MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

RELATED SUPPORT – **TEMPLATE GUIDE Monitoring Report v. 1.1**

This document contains the following Sections

KEY PROJECT INFORMATION

Programme of Activity Information

GS ID of Programme	1247
Title of Programme	Improved Kitchen Regimes Multi-Country PoA
Version of POA-DD applicable to this monitoring report	Version 4.0
Name and GS ID of fully Validated CPA/VPAs (i.e. non compliance check)	GS1247 VPA 65 Zoba Debub Community Boreholes (GS5038) GS1247 VPA 66 Zoba Debub Community Boreholes (GS5039) GS1247 VPA 67 Zoba Debub Community Boreholes (GS5040) GS1247 VPA 68 Zoba Debub Community Boreholes (GS5041) GS1247 VPA 69 Zoba Debub Community Boreholes (GS5042) GS1247 VPA 70 Zoba Debub Community Boreholes (GS5043) GS1247 VPA 119 Zoba Debub Community Boreholes (GS5825) GS1247 VPA 120 Zoba Debub Community Boreholes (GS5826) GS1247 VPA 121 Zoba Debub Community Boreholes (GS5827) GS1247 VPA 176 Zoba Debub Community Boreholes (GS7330) GS1247 VPA 177 Zoba Debub Community Boreholes (GS7331) GS1247 VPA 178 Zoba Debub Community Boreholes (GS7332) GS1247 VPA 179 Zoba Debub Community Boreholes (GS7333) GS1247 VPA 180 Zoba Debub Community Boreholes (GS7334) GS1247 VPA 181 Zoba Debub Community Boreholes (GS7335) GS1247 VPA 182 Zoba Debub Community Boreholes (GS7336)

Key Project Information

GS ID (s) of Project (s)	GS5038 GS5039 GS5040 GS5041 GS5042 GS5043 GS5825 GS5826 GS5827 GS7330 GS7331 GS7332 GS7333 GS7334 GS7335 GS7336
Title of the project (s) covered by monitoring report	GS1247 VPA 65 Zoba Debub Community Boreholes (GS5038) GS1247 VPA 66 Zoba Debub Community Boreholes (GS5039) GS1247 VPA 67 Zoba Debub Community Boreholes (GS5040) GS1247 VPA 68 Zoba Debub Community Boreholes (GS5041) GS1247 VPA 69 Zoba Debub Community Boreholes (GS5042) GS1247 VPA 70 Zoba Debub Community Boreholes (GS5043) GS1247 VPA 119 Zoba Debub Community Boreholes (GS5825) GS1247 VPA 120 Zoba Debub Community Boreholes (GS5826) GS1247 VPA 121 Zoba Debub Community Boreholes (GS5827) GS1247 VPA 176 Zoba Debub Community Boreholes (GS7330) GS1247 VPA 177 Zoba Debub Community Boreholes (GS7331) GS1247 VPA 178 Zoba Debub Community Boreholes (GS7332) GS1247 VPA 179 Zoba Debub Community Boreholes (GS7333) GS1247 VPA 180 Zoba Debub Community Boreholes (GS7334) GS1247 VPA 181 Zoba Debub Community Boreholes (GS7335) GS1247 VPA 182 Zoba Debub Community Boreholes (GS7336)
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	VPA 65-70 (GS5038-43) – v1.5 VPA 119-121 (GS5825-7) – v4 VPA 176-82 (GS7330-6) – v2
Version number of the monitoring report	Version 5
Completion date of the monitoring report	29/08/2024
Date of project design certification	VPA 65 (GS5038) – not specified VPA 66 (GS5039) – not specified VPA 67 (GS5040) – not specified

	VPA 68 (GS5041) – not specified VPA 69 (GS5042) – not specified VPA 70 (GS5043) – not specified VPA 119 (GS5825) – not specified VPA 120 (GS5826) – not specified VPA 121 (GS5827) – not specified VPA 176 (GS7330) – not specified VPA 177 (GS7331) – not specified VPA 178 (GS7332) – not specified VPA 179 (GS7333) – not specified VPA 180 (GS7334) – not specified VPA 181 (GS7335) – not specified VPA 182 (GS7336) – not specified
Date of Last Annual Report	13/12/2023
Monitoring period number	MP6/MP5 VPA 65 (GS5038) – **MP6** VPA 66 (GS5039) **– MP6** VPA 67 (GS5040) **– MP6** VPA 68 (GS5041) **– MP6** VPA 69 (GS5042) **– MP6** VPA 70 (GS5043) – **MP6** VPA 119 (GS5825) **– MP5** VPA 120 (GS5826) **– MP5** VPA 121 (GS5827) **– MP5** VPA 176 (GS7330) **– MP6** VPA 177 (GS7331) **– MP6** VPA 178 (GS7332) **– MP6** VPA 179 (GS7333) **– MP6** VPA 180 (GS7334) **– MP6** VPA 181 (GS7335) **– MP6** VPA 182 (GS7336) **– MP6**
Duration of this monitoring period	VPA 65 (GS5038) – 01/06/2022 - 20/10/2023 VPA 66 (GS5039) – 01/06/2022 - 20/10/2023 VPA 67 (GS5040) – 01/06/2022 - 20/10/2023 VPA 68 (GS5041) – 01/06/2022 - 22/10/2023 VPA 69 (GS5042) – 01/06/2022 - 25/10/2023 VPA 70 (GS5043) – 01/06/2022 - 21/10/2023 VPA 119 (GS5825) – 01/06/2022 - 17/01/2024 VPA 120 (GS5826) – 01/06/2022 - 17/01/2024 VPA 121 (GS5827) – 01/06/2022 - 17/01/2024 VPA 176 (GS7330) – 01/06/2022 - 28/10/2023 VPA 177 (GS7331) – 01/06/2022 - 03/01/2024 VPA 178 (GS7332) – 01/06/2022 - 17/01/2024 VPA 179 (GS7333) – 01/06/2022 - 17/01/2024 VPA 180 (GS7334) – 01/06/2022 - 17/01/2024 VPA 181 (GS7335) – 01/06/2022 - 25/10/2023

	VPA 182 (GS7336) – 01/06/2022 - 29/12/2023
Project Representative	Johanna Grosssteinbeck Rebecca Barton (CO2balance UK Ltd)
Host Country	State of Eritrea
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	TPDDTEC 1.0
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
SDG3 – Good Health and Well Being	Variation in household smoke (All VPAs)	95% decrease in household smoke (All VPAs)	tCO2e
SDG5 – Gender Equality	Variation of time spent on firewood collection	0.72 hours of time saved by borehole project on average per household per day (All VPAs)	hours
SDG6 – Clean Water and Sanitation	People gain access to safe water	41,226 additional people gain access to safe water VPA breakdown: GS5038: 2,227 GS5039: 2,214 GS5040: 2,272 GS5041: 2,337 GS5042: 2,187 GS5043: 2,076 GS5825: 2,428 GS5826: 2,281 GS5827: 2,637 GS7330: 2,966 GS7331: 2,671 GS7332: 3,258 GS7333: 3,046	people

		GS7334: 2,773 GS7335: 2,845 GS7336: 3,008	
SDG13 – Climate Action	Emission Reductions	Total Emission Reductions: 79,172 tCO2e/y Per VPA: GS5038: 4,108 tCO2e/y GS5039: 4,089 tCO2e/y GS5040: 4,141 tCO2e/y GS5041: 4,014 tCO2e/y GS5042: 3,713 tCO2e/y GS5043: 4,179 tCO2e/y GS5825: 6,529 tCO2e/y GS5826: 6,351 tCO2e/y GS5827: 5,690 tCO2e/y GS7330: 4,648 tCO2e/y GS7331: 4,575 tCO2e/y GS7332: 6,338 tCO2e/y GS7333: 6,303 tCO2e/y GS7334: 5,486 tCO2e/y GS7335: 4,395 tCO2e/y GS7336: 4,613 tCO2e/y	tCO_2e/VERs

