

Gold standard for the global goals
Monitoring report



June 2017, version 1

Title of the project	<p>GS1247 VPA 91 Improved Kitchen Regimes Multi-Country PoA –Dowa Boreholes, Malawi</p> <p>GS1247 VPA 92 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 93 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 94 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 95 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 96 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 97 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 98 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 112 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 113 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 114 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 115 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p> <p>GS1247 VPA 116 Improved Kitchen Regimes Multi-Country PoA - Dowa Boreholes, Malawi</p>
Gold Standard project id	<p>GS 5329, GS 5330, GS 5331, GS 5332, GS 5335, GS 5336, GS 5337, GS 5338, GS 5437, GS 5438, GS 5439, GS 5440, GS 5441</p>
Version number of the monitoring report	<p>4</p>
Completion date of the monitoring report	<p>22/05/2020</p>
Date of project design certification	<p>06/11/2017</p>
Start date of crediting period	<p>GS5329: 20/12/2015</p> <p>GS5330: 12/01/2016</p> <p>GS5331: 21/01/2016</p> <p>GS5332: 09/02/2016</p> <p>GS5335: 22/02/2016</p> <p>GS5336: 27/04/2016</p> <p>GS5337: 20/04/2016</p> <p>GS5338: 19/05/2016</p> <p>GS5437: 17/06/2016</p> <p>GS5438: 02/07/2016</p>

	<p>GS5439: 04/09/2016</p> <p>GS5440: 24/09/2016</p> <p>GS5441: 04/10/2016</p>
Duration of this monitoring period	All VPAs: 01/01/2019-31/12/2019
Duration of previous monitoring period	<p>GS5329: 01/01/2018-31/12/2018</p> <p>GS5330: 01/01/2018-31/12/2018</p> <p>GS5331: 01/01/2018-31/12/2018</p> <p>GS5332: 01/01/2018-31/12/2018</p> <p>GS5335: 01/01/2018-31/12/2018</p> <p>GS5336: 01/01/2018-31/12/2018</p> <p>GS5337: 01/01/2018-31/12/2018</p> <p>GS5338: 01/01/2018-31/12/2018</p> <p>GS5437: 01/01/2018-31/12/2018</p> <p>GS5438: 01/01/2018-31/12/2018</p> <p>GS5439: 01/01/2018-31/12/2018</p> <p>GS5440: 01/01/2018-31/12/2018</p> <p>GS5441: 01/01/2018-31/12/2018</p>
Project representative(s)	Oscar Lozada
Host Country	Malawi
Certification pathway (activity certification/impact certification)	Impact Certification
SDG Contributions targeted (as per approved PDD)	<p>SDG 3 – Good Health and Well-Being</p> <p>SDG 5 – Gender Equality</p> <p>SDG 6 – Clean Water and Sanitation</p> <p>SDG 13 – Climate Action</p>
Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)	GSVER
Selected methodology(ies)	Technologies and Practices to Displace Decentralised Thermal Energy Consumption (TPDDTEC) v1

<p>Estimated amount of annual average certified SDG impact (as per approved PDD)</p>	<p>Contributions to SDGs 3,5 and 6 have been supplied through the transition annex as the project began prior to transition.</p> <p>SDG 3: at least the following additional persons consuming safe water, per VPA, based on the calculated proportion of their contribution according to their Py:</p> <p>GS5329: 1657</p> <p>GS5330: 1665</p> <p>GS5331: 1661</p> <p>GS5332: 1685</p> <p>GS5335: 1673</p> <p>GS5336: 1673</p> <p>GS5337: 1659</p> <p>GS5338: 1675</p> <p>GS5437: 1677</p> <p>GS5438: 1648</p> <p>GS5439: 1653</p> <p>GS5440: 1675</p> <p>GS5441: 1645</p> <p>SDG 5: at least 0.5 hours per trip per household time saved.</p> <p>SDG 6: at least the following additional persons with provision to safe water, per VPA, based on the calculated proportion of their contribution according to their Py.</p> <p>GS5329: 2502</p> <p>GS5330: 2513</p> <p>GS5331: 2507</p> <p>GS5332: 2543</p> <p>GS5335: 2525</p> <p>GS5336: 2526</p> <p>GS5337: 2505</p> <p>GS5338: 2529</p> <p>GS5437: 2531</p> <p>GS5438: 2487</p> <p>GS5439: 2495</p> <p>GS5440: 2528</p> <p>GS5441: 2484</p>

