firewood per household per day	0.28 hours decrease in time spent collecting firewood
SDG 6	0 people with access to safe water	People with access to safe water: GS5951: 3,416 GS5952: 3,475 GS5953: 3,376 GS5954: 3,472 GS5955: 3,444	Additional people with access to safe water: GS5951: 3,416 GS5952: 3,475 GS5953: 3,376 GS5954: 3,472 GS5955: 3,444
SDG 13	GS5951: 9,812 tCO ₂ -e GS5952: 9,811 tCO ₂ -e GS5953: 9,766 tCO ₂ -e GS5954: 10,039 tCO ₂ -e GS5955: 10,123 tCO ₂ -e	GS5951: 0 tCO ₂ -e/y GS5952: 0 tCO ₂ -e/y GS5953: 0 tCO ₂ -e/y GS5954: 0 tCO ₂ -e/y GS5955: 0 tCO ₂ -e/y	GS5951: 9,812 tCO ₂ -e GS5952: 9,811 tCO ₂ -e GS5953: 9,766 tCO ₂ -e GS5954: 10,039 tCO ₂ -e GS5955: 10,123 tCO ₂ -e

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

Ex-ante estimates can be found in the transition annex for these projects as the project began prior to the transition to Gold Standard for the Global Goals.

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 3	80% reduction in exposure to Household Air Pollution due to boiling water	100% reduction in exposure to Household Air Pollution due to boiling water
SDG 5	at least 0.5 hours per trip per household time saved	Time spent collecting firewood has decreased during this monitoring period by 0.28 hours
SDG 6	Number of additional persons with access to safe water: GS5951: 3,416 GS5952: 3,475 GS5953: 3,376 GS5954: 3,472 GS5955: 3,444	Actual persons with access to safe water: GS5951: 3,416 GS5952: 3,475 GS5953: 3,376 GS5954: 3,472 GS5955: 3,444
SDG 13	Ex-ante Emission Reductions of 10,767 tCO ₂ e/y	Actual Emission Reductions of: GS5951: 9,812 GS5952: 9,811 GS5953: 9,766 GS5954: 10,039 GS5955: 10,123

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

These projects were design certified prior to transition to Gold Standard for the Global Goals, hence all ex-ante estimates of SDG outcomes are derived from the relevant transition annex. All SDG targets were either met or exceeded and had positive SDG impacts.

For SDG 3, in the project scenario there was a 100% reduction in exposure to Household Air pollution arising from smoke emitted from boiling water. This is due to no one boiling the borehole water in the project because it is safe for human consumption as determined by annual water quality tests. This not only frees up time spent previously boiling water but also reduces the negative health implications of smoke related illnesses which are disproportionately suffered by women and children. This impacts positively towards SDG 3 good health and wellbeing.

Time spent collecting firewood reduced by 0.45 hours (27 mins) in the project. This presents a 0.28 hour reduction in time spent collecting firewood compared to the baseline and is close to the ex-ante estimate of 0.5 hours' time saving. It may have not met the target due to participants recording in the project survey travelling further to collect wood due to local deforestation and wood resource depletion. The project still presents a time saving for participants and impacts positively to SDG 5 gender equality.

All project participants now have access to safe water in the project. In the baseline, all participants collected water from unsafe sources such as rivers, streams and open wells, and had to boil their water

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in order to make it safe to drink. In the project, 100% of participants now collect their water from a rehabilitated borehole, no longer requiring them to boil water for purification and positively contributing towards SDG 6 clean water and sanitation.

For SDG 13, the ex-ante estimation was 10,000 emission reductions per year per VPA. However, the number of users per borehole is lower than expected hence there are less than 10,000 tCO₂-e/y per VPA. As an average, the VPAs will generate over 9,000 ERs annually at full capacity due to the lower number of users. Although this does not meet the target of 10,000 tCO₂-e/y, the projects are still achieving a large number of emission reductions during this monitoring period which would not be possible without the project contributing positively to SDG 13 climate action.

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 Stakeholder feedback or comments have been received during this monitoring period.

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

There was no previous monitoring period to this one. No Stakeholder feedback or comments have been received during this monitoring period hence no follow up action has been taken 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