Table 2 – Product Vintages

		Amount Achieved
Start Dates	**End Dates**	**VERs (tCO2/y)**
01/06/2022	31/12/2022	GS5038: 1,733 (MP6)
01/06/2022	31/12/2022	GS5039: 1,725 (MP6)
01/06/2022	31/12/2022	GS5040: 1,741 (MP6)
01/06/2022	31/12/2022	GS5041: 1,695 (MP6)
01/06/2022	31/12/2022	GS5042: 1,552 (MP6)
01/06/2022	31/12/2022	GS5043: 1,760 (MP6)
01/06/2022	31/12/2022	GS5825: 2,344 (MP5)
01/06/2022	31/12/2022	GS5826: 2,280 (MP5)
01/06/2022	31/12/2022	GS5827: 2,043 (MP5)
01/06/2022	31/12/2022	GS7330: 1,931 (MP6)
01/06/2022	31/12/2022	GS7331: 1,683 (MP6)
01/06/2022	31/12/2022	GS7332: 2,276 (MP6)
01/06/2022	31/12/2022	GS7333: 2,264 (MP6)
01/06/2022	31/12/2022	GS7334: 1,924 (MP6)
01/06/2022	31/12/2022	GS7335: 1,837 (MP6)
01/06/2022	31/12/2022	GS7336: 1,710 (MP6)
01/01/2023	20/10/2023	GS5038: 2,375 (MP6)
01/01/2023	20/10/2023	GS5039: 2,364 (MP6)
01/01/2023	22/10/2023	GS5040: 2,400 (MP6)
01/01/2023	22/10/2023	GS5041: 2,319 (MP6)
01/01/2023	25/10/2023	GS5042: 2,161 (MP6)

01/01/2023	21/10/2023	GS5043: 2,419 (MP6)
01/01/2023	31/12/2023	GS5825: 4,000 (MP5)
01/01/2023	31/12/2023	GS5826: 3,892 (MP5)
01/01/2023	31/12/2023	GS5827: 3,487 (MP5)
01/01/2023	28/10/2023	GS7330: 2,717 (MP6)
01/01/2023	31/12/2023	GS7331: 2,871 (MP6)
01/01/2023	31/12/2023	GS7332: 3,883 (MP6)
01/01/2023	31/12/2023	GS7333: 3,862 (MP6)
01/01/2023	31/12/2023	GS7334: 3,285 (MP6)
01/01/2023	25/10/2023	GS7335: 2,558 (MP6)
01/01/2023	29/12/2023	GS7336: 2,903 (MP6)
01/01/2024	17/01/2024	GS5825: 185 (MP5)
01/01/2024	17/01/2024	GS5826: 179 (MP5)
01/01/2024	17/01/2024	GS5827: 160 (MP5)
01/01/2024	03/01/2024	GS7331: 21 (MP6)
01/01/2024	17/01/2024	GS7332: 179 (MP6)
01/01/2024	17/01/2024	GS7333: 177 (MP6)
01/01/2024	17/01/2024	GS7334: 277 (MP6)

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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 and 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 Debub 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 87 boreholes were rehabilitated as part of these projects between the 20th October 2016 and 2nd March 2018. The date, location and number of people served by each borehole are given in the table below, which forms the following project database. Please note, the users per borehole have been capped at 400, which have been applied within the emission reduction calculations.

VPA ID	GS ID	Borehole ID	Village	Lat	Long	Rehabilitation Date	No People Capped/Uncapped
65	5038	ZD037	Adiembahsea	14.60234	39.39475	20/10/2016	355 (504)
65	5038	ZD050	Adiferas-Maygoduf	14.73116	39.39709	27/10/2016	371 (530)
65	5038	ZD103	Adideraghudi	14.52234	38.80716	27/12/2016	326 (737)
65	5038	ZD114	Adenfi	14.63129	38.79645	29/01/2017	332
65	5038	ZD138	Adiraghenay	14.52966	38.42865	18/03/2017	242
66	5039	ZD038	Adighubo	14.58613	39.39523	20/10/2016	371 (477)
66	5039	ZD039	Kesadburka	14.60510	39.37565	21/10/2016	232
66	5039	ZD040	Adichoka	14.57931	39.38140	21/10/2016	340 (483)
66	5039	ZD045	Adimenekseyto	14.53146	39.48664	24/10/2016	352
66	5039	ZD101	Endagherghish	14.55700	38.75309	25/12/2016	323 (787)

67	5040	ZD042	Adimighiderbena	14.60044	39.46406	22/10/2016	200
67	5040	ZD044	Adimesraha	14.61916	39.45731	23/10/2016	355 (645)
67	5040	ZD104	Adiguwur	14.52174	38.78847	27/12/2016	336 (450)
67	5040	ZD105	Adibaresom	14.53625	38.71119	28/12/2016	371 (394)
67	5040	ZD110	Kusmodengolo	14.70787	38.84775	24/01/2017	371 (703)
68	5041	ZD043	Adiqelqelmelasa	14.61063	39.47063	22/10/2016	150
68	5041	ZD049	Adiareghen	14.55251	39.34296	26/10/2016	371 (585)
68	5041	ZD102	Himbar	14.56032	38.75577	25/12/2016	336 (697)
68	5041	ZD111	Adihdug	14.58293	38.85257	25/01/2017	371 (528)
68	5041	ZD120	Adighodo	14.77771	39.12907	18/01/2017	331 (500)
69	5042	ZD046	Adigolo-Imbasoyra	14.72127	39.50390	25/10/2016	179
69	5042	ZD051	Adikaribosa-maygoduf	14.72284	39.40948	27/10/2016	163
69	5042	ZD106	Adiguer	14.55558	38.77398	28/12/2016	371 (434)
69	5042	ZD145	Mekabirtsabla	14.53337	38.50480	22/03/2017	371 (699)
69	5042	ZD148	Adihawya	14.55404	38.54628	23/03/2017	371 (828)
70	5043	ZD041	Dibdib	14.63570	39.41110	21/10/2016	321 (500)
70	5043	ZD048	Ambeseteghelebа	14.52690	39.36560	26/10/2016	363
70	5043	ZD109	Adishertai	14.56879	38.67112	04/01/2017	321 (466)
70	5043	ZD123	Haddishadihalai	15.01517	39.30918	27/02/2017	321 (532)
70	5043	ZD151	Adishimandit	14.53306	38.55421	24/03/2017	325
119	5825	ZD162	Adisemharo	14.86439	38.54125	07/05/2017	324 (456)
119	5825	ZD165	Adibelesey	15.02274	38.57111	10/05/2017	371 (564)
119	5825	ZD178	Adilalayadi	14.86234	38.65809	16/05/2017	371 (404)
119	5825	ZD183	Maihans	14.63533	38.79704	10/12/2017	300
119	5825	ZD191	Adiasmeru	14.97780	38.58642	29/12/2017	346
119	5825	ZD199	Adiembarhagoda	14.54391	39.44573	27/01/2018	196
119	5825	ZD204	Embamedhan	14.55520	39.37903	31/01/2018	290
120	5826	ZD158	Adinefas	14.86579	38.42416	04/05/2017	371 (412)
120	5826	ZD167	Aditsetserat	15.02267	38.57102	11/05/2017	371 (451)
120	5826	ZD180	Areza	14.92754	38.56274	17/05/2017	371 (510)
120	5826	ZD189	Dekiwerasi	14.94946	38.61462	27/12/2017	355 (355)
120	5826	ZD190	Adiwesek	14.81237	38.41819	28/12/2017	355 (359)
120	5826	ZD207	Adinedwe	14.56684	39.47941	11/02/2018	315
121	5827	ZD157	Adinefas-Maiaye	14.866 80	38.40997	04/05/2017	331
121	5827	ZD164	Adimomosh-sebea	15.00224	38.57816	09/05/2017	371 (517)
121	5827	ZD176	Adikushet	14.94407	38.66774	15/05/2017	330 (619)
121	5827	ZD192	Adighurdi	14.93222	38.58708	31/12/2017	280