<p>Estimated amount of annual average certified SDG impact (as per approved PDD) (continued)</p>	<p>SDG13: an estimated 120,461 tCO2e per year. VPA breakdown:</p> <p>GS5329: 9,224 tCO2e</p> <p>GS5330: 9,266 tCO2e</p> <p>GS5331: 9,242 tCO2e</p> <p>GS5332: 9,376 tCO2e</p> <p>GS5335: 9,309 tCO2e</p> <p>GS5336: 9,312 tCO2e</p> <p>GS5337: 9,234 tCO2e</p> <p>GS5338: 9,323 tCO2e</p> <p>GS5437: 9,331 tCO2e</p> <p>GS5438: 9,170 tCO2e</p> <p>GS5439: 9,197 tCO2e</p> <p>GS5440: 9,320 tCO2e</p> <p>GS5441: 9,157 tCO2e</p>
<p>Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period</p>	<p>SDG 3 – 21,572 additional persons consuming safe water. VPA breakdown:</p> <p>GS5329: 1582</p> <p>GS5330: 1665</p> <p>GS5331: 1661</p> <p>GS5332: 1685</p> <p>GS5335: 1673</p> <p>GS5336: 1673</p> <p>GS5337: 1659</p> <p>GS5338: 1675</p> <p>GS5437: 1677</p> <p>GS5438: 1648</p> <p>GS5439: 1653</p> <p>GS5440: 1675</p> <p>GS5441: 1645</p> <p>SDG 5 - 0.65 hours saved per trip per household time saved (43% reduction) to all VPAs.</p> <p>SDG 6 – 39,887 additional persons with provision to safe water. VPA breakdown:</p> <p>GS5329: 2926</p> <p>GS5330: 3079</p> <p>GS5331: 3071</p> <p>GS5332: 3116</p> <p>GS5335: 3093</p> <p>GS5336: 3094</p> <p>GS5337: 3068</p> <p>GS5338: 3098</p> <p>GS5437: 3100</p> <p>GS5438: 3047</p> <p>GS5439: 3056</p> <p>GS5440: 3097</p>

	GS5441: 3042
	SDG 13 - 130,000 tCO2e per year. VPA breakdown:
	GS5329: 10,000 tCO2e
	GS5330: 10,000 tCO2e
	GS5331: 10,000 tCO2e
	GS5332: 10,000 tCO2e
	GS5335: 10,000 tCO2e
	GS5336: 10,000 tCO2e
	GS5337: 10,000 tCO2e
	GS5338: 10,000 tCO2e
	GS5437: 10,000 tCO2e
	GS5438: 10,000 tCO2e
	GS5439: 10,000 tCO2e
	GS5440: 10,000 tCO2e
	GS5441: 10,000 tCO2e

SECTION A. Description of project

A.1. Purpose and general description of project

In Malawi, approximately half the population is without access to clean water and therefore relies on unprotected water sources such as hand dug open wells and rivers for drinking water, which are often contaminated by bacteria and pollutants. One of the key factors influencing water scarcity is the absence of borehole maintenance programs and the high costs of implementation. According to the Rural Water Supply Network over 40% of Malawi's boreholes are non-functioning, thus there is a clear need for improved intervention.