121	5827	ZD201	Adiembakom	14.53887	39.43643	28/01/2018	233
121	5827	ZD211	Damba	14.61719	39.37820	02/03/2018	371 (796)
176	7330	ZD052	Saloda	14.64671	39.46481	28/10/2016	213
176	7330	ZD112	Betghebriel	14.61149	38.87411	26/01/2017	371 (554)
176	7330	ZD127	Dekilefey	14.75073	39.2851	19/02/2017	344 (720)
176	7330	ZD129	Arazn	14.63906	39.25501	22/02/2017	371 (691)
176	7330	ZD135	Adikolakul	14.54717	38.49318	16/03/2017	171
176	7330	ZD140	Maighorzo 1	14.51071	38.42885	19/03/2017	341 (774)
177	7331	ZD108	Kuhulizbi	14.51105	38.63651	03/01/2017	371 (783)
177	7331	ZD119	Adimesghan	14.77644	39.15696	18/01/2017	142
177	7331	ZD139	Adihans	14.53787	38.45353	19/03/2017	371 (865)
177	7331	ZD142	Adihidug	14.54723	38.51401	20/03/2017	323
177	7331	ZD152	Aditsekemete	14.52733	38.55903	25/03/2017	371 (699)
178	7332	ZD115	Dembesilase	14.63725	38.81214	30/01/2017	371 (804)
178	7332	ZD117	Adighad 2	14.79131	39.17464	17/01/2017	367
178	7332	ZD118	Adighad 1	14.79244	39.17344	17/01/2017	333 (824)
178	7332	ZD132	Aditelae	14.75135	39.18513	24/02/2017	371 (682)
178	7332	ZD137	Adiserenta	14.54437	38.49462	17/03/2017	337
178	7332	ZD146	Meztaeshenfae	14.52633	38.49049	22/03/2017	355 (416)
179	7333	ZD121	Adizebe	14.75382	39.13788	26/02/2017	369 (624)
179	7333	ZD122	Adihabenat	14.79504	39.08945	27/02/2017	269
179	7333	ZD130	Wulusho 1	14.63958	39.23034	23/02/2017	371 (618)
179	7333	ZD134	Adimesihal	14.61430	39.37714	06/03/2017	371 (615)
179	7333	ZD136	Endabaynas	14.54377	38.4754	17/03/2017	371 (448)
179	7333	ZD147	Adimerobi	14.57015	38.54163	23/03/2017	371 (633)
180	7334	ZD116	Adilghese	14.67419	38.84986	31/01/2017	371 (707)
180	7334	ZD125	Maichena	14.56999	39.2709	15/02/2017	371 (703)
180	7334	ZD128	Chearegahit	14.77176	39.22009	20/02/2017	371 (387)
180	7334	ZD131	Wulusho 2	14.63845	39.23017	23/02/2017	371 (540)
180	7334	ZD150	Gezaterer	14.53168	38.55079	24/03/2017	371 (582)
181	7335	ZD047	Adimelhidaga	14.72299	39.47275	25/10/2016	361 (510)
181	7335	ZD113	Unagaaben	14.63448	38.86509	27/01/2017	371 (682)
181	7335	ZD124	Ghenetseba	14.83629	39.08263	28/02/2017	371 (621)
181	7335	ZD143	Aditsetser	14.55885	38.51297	21/03/2017	336 (899)
181	7335	ZD144	Adiamine	14.54193	38.51299	22/03/2017	283 (283)
182	7336	ZD107	Adiburkut	14.51480	38.68100	29/12/2016	371 (799)
182	7336	ZD126	Adiflho	14.75765	039.29788	18/02/2017	371 (697)
182	7336	ZD133	Unawelesti	14.50053	39.279	25/02/2017	120

182	7336	ZD141	Maighorzo 2	14.51118	38.42827	20/03/2017	371 (763)
182	7336	ZD149	Adinaamn	14.53102	38.55626	23/03/2017	371 (788)

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 Debub, Eritrea is marked in green 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 in green on the Google Earth images. 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	14.674048°	38.262243°
GPS2	14.912112°	38.222587°
GPS3	15.196781°	38.392505°
GPS4	15.270219°	39.083873°
GPS5	14.841412°	39.670669°
GPS6	14.404751°	39.282490°

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 first crediting period is to be 7 years, twice renewable, totaling 21 years.

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

Project GS ID	Start Date	Crediting period start date	Crediting period end date
5038	20/10/2016	21/10/2016	20/10/2023
5039	20/10/2016	21/10/2016	20/10/2023
5040	22/10/2016	23/10/2016	22/10/2023
5041	22/10/2016	23/10/2016	22/10/2023
5042	25/10/2016	26/10/2016	25/10/2023
5043	21/10/2016	22/10/2016	21/10/2023
5825	07/05/2017	08/05/2017	07/05/2024
5826	04/05/2017	05/05/2017	04/05/2024
5827	04/05/2017	05/05/2017	04/05/2024
7330	28/10/2016	29/10/2016	28/10/2023
7331	03/01/2017	04/01/2017	03/01/2024
7332	17/01/2017	18/01/2017	17/01/2024
7333	23/02/2017	24/02/2017	23/02/2024
7334	31/01/2017	01/02/2017	31/01/2024
7335	25/10/2016	26/10/2016	25/10/2023
7336	29/12/2016	30/12/2016	29/12/2023

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

Vita has rehabilitated 87 boreholes as part of these projects and all water points 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 Debub.

Furthermore, grievance expression process books placed at all water points have received positive feedback during this monitoring period. Other than the maintenance in the table below,Vita field staff have not received any other 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.1.1 Forward Action Requests

N/A

Maintenance dates and details carried out during this monitoring period is shown in the table below.

GS ID	VPA	BH ID	Breakdown Start Date	Breakdown End Date	Days	Description	Action
GS5042	69	ZD106	24/04/2023	26/04/2023	3	Head was broken	Head was replaced
GS7332	178	ZD118	14/01/2023	17/01/2023	4	Rubber was damaged	Rubber was changed

B.2. Post-Design Certification changes

B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

Deviation request, Dev_242, was approved by GS on 13/06/2022, and allows PP to claim for up to 400 users per borehole.

B.2.2. Corrections

https://globalgoals.goldstandard.org/standards/RU_2021_Application-of-TPDDTEC-methodology-to-Safe-water-supply-projects.pdf

The Baseline Water Boiling Test (BWBT) is now quantified by a capped value imposed following the GS BAMG Report. This is now capped at 0.4kg.

Functionality cap imposed relating to the amount of functionality evidence provided:

- 95% if sufficient evidence provided
- 75% if insufficient evidence provided

95% cap imposed on usage rate for this monitoring report.

Update on the fixed default emissions factor $EF_{p,non\ co2}$ in line with the updated AR5 – (https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf). The new value applied is 9.46. Details of the updated calculation can be found in section D.1, in the specific parameter box.

<table>
<tr><td>Relevant SDG Indicator</td><td>SDG 13.B.1 (Climate Action)</td></tr>
<tr><td>Data/parameter:</td><td>$EF_{b,non\ co2}$</td></tr>
<tr><td>Unit</td><td>tCO_2e/TJ</td></tr>
<tr><td>Description</td><td>Non-CO_2 (CH_4 and N_2O) emission factor arising from use of wood fuel in baseline scenario</td></tr>
<tr><td>Source of data</td><td>Default emissions factor: https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_2_Non-CO2_Stationary_Combustion.pdf

1. https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf
2. Global Warming Potential: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14</td></tr>
<tr><td>Value(s) applied)</td><td>9.46</td></tr>
<tr><td>Choice of data or measurement methods and procedures</td><td>Deemed valid by Methodology
<table>
<tr><th>Gas</th><th>Default Emissions factor (kg_gas/TJ_{NCV})</th><th>GWP of gas</th><th>Default Emissions factor (kg_CO_2e/TJ_{NCV})</th><th>Default Emissions factor (t_CO_2e/TJ_{NCV})</th></tr>
<tr><td>CH_4</td><td>300</td><td>28</td><td>8400</td><td>8.4000</td></tr>
<tr><td>N_2O</td><td>4</td><td>265</td><td>1,060</td><td>1.060</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>9.46</td></tr>
</table></td></tr>
<tr><td>Purpose of data</td><td>Calculation of emission reductions.</td></tr>
<tr><td>Additional comments</td><td>This value corresponds with updated AR5 GWP value.