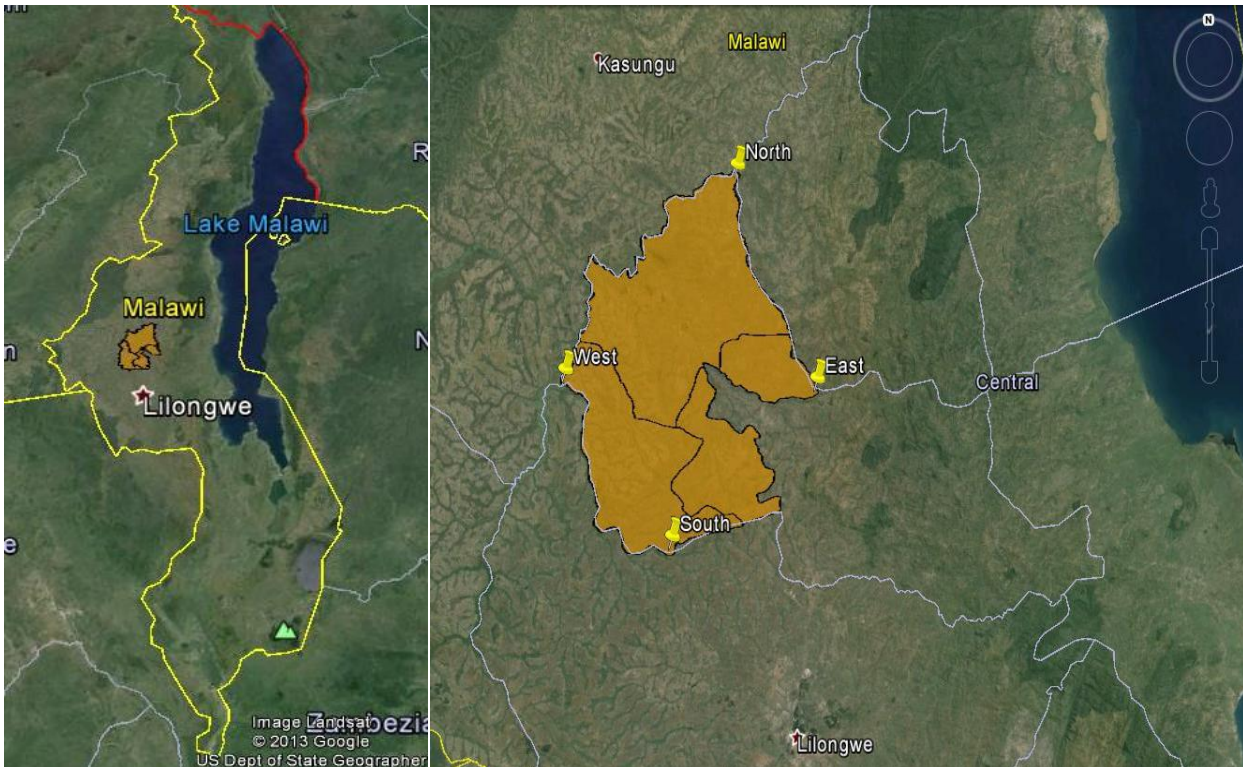
As part of our GS1247 Improved Kitchen Regimes Multi-Country PoA, CO2balance UK Ltd and United Purpose (formerly known as Concern Universal) have developed pure water supply projects in the Republic of Malawi. This project has been registered under the Gold Standard Foundation Programme of Activities (thereafter GS PoA) using the methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption. v1.0" (TPDDTEC).

In this project CO2balance and United Purpose have provided safe drinking water to communities and reduced the need to boil water as a means of purification through the repair of damaged boreholes and the drilling of additional new boreholes. By providing safe water, the project ensures that households consume less firewood during the process of water purification and as a result there has been a reduction of greenhouse gas emissions from the combustion process. The carbon credits earned through the reduction of emissions have been used, in part, to fund and create a self-sustaining maintenance program.

In total 115 boreholes were drilled or rehabilitated across VPAs in Dowa between the 19th December 2015 and 22nd December 2016. One borehole was subsequently removed in MP3 due to non-functionality and non-repairability, bringing the total in Dowa to 114.

A.2. Location of project

The location of the project activity is within the administrative boundary of Dowa District in the central region of Malawi. Below is the geographic reference to allow unique identification of the VPA Improved Kitchen Regimes, Dowa.



Project Area Extremities		
	Latitude	Longitude
North	-13.206318°	33.702993°
South	-13.716648°	33.578534°
East	-13.505547°	33.825191°
West	-13.480841°	33.409259°

A.3. Reference of applied methodology

Technologies and Practices to Displace Decentralised Thermal Energy Consumption v1

A.4. Crediting period of project

Each VPA has a crediting period of 7 years, twice renewable. The crediting period start date for each VPA is:

- GS5329: 20/12/2015
- GS5330: 12/01/2016
- GS5331: 21/01/2016
- GS5332: 09/02/2016
- GS5335: 22/02/2016
- GS5336: 27/04/2016
- GS5337: 20/04/2016
- GS5338: 19/05/2016
- GS5437: 17/06/2016

SECTION B. Implementation of project

B.1. Description of implemented project

The projects are now in their third monitoring period. Relationships with the project partners is strong and usage of the project technology remains at 98%, offering benefits to all stakeholders. No delays or deviations to the projects have occurred.