AR5 - https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf</td></tr>
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3. Global Warming Potential: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14</td></tr>
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</table>

B.2.3. Changes to start date of crediting period

N/A

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

There was a Design Change in February 2019 to apply a new bWBT parameter and with the aim of rebundling VPAs with different start dates. The Submission date for the Design Change is dated 27/02/2019, the final GS feedback round, approving the change, is dated 18/06/2019.

B.2.5. Changes to project design of approved project

None that took place during this monitoring period.

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 90/30 precision (90% confidence interval and 30% 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. In line with the deviation request, Dev_242, that was approved by GS on 13/06/2022, a cap of 400 people of less per borehole are counted in the emission reduction calculations.

Ongoing Monitoring Studies

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

- **Water consumption field test** (Equation parameters Qp,y and Qp,rawboil,y) - Completed prior to first verification and then biennially 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 Water Resource Department (part of the Ministry of Land, Water and Environment) follows the WHO guidelines (Guidelines for drinking-water quality: fourth edition incorporating the first addendum. Geneva: World Health Organization; 2017). All parameters will be shown to be within levels considered acceptable for domestic human consumption.

- **Usage Survey** - boreholes have been installed between 20/10/2016 – 02/03/2018 and are expected to last the lifetime of the project, minimum samples of

30 for different aged technologies will be applied. Overall 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 a minimum sample size of 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 Assessment -** The PDD has described which sources of leakage detailed within the methodology are relevant to this project and which have been discounted.

The potential sources of leakage listed in the methodology have been investigated, and addressed below:

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

b) The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.
There is no evidence to suggest significant (if any) use of renewable energy for purifying water in the project region as found in the Baseline Water Surveys. 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.

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.

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 Debub (GS 5038-43; 5825-27; 7330-36). 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 every two years

SECTION D. DATA AND PARAMETERS

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

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 6.1.1 (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 though 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
Additional comments	-

Relevant SDG Indicator	SDG 13.B.1 (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.B.1 (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	Default emissions factor: https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_2_Non-CO2_Stationary_Combustion.pdf 3. https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf 4. Global Warming Potential: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14
Value(s) applied)	9.46
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	28	8400	8.4000
N_2O	4	265	1,060	1.060
			Total	**9.46**

Purpose of data	Calculation of emission reductions.
Additional comments	This value corresponds with updated AR5 GWP value. AR5 - https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf

Relevant SDG Indicator	SDG 13.B.1 (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.B.1 (Climate Action)
Data/parameter:	$EFp_{,non\ co2}$
Unit	tCO_2e/TJ
Description	Non-CO_2 (CH_4 and N_2O) emission factor arising from use of wood fuel in baseline scenario

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4. https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf
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</table>

Relevant SDG Indicator	SDG 13.B.1 (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.B.1 (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.B.1 (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

Source of data	CDM Default stated in following document: https://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.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.B.1 (Climate Action), SDG 3.9.1 (Good Health and Well-Being)
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)	Default 0.0004 (baseline WBT 0.0008892)
Choice of data or measurement methods and procedures	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: *Technologies and Practices to Displace Decentralized Thermal Energy Consumption* Version 1*, Draft General Guidelines On Sampling And Surveys*; EB37 Annex 27; and *Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities* (Version 02); EB65 Annex 2
Purpose of data	Calculation of emission reductions.
Additional comments	Capped in line with GS BAMG report outcomes.

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
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)	Default 0.0004 (baseline WBT 0.0008892)
Choice of data or measurement methods and procedures	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: *Technologies and Practices to Displace Decentralized Thermal Energy Consumption* Version 1*, Draft General Guidelines On Sampling And Surveys*; EB37 Annex 27; and *Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities* (Version 02); EB65 Annex 2
Purpose of data	Calculation of emission reductions.
Additional comments	Capped in line with GS BAMG report outcomes.

Relevant SDG Indicator	SDG 13.B.1 (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)	0%
Choice of data	Suppressed demand will be determined through a set of questions in the project survey that establish the method households use to

or measurement methods and procedures	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 5.4.1 (Gender Equality)
Data/parameter:	$T_{b,y}$
Unit	Hours
Description	Time saved by borehole project on average per household per day prior to project (hours)
Source of data	Baseline survey
Value(s) applied)	0
Choice of data or measurement methods and procedures	Measured by question in the baseline survey.
Purpose of data	Calculating time saving by the project.
Additional comments	-

Relevant SDG Indicator	SDG 3.9.1 (Good Health and Well-Being)
Data/parameter:	Pb,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)	0.003 calculated using default and capped values (bWBT 6.669)
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.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation)
Data/parameter:	$N_{p,y}$
Unit	Project Technology Days, 5 Minute Stroke Test
Description	Number of persons consuming water supplied by project scenario p through year y
Measured/calculated/default	Measured
Source of data	Borehole Project Database (Zoba Debub ERs_22-24)
Value(s) of monitored parameter	GS5038: 783,163 (downtime: 0%, 0 days) (Uncapped: 1,129,469) GS5039: 779,310 (downtime: 0%, 0 days) (Uncapped: 1,122,726) GS5040: 789,637 (downtime: 0%, 0 days) (Uncapped: 1,156,652)

	GS5041: 765,342 (downtime: 0%, 0 days) (Uncapped: 1,184,859) GS5042: 707,712 (downtime: 0.16%, 3 days) (Uncapped: 1,120,179) GS5043: 796,773 (downtime: 0%, 0 days) (Uncapped: 1,054,964) GS5825: 1,244,508 (downtime: 0%, 0 days) (Uncapped: 2,724,554) GS5826: 1,210,536 (downtime: 0%, 0 days) (Uncapped: 1,321,220) GS5827: 1,084,839 (downtime: 0%, 0 days) (Uncapped: 1,526,939) GS7330: 886,032 (downtime: 0%, 0 days) (Uncapped: 1,527,928) GS7331: 872,476 (downtime: 0%, 0 days) (Uncapped: 1,546,741) GS7332: 1,208,271 (downtime: 0.67%, 4 days) (Uncapped: 1,886,672) GS7333: 1,201,476 (downtime: 0%, 0 days) (Uncapped: 1,764,010) GS7334: 1,045,998 (downtime: 0%, 0 days) (Uncapped: 1,605,596) GS7335: 837,581 (downtime: 0%, 0 days) (Uncapped: 1,456,768) GS7336: 879,233 (downtime: 0%, 0 days) (Uncapped: 1,735,991)
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.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation), SDG 3.9.1 (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	Calculated
Source of data	Usage Survey
Value(s) of monitored parameter	95% capped (reported usage rate is 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. The Usage Rate is capped at 95% for conservativeness.
QA/QC procedures:	N/A
Purpose of data:	Calculation of usage.
Additional comments:	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 3.9.1 (Good Health and Well-Being)
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)
Value(s) of monitored parameter	capped at 7.5 (8.52 WCFT)
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. Last survey took place between 19/12/2022 – 22/12/2022.
QA/QC procedures:	N/A
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 3.9.1 (Good Health and Well-Being)
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)
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.B.1 (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	Measured
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 6.1.1 (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	Measured
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. The Water Resource Department (part of the Ministry of Land, Water and Environment) follows the WHO guidelines.
QA/QC procedures:	N/A
Purpose of data:	To test water quality for safety of human consumption.
Additional comments:	The lab carrying out the WQT is part of the WRD (Water Resources Department) of the Ministry of Land, Water and Environment which is a certified government laboratory.

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	$LE_{p,y}$
Unit	tCO2e per year
Description	Leakage in project scenario p during year y
Measured/calculated/default	Calculated
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 5.4.1 (Gender Equality)
Data/parameter:	$T_{p,y}$
Unit	hours
Description	Project time saved by borehole project on average per household per day (hours)

Measured/calculated/default	Measured
Source of data	Project Survey
Value(s) of monitored parameter	0.72 hours (43.23 minutes)
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey Question 32
QA/QC procedures:	N/A
Purpose of data:	Calculation of SDG 5.
Additional comments:	-

Relevant SDG Indicator	SDG 5.4.1 (Gender Equality)
Data/parameter:	$TR_{,y}$
Unit	hours
Description	Total time saved by borehole project on average per household per day for project activity in year y (hours)
Measured/calculated/default	Calculated
Source of data	Project Survey and baseline survey
Value(s) of monitored parameter	0.72 hours (43.23 minutes)
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey Question 40 (Debub MS PS_BHs_2022.v1) and question 41 (Debub_MS_PS_23_V1)
QA/QC procedures:	N/A
Purpose of data:	Calculation of SDG 5
Additional comments:	Due to the long monitoring period, 2 project surveys were conducted. The result for 2022 was 42.71 minutes. The result for 2023 was 43.75 minutes. This gave an average of 43.23 minutes.

Relevant SDG Indicator	SDG 3.9.1 (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	Calculated
Source of data	Project Survey and baseline survey
Value(s) of monitored parameter	95%
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 3
Additional comments:	-

Relevant SDG Indicator	SDG 3.9.1 (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	Measured
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 6.1.1 (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	Calculated
Source of data	Project Survey and baseline survey
Value(s) of monitored parameter	41,226 additional people gain access to safe water GS5038: 2,227 GS5039: 2,214 GS5040: 2,272 GS5041: 2,337 GS5042: 2,187 GS5043: 2,076 GS5825: 2,428 GS5826: 2,281 GS5827: 2,637 GS7330: 2,966 GS7331: 2,671 GS7332: 3,258 GS7333: 3,046 GS7334: 2,773 GS7335: 2,845 GS7336: 3,008
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:	-

Relevant SDG Indicator	SDG 6.1.1 (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	Measured
Source of data	Usage Survey and Household list

Value(s) of monitored parameter	GS5038: 2,345 GS5039: 2,331 GS5040: 2,392 GS5041: 2,460 GS5042: 2,303 GS5043: 2,186 GS5825: 2,556 GS5826: 2,402 GS5827: 2,776 GS7330: 3,123 GS7331: 2,812 GS7332: 3,430 GS7333: 3,207 GS7334: 2,919 GS7335: 2,995 GS7336: 3,167
Monitoring equipment	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. Comparison of monitored parameters with last monitoring period

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
$N_{p,y}$	GS5038: 783,163 GS5039: 779,310 GS5040: 789,637 GS5041: 765,342 GS5042: 707,712 GS5043: 796,773 GS5825: 1,244,508 GS5826: 1,210,536 GS5827: 1,084,839 GS7330: 886,032 GS7331: 872,476 GS7332: 1,208,271 GS7333: 1,201,476 GS7334: 1,045,998 GS7335: 837,581 GS7336: 879,233	GS5038: 520,125 GS5039: 520,125 GS5040: 518,391 GS5041: 490,305 GS5042: 481,636 GS5043: 520,125 GS5825: 728,175 GS5826: 624,150 GS5827: 624,150 GS7330: 601,611 GS7331: 484,063 GS7332: 624,150 GS7333: 624,150 GS7334: 520,125 GS7335: 520,125 GS7336: 485,797
$U_{p,y}$	95%	95%
$Q_{p,y}$	7.5	7.5
$Q_{p,cleanboil,y}$	0	0
$Q_{p,rawboil,y}$	0	0
Quality of Treated Water	Pass	Pass
$LE_{p,y}$	0	0

$T_{p,y}$	0.72	1.46
$TR_{,y}$	0.72	1.46
$HAPR_{,y}$	95%	95%
$P_{p,y}$	0	0
P_{access}	GS5038: 2227 GS5039: 2214 GS5040: 2272 GS5041: 2337 GS5042: 2187 GS5043: 2076 GS5825: 2428 GS5826: 2281 GS5827: 2637 GS7330: 2966 GS7331: 2671 GS7332: 3258 GS7333: 3046 GS7334: 2773 GS7335: 2845 GS7336: 3008	GS5038: 1,425 GS5039: 1,425 GS5040: 1,420 GS5041: 1,343 GS5042: 1,320 GS5043: 1,425 GS5825: 1,995 GS5826: 1,710 GS5827: 1,710 GS7330: 1,648 GS7331: 1,326 GS7332: 1,710 GS7333: 1,710 GS7334: 1,425 GS7335: 1,425 GS7336: 1,331
$P_{,y}$	GS5038: 2345 GS5039: 2331 GS5040: 2392 GS5041: 2460 GS5042: 2303 GS5043: 2186 GS5825: 2556 GS5826: 2402 GS5827: 2776 GS7330: 3123 GS7331: 2812 GS7332: 3430 GS7333: 3207 GS7334: 2919 GS7335: 2995 GS7336: 3167	GS5038: 1500 GS5039: 1500 GS5040: 1495 GS5041: 1414 GS5042: 1389 GS5043: 1500 GS5825: 2100 GS5826: 1800 GS5827: 1800 GS7330: 1735 GS7331: 1396 GS7332: 1800 GS7333: 1800 GS7334: 1500 GS7335: 1500 GS7336: 1401

D.4. 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.

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, however, four outliers were detected bringing the sample to 36. This complies with the recommended minimum sample size of 30 in the Gold Standard requirements. Furthermore, the sample confidence interval is within 30% 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 19/12/2022 – 22/12/2022. 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 8.52 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. A minimum samples of 30 for different aged technologies will be applied. The annual usage survey has been conducted using a minimum sample size of 100.

The usage surveys in this monitoring period were carried out by 2-3 staff between 14/12/2022 – 17/12/2022 and 12/09/2023 - 14/09/2023 on a minimum sample size of 120 (each time) randomly selected households. 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. Please see 'Debub MS US_BHs_2022.v1' and 'Debub_MS_US_23_V1'

Project Survey Analysis

Project surveys were conducted by 2-3 staff between 14/12/2022 – 17/12/2022 and 12/09/2023 - 14/09/2023 on a minimum sample size of 120 (each time) randomly selected households from across the homogenous VPAs in Zoba Debub to explore changes in the project scenario (demographics, water use and purification practices etc) over time. Please see 'Debub MS PS_BHs_2022.v1' and 'Debub_MS_PS_23_V1'

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.

5 Minute Stroke Test

As per the deviation request, Dev_242, approved on 13/06/2022, PP introduced a 5 Minute Stroke Test for this monitoring period. The test and method were created by UPGro Hidden Crisis Research Project and approved by GS. The Deviation request and field methodology have been included with the verification documents.

The test requires four people for different roles. One person is responsible for ensuring a steady pump rate of 40 strokes per minute, one is responsible for counting the number of strokes using a tally counter, one is ready to change the buckets collecting water, and one is responsible for recording the results and keeping time.

A metronome placed at the top of the pump head ensures a steady pump rate of 40 stokes per minute. The pump handle is then pumped at 40 strokes per minute and the observer counts the number of strokes before water is released. Once the flow is consistent and continuous two stop watches are started simultaneously. With a constant pump rate of 40 strokes per minute, using full length stokes, water is collected into empty buckets and when the volume reaches 10 litres the time is recorded. For the last 5 seconds of each minute, a countdown is begun and the person responsible for counting the number of strokes says what the count is. This is recorded. The test continues for 5 minutes with a consistent stroke rate.

The key indicators used to determine if 400 users can use the borehole are:
- A minimum of 50 litres of water is collected in the five-minute duration of the test.
- A flow rate of 10 litres per minute or more is achieved throughout the test.

If these indicators are met then it satisfies the requirements of obtaining 600 litres per hour, allowing a cap of 400 users per borehole to be applied.

As per the Deviation request and using CDM sampling, the test is required to be conducted for each season. This test was done during the rainy season on the dates 06/09/2023 – 12/09/2023, and during the dry season on the dates 06/03/2023-10/03/2023. The total sample size was 45, with 15 in the rainy season and 40 in the dry season. There was one outlier in the rainy season bringing the sample size down to 44.

	Average				
	L/day	L/hour	L/ 5 mins	Flow rate L/min	Users
Rainy Season	6000.1	750.0	62.5	12.5	400.0
Dry Season	5146.2	643.3	53.6	10.7	343.1
Both seasons	5573.2	696.6	58.1	11.6	371.6

The results showed an average of 62.5 litres of water is collected per five minutes for the rainy season and an average of 53.6 litres per five minutes for the dry season. This satisfies the key indicator that a minimum of 50 litres of water is collected during the five-minute duration of the test. All test results showed more than 50 litres of water collected per 5 minutes.

The second key indicator requires a flow rate of a minimum of 10 litres per minute. Results show that this requirement has been met with an average flow rate of 12.5 litres per minute for the rainy season and an average of 10.7 litres per minute for the dry season. These results therefore satisfy the requirements of obtaining 600 litres per hour, and a cap of 371 users per borehole has been applied.

SECTION E. CALCULATION OF SDG IMPACTS

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

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:

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

3 = 0.4 * 7.5

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 saved per household due to the presence of the borehole project. $T_{b,y}$ baseline parameter assumed to be 0 before the project activity will be taken as a proxy contribution towards the SDG target.

$T_{b,y} = 0$

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).

Cj = 0 (Baseline survey)

Outcomes for 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:

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

GS5038: 4,327 = 2,349 * ((0.97 * 112) + 9.46) * 0.0156

GS5039: 4,305 = 2,337 * ((0.97 * 112) + 9.46) * 0.0156

GS5040: 4,362 = 2,368 * ((0.97 * 112) + 9.46) * 0.0156

GS5041: 4,230 = 2,296 * ((0.97 * 112) + 9.46* 0.0156

GS5042: 3,911 = 2,123 * ((0.97 * 112) + 9.46* 0.0156
GS5043: 4,403 = 2,390 * ((0.97 * 112) + 9.46) * 0.0156
GS5825: 6,877 = 3,733 * ((0.97 * 112) + 9.46) * 0.0156
GS5826: 6,689 = 3,631* ((0.97 * 112) + 9.46) * 0.0156
GS5827: 5,995 = 3,254 * ((0.97 * 112) + 9.46) * 0.0156
GS7330: 4,896 = 2,658 * ((0.97 * 112) + 9.46) * 0.0156
GS7331: 4,821 = 2,617 * ((0.97 * 112) + 9.46) * 0.0156
GS7332: 6,676 = 3,624 * ((0.97 * 112) + 9.46) * 0.0156
GS7333: 6,639 = 3,604 * ((0.97 * 112) + 9.46) * 0.0156
GS7334: 5,779 = 3,137 * ((0.97 * 112) + 9.46) * 0.0156
GS7335: 4,628 = 2,512 * ((0.97 * 112) + 9.46) * 0.0156
GS7336: 4,858 = 2,637 * ((0.97 * 112) + 9.46) * 0.0156

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

GS5038: 2,349 = (1 – 0) * 783,163 * 0.0004 * (7.09 + 0)
GS5039: 2,337 = (1 – 0) * 779,310 * 0.0004 * (7.09 + 0)
GS5040: 2,368 = (1 – 0) * 789,637 * 0.0004 * (7.09 + 0)
GS5041: 2,296 = (1 – 0) * 765,342 * 0.0004 * (7.09 + 0)
GS5042: 2,123 = (1 – 0) * 707,712 * 0.0004 * (7.09 + 0)
GS5043: 2,390 = (1 – 0) * 796,773 * 0.0004 * (7.09+ 0)
GS5825: 3,733 = (1 – 0) * 1,244,508 * 0.0004 * (7.09 + 0)
GS5826: 3,631 = (1 – 0) * 1,210,536* 0.0004 * (7.09 + 0)
GS5827: 3,254 = (1 – 0) * 1,084,839 * 0.0004 * (7.09 + 0)
GS7330: 2,571 = (1 – 0) * 886,032 * 0.0004 * (7.09 + 0)
GS7331: 2,617 = (1 – 0) * 872,476 * 0.0004 * (7.09 + 0)
GS7332: 3,624 = (1 – 0) * 1,208,271 * 0.0004 * (7.09 + 0)
GS7333: 3,604 = (1 – 0) * 1,201,476 * 0.0004 * (7.09 + 0)
GS7334: 3,137 = (1 – 0) * 1,045,998 * 0.0004 * (7.09 + 0)
GS7335: 2,512 = (1 – 0) * 837,581 * 0.0004 * (7.09 + 0)
GS7336: 2,637 = (1 – 0) * 879,233 * 0.0004 * (7.09 + 0)

Where:

$N_{j,y}$ Number of persons-days consuming water supplied by project scenario p through year y

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

$B_{b,y}$ 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 the project year y, as per Baseline Water Boiling Test

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

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):

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:

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

All VPAs:

95% = ((3.0 – 0) / 3.0) * 95%

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

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

All VPAs:

3.00 = 0.4 * 7.5

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

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

All VPAs:

0 = 0.4* 0

Where :

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

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

Outcome for SDG 5 (Gender Equality):

The overall time saved by borehole project on average per household per day in the project activity is calculated as follows:

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

All VPAs:

0.72 = 0.72 - 0

Where:

TR_y Total time saved by borehole project on average per household per day for project activity in year y (hours)

$T_{b,y}$ Baseline time saved by borehole project on average per household per day in year y (hours)

$T_{p,y}$ Project time saved by borehole project on average per household per day in year y (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. Paccess has been rounded down to the nearest whole number. Calculations are as follows:

Paccess = Py * (1 - Cj) * Up,y

GS5038: 2227 = 2345 * (1-0) * 0.95

GS5039: 2214 = 2331 * (1-0) * 0.95

GS5040: 2272 = 2392 * (1-0) * 0.95

GS5041: 2337 = 2460 * (1-0) * 0.95

GS5042: 2187 = 2303 * (1-0) * 0.95
GS5043: 2076 = 2186 * (1-0) * 0.95
GS5825: 2428 = 2556 * (1-0) * 0.95
GS5826: 2281 = 2402 * (1-0) * 0.95
GS5827: 2637 = 2776 * (1-0) * 0.95
GS7330: 2967 = 3123 * (1-0) * 0.95
GS7331: 2671 = 2812 * (1-0) * 0.95
GS7332: 3258 = 3430 * (1-0) * 0.95
GS7333: 3046 = 3207 * (1-0) * 0.95
GS7334: 2773 = 2919 * (1-0) * 0.95
GS7335: 2845 = 2995 * (1-0) * 0.95
GS7336: 3008 = 3167 * (1-0) * 0.95

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 and section E.4. below.

$$ERy = ((BEb,y - PEp,y) * Up,y - LEp,y)*(1-Xboil)$$
$$ERy = ((2,874-0) * 0.95 - 0)* (1 - 0)$$

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:

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

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

Example VPA, GS5038:

ERy = ((2,874-0) * 0.95 - 0)* (1 - 0)= 2726

See accompanying Emissions Reductions calculations for all VPAs.

E.3. Calculation of leakage

The project does not result in leakage and therefore the value is 0 as can be seen in the assessment on pg. 15 – 16.

Therefore, a value of 0 is applied for leakage.

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
SDG 3 Good Health and Well-being	Variation in household smoke (All VPAs)	0% reduction in exposure to Household Air Pollution due to no longer boiling water	95% reduction in exposure to Household Air Pollution due to no longer boiling water	95% reduction in exposure to Household Air Pollution due to no longer boiling water
SDG 5 Gender Equality	Variation of time spent on firewood collection	0 hours of time saved by borehole project on average per household per day	0.72 hours of time saved by borehole project on average per household per day	0.72 hours of time saved by borehole project on average per household per day

SDG 6 Clean Water and Sanitation	People gain access to safe water	People with access to safe water: GS5038: 0 GS5039: 0 GS5040: 0 GS5041: 0 GS5042: 0 GS5043: 0 GS5825: 0 GS5826: 0 GS5827: 0 GS7330: 0 GS7331: 0 GS7332: 0 GS7333: 0 GS7334: 0 GS7335: 0 GS7336: 0	GS5038: 2345 GS5039: 2331 GS5040: 2392 GS5041: 2460 GS5042: 2303 GS5043: 2186 GS5825: 2556 GS5826: 2402 GS5827: 2776 GS7330: 3123 GS7331: 2812 GS7332: 3430 GS7333: 3207 GS7334: 2919 GS7335: 2995 GS7336: 3167	GS5038: 2,227 GS5039: 2,214 GS5040: 2,272 GS5041: 2,337 GS5042: 2,187 GS5043: 2,076 GS5825: 2,428 GS5826: 2,281 GS5827: 2,637 GS7330: 2,966 GS7331: 2,671 GS7332: 3,258 GS7333: 3,046 GS7334: 2,773 GS7335: 2,845 GS7336: 3,008
SDG 13 Climate Action	Emission reductions	Baseline Emission Reductions of: GS5038: 0 tCO2e GS5039: 0 tCO2e GS5040: 0 tCO2e GS5041: 0 tCO2e GS5042: 0 tCO2e GS5043: 0 tCO2e GS5825: 0 tCO2e GS5826: 0 tCO2e GS5827: 0 tCO2e GS7330: 0 tCO2e GS7331: 0 tCO2e GS7332: 0 tCO2e GS7333: 0 tCO2e GS7334: 0 tCO2e GS7335: 0 tCO2e GS7336: 0 tCO2e	GS5038: 4,108 tCO2e/y GS5039: 4,089 tCO2e/y GS5040: 4,141 tCO2e/y GS5041: 4,014 tCO2e/y GS5042: 3,713 tCO2e/y GS5043: 4,179 tCO2e/y GS5825: 6,529 tCO2e/y GS5826: 6,351 tCO2e/y GS5827: 5,690 tCO2e/y GS7330: 4,648 tCO2e/y GS7331: ,575 tCO2e/y GS7332: 6,338 tCO2e/y GS7333: 6,303 tCO2e/y GS7334: 5,486 tCO2e/y GS7335: 4,395 tCO2e/y GS7336: 4,613 tCO2e/y	GS5038: 4,108 tCO2e/y GS5039: 4,089 tCO2e/y GS5040: 4,141 tCO2e/y GS5041: 4,014 tCO2e/y GS5042: 3,713 tCO2e/y GS5043: 4,179 tCO2e/y GS5825: 6,529 tCO2e/y GS5826: 6,351 tCO2e/y GS5827: 5,690 tCO2e/y GS7330: 4,648 tCO2e/y GS7331: 4,575 tCO2e/y GS7332: 6,338 tCO2e/y GS7333: 6,303 tCO2e/y GS7334: 5,486 tCO2e/y GS7335: 4,395 tCO2e/y GS7336: 4,613 tCO2e/y

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values[1] achieved during this monitoring period
6	Number of additional persons with access to safe water: GS5038: 2751 GS5039: 2638 GS5040: 2699 GS5041: 2856 GS5042: 2765 GS5043: 2810 GS5825: 2979 GS5826: 2874 GS5827: 3204 GS7330: 3830 GS7331: 3408 GS7332: 3648 GS7333: 3718 GS7334: 3367 GS7335: 3603 GS7336: 3729	GS5038: 2,227 GS5039: 2,214 GS5040: 2,272 GS5041: 2,337 GS5042: 2,187 GS5043: 2,076 GS5825: 2,428 GS5826: 2,281 GS5827: 2,637 GS7330: 2,966 GS7331: 2,671 GS7332: 3,258 GS7333: 3,046 GS7334: 2,773 GS7335: 2,845 GS7336: 3,008
5	at least 0.5 hours of time saved by borehole project on average per household per day	0.72 hours of time saved by borehole project on average per household per day
3	80% reduction in exposure to Household Air Pollution due to boiling water	95% reduction in exposure to Household Air Pollution due to boiling water
13	Ex-ante Emission Reductions of: GS5038: 10000 tCO2e GS5039: 10000 tCO2e GS5040: 10000 tCO2e GS5041: 10000 tCO2e GS5042: 10000 tCO2e GS5043: 10000 tCO2e	Total Emission Reductions: 79,172 tCO2e/y Per VPA: GS5038: 4,108 tCO2e/y GS5039: 4,089 tCO2e/y

[1] Whenever emission reductions are capped, both the original and capped values used for calculations must be transparently reported. Use brackets to denote original values.

	GS5825: 10000 tCO2e GS5826: 10000 tCO2e GS5827: 10000 tCO2e GS7330: 10000 tCO2e GS7331: 10000 tCO2e GS7332: 10000 tCO2e GS7333: 10000 tCO2e GS7334: 10000 tCO2e GS7335: 10000 tCO2e GS7336: 10000 tCO2e	GS5040: 4,141 tCO2e/y GS5041: 4,014 tCO2e/y GS5042: 3,713 tCO2e/y GS5043: 4,179 tCO2e/y GS5825: 6,529 tCO2e/y GS5826: 6,351 tCO2e/y GS5827: 5,690 tCO2e/y GS7330: 4,648 tCO2e/y GS7331: 4,575 tCO2e/y GS7332: 6,338 tCO2e/y GS7333: 6,303 tCO2e/y GS7334: 5,486 tCO2e/y GS7335: 4,395 tCO2e/y GS7336: 4,613 tCO2e/y

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

All values in the ex-ante column above are those from the approved PDD.

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

SDG 3
Positive achievements have been achieved during this monitoring period.

SDG 5
Positive achievements have been achieved during this monitoring period.

SDG 6
The SDG 6 achievements during this Monitoring Period fall short of the estimated contributions due to introduction of the BAMG changes. Positive contributions to SDG have still been made.

SDG 13

The SDG 13 achievements during this Monitoring Period fall short of the estimated contributions due to introduction of the BAMG changes. Positive contributions to SDG have still been made.

SECTION F. SAFEGUARDS REPORTING

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Monitoring
1 Human Rights	a. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights. b. The Project shall not discriminate with regards to participation and inclusion.	No	The project will adhere to all human rights requirements including respecting internationally proclaimed human rights and Universal Declaration of Human Rights and will not discriminate in any way.	During all trainings, it will be emphasised that project beneficiaries should support vulnerable or less mobile community members to access water
2 Gender Equality and Women's Rights	The Project shall not directly or indirectly reinforce gender-based discrimination and shall not lead to/contribute to adverse impacts on gender equality and/or the situation of women. Specifically, this shall include (not exhaustive): (a) Sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation	 No	 The burden on the whole community of travelling far to collect water and gather firewood for water purification will be reduced. This will also mitigate the social isolation of spending	SDG 5 $T_{p,y}$ $TR_{,y}$ The time spent collecting wood fuel is monitored in the project survey. The project aims to reduce the burden on the whole community of traveling far to collect wood and in particular to women who perform the majority of unpaid domestic work.

	or human trafficking.		a long time collecting these resources	
	(b) Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls.	No	The project will decrease the drudgery by reducing time spent on water and firewood collection	
	(c)Restriction of women's rights or access to resources (natural or economic).	No	The project will increase women's access to resources such as water by making safe water available in the community. The project will increase women's ability to use, develop and protect natural resources by making safe water more readily available and enabling women to participate in project decision-making.	
	(d) Recognise women's ownership rights regardless of marital status – adopt project measures where possible to support to women's access to inherit and own land, homes, and other assets or natural resources. Projects shall apply the principles of non-discrimination, equal treatment, and equal pay for equal work, specifically:	No	The project will decrease the workload of women in collecting water and firewood, thereby allowing more time to engage in other activities.	
	(a) Where appropriate for the implementation of a Project, paid, volunteer work or community contributions will be organised to provide the	Yes	Equal participation of women and men in decision making will be encouraged by promoting their equal membership on water point committees (WPCs). These WPCs will be trained to	

	conditions for equitable participation of men and women in the identified tasks/activities.		facilitate the participation of members depending on their specific circumstances. They will also assist all communities mem bers to provide feedback on the project, regardless of their situation.	
	(b) Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status.	Yes	The project aims to benefit the whole community equally and women's equal participation in the LSC and water point committees is encouraged	
	(c) Ensure that these conditions do not limit the access of women or men, as the case may be, to Project participation and benefits.	Yes	The project will encourage equal participation of men and women.	
	3.2.3 The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks.	Yes	The analysis of the project is in line with the country gender strategy is in section A.8. of the PDD	
3 Community Health, Safety and Working Conditions	The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community.	Yes	The project will reduce the community exposure to water borne illness through the provision of a safe water source, and will reduce the risk of household air pollution by removing the need for households to boil water for purification.	SDG 3, 6 and 13 $Np_{,y}$ $Qp_{,y}$ $Qp_{,cleanboil,y}$ Quality of Treated Water P_{safe} P_{access} $P_{,y}$ $Pp_{,y}$ Incidences of water borne illnesses are monitored

				through the annual Monitoring Project Survey. A WASH programme is carried out by the project including WASH training at the beginning of the project, as well as subsequent WASH follow-up training
4.1 Sites of Cultural and Historical Heritage	Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, or practices)?	No	The project area does not include sites or structures of historic and cultural value. Project activities do not compromise historic, cultural or religious practices.	
4.2 Forced Eviction and Displacement	Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No	The project will not impact the physical or economic relocation of peoples. The focus of the project is rehabilitating and installing water point infrastructure only.	
4.3 Land Tenure and Other Rights	Does the Project require any change to land tenure arrangements and/or other rights?	No	The project will not impact on land tenure arrangements or rights.	
4.4 Indigenous Peoples	Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	No	The project will take place on land owned either by the county government or by local people for which their permission will first be sought.	
5 Corruption	The Project shall not involve, be complicit in or inadvertently contribute to or	No	The project shall ensure that all forms of corruption are avoided. Project beneficiaries are able	

	reinforce corruption or corrupt Projects.		to contact the project developer and implementer through the continuous grievance mechanism to report any form of corruption.	
6.1 Labour Rights	The Project Developer shall ensure that there is no forced labour and that all employment is in compliance with national labour and occupational health and safety laws, with obligations under international law, and consistency with the principles and standards embodied in the International Labour Organization (ILO) fundamental conventions. Where these are contradictory and a breach of one or other cannot be avoided, then guidance shall be sought from Gold Standard. Child labour, as defined by the ILO Minimum Age convention is not allowed. The Project Developer shall use adequate and verifiable mechanisms for age verification in recruitment procedures. Exceptions are children for work on their families' property as long as: (a) Their compulsory schooling (minimum of 6	No No	The project will adhere to labour laws and requirements The projects will not use child labour	

	schooling years) is not hindered, AND (b) The tasks they perform do not harm their physical and mental development, AND (c) The opinions and recommendations of an Expert Stakeholder shall be sought and demonstrated as being included in the project design.			
6.2 Negative Economic Consequences	Does the project cause negative economic consequences during and after project implementation, e.g., for vulnerable and marginalised social groups in targeted communities?	Yes	The project is not expected to have any negative economic impacts or cause any risks.	To ensure long term sustainability of the water points, and avoid unexpected breakdowns and spending, training was conducted at the beginning of the project on conducting minor maintenance. The project is expected to benefit all members of the community
7.1 Emissions	Will the Project increase greenhouse gas emissions over the Baseline Scenario?	Yes	The project will reduce greenhouse gas emissions compared to the baseline scenario.	SDG 13 The ERs are monitored during the MP. During this MP a large number of emission reductions were achieved
7.2 Energy Supply	Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	Only hand pumped boreholes that use no electricity are included in the project. The project will reduce fuel use due to reducing the need for water purification by boiling	
8.1 Impact on natural water	Will the Project affect the natural or pre-existing pattern of	No	There will be no significant change in the volume of water	

patterns/flows	watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?		consumed by the households.	
8.2 Erosion and/or water body instability	Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	No	The water is taken from boreholes at household usage levels. Therefore it is extremely unlikely that there will be additional erosion and/or water body instability or disruption of the natural pattern of erosion.	
9.1 Landscape modification and soil	Does the Project involve the use of land and soil for production of crops or other products?	No	No crops or other products will be produced in the project.	
9.2 Vulnerability to Natural Disaster	Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No	There will be no impact by the project to natural disasters.	
9.3 Genetic Resources	Could the Project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development)?	No	No GMOs will be used in the project and the boreholes would not be affected by GMOs as they are all protected.	
9.4 Release of pollutants	Could the Project potentially result in the release of pollutants to the environment?	No	As safe ground water is used, there is no risk or releasing pollutants to the environment.	
9.5 Hazardous and Non-	Will the Project involve the manufacture, trade, release,	No	The project does not deal with hazardous or non-hazardous	

hazardous Waste	and/ or use of hazardous and non-hazardous chemicals and/or materials?		chemicals and/or materials.	
9.6 Pesticides and fertilizers	Will the Project involve the application of pesticides and/or fertilisers?	No	No pesticides and/or fertilisers will be used in the project.	
9.7 Harvesting of forests	Will the Project involve the harvesting of forests?	No	As the project reduces the consumption of firewood, there is a positive impact on forests.	
9.8 Food	Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No	The project has no impact on the quantity or nutritional quality of food.	
9.9 Animal Husbandry	Will the Project involve animal husbandry?	No	The project will not involve animal husbandry.	
9.10 High Conservation Value Areas and Critical Habitats	Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No	The project rehabilitates water points and decreases the consumption of firewood, having a positive impact on conserving forest ecosystems.	
9.11 Endangered Species	Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? Does the Project potentially impact other areas where endangered species may be present through transboundary affects?	No No	The project is not envisaged to have any impact on their habitat as it only affects borehole infrastructure. The project only impacts borehole infrastructure and does not impact other areas where endangered species are present.	

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

Comments from users of local communities which borehole is part of the project have been reported during this monitoring period. The comments are raised in logbooks which are with the village administrator. Vita checks the comments when they visit the boreholes. The feedback is generally positive, but if there are negatives, Vita can either respond to them directly or raise the issues with us. The comments from this monitoring period are positive towards the project: the users expressed their satisfaction on the management of the boreholes and on the continuous follow ups of the project team. Even though there were breakdowns, these were resolved. The boreholes maintained by the project provide safe water to the communities preventing them walking long distances to fetch water.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

No Stakeholder feedback or comments were received during the previous monitoring period hence no follow up action has been taken during this monitoring period.

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

No legal challenges arose during this monitoring period.

Revision History

Version	Date	Remarks
1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user under detailed rules and requirements
1.0	10 July 2017	Initial adoption