In total 115 boreholes were drilled or rehabilitated across VPAs in Dowa between the 19th December 2015 and 22nd December 2016 (however, one borehole was subsequently removed in MP3 due to non-functionality and non-repairability, bringing the total in Dowa to 114.). The project is monitored annually by trained field staff from United Purpose, in coordination with CO2balance. All boreholes in Dowa have been fully functional across the current MP, with no breakdowns recorded. The following table lists the boreholes contained within each VPA, along with their date of rehabilitation and their operational status during this MP. Further information can be found in the Dowa Emission Reduction Calculations spreadsheet.

B.2. Post-registration changes

B.2.1. Temporary deviations from Certified Key Project Information, Project Design Document, Monitoring & Reporting Plan, applied methodology or applied standardized baseline

No temporary deviations have been made.

B.2.2. Corrections

No corrections have been applied.

B.2.3. Changes to start date of crediting period

No changes have been made to the start date of the crediting periods.

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

No permanent changes have been made.

B.2.5. Changes to project design of approved project

No changes have been made to the project design.

SECTION C. Description of monitoring system applied by the project

All surveys are administered by trained CO2balance staff and partner United Purpose that are local to the area and conversant in the local dialects to ensure that the responses are consistent and not biased by any

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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 which is sent to the UK head office for data analysis. The documentation procedure that CO2balance has devised ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in the United Purpose Malawi 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. Using an online research randomizer, each borehole user, selected from the total user list for all VPAs, is assigned a unique random number which is then sorted in order from lowest to highest.

The size of the random 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). In this case, the first 120 Households were selected for the Project survey and Usage survey, and the first 60 for the WCFT. The random sample is reselected for every monitoring period to ensure the selection remains random.

Leakage Assessment: Sources of leakage detailed within the methodology relevant to this project have here been reviewed.

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

a) The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.

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

b) The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.

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

c) The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario.

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

d) The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.

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

e) By virtue of promotion and marketing of new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.

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

SECTION D. Data and parameters

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

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

Relevant SDG Indicator	SDG 3 (Good Health and Wellbeing) SDG 6 (Clean Water and Sanitation)
Data/parameter:	Py
Unit	Number
Description	Number of persons consuming safe water
Source of data	Baseline survey
Value(s) applied)	GS5329: 3284 GS5330: 3456 GS5331: 3447 GS5332: 3497 GS5335: 3472 GS5336: 3473 GS5337: 3444 GS5338: 3477 GS5437: 3480 GS5438: 3477 GS5439: 3430 GS5440: 3476 GS5441: 3415
Choice of data or measurement methods and procedures	Sum of the total number of people using each borehole in the project. The total number of households using each borehole will be established through lists supplied by the water resource committee and/or community group and/or district officer responsible for that borehole. Using this method, the total number of people using each borehole will be known.
Purpose of data	Determination of number of persons using safe water
Additional comments	

Relevant SDG Indicator	SDG 3 (Good Health and Wellbeing) SDG 6 (Clean 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 project survey
Value(s) applied)	9.1%
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 calculate the additional number of persons having access to safe water in the project activity compared to the baseline scenario
Additional comments	

Relevant SDG Indicator	SDG 3 (Good Health and Wellbeing)
Data/parameter:	$P_{b,boil}$
Unit	Percentage
Description	Percentage of persons boiling water in the baseline
Source of data	Baseline survey
Value(s) applied)	47%
Choice of data or measurement methods and procedures	The percentage of people stating that they used to boil their water for purification in the baseline scenario, evaluated through the baseline survey.
Purpose of data	Determination of number of persons boiling water in the baseline
Additional comments	

Relevant SDG Indicator	SDG 13
Data/parameter:	EF_{fuel}
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor arising from use of wood-fuel in baseline scenario (includes production, transport and use)
Source of data	Calculated from IPCC defaults
Value(s) applied)	112
Choice of data or measurement methods and procedures	IPCC defaults
Purpose of data	EF_{fuel} was used in accordance with the methodology as a methodology default value
Additional comments	

Relevant SDG Indicator	SDG 13
Data/parameter:	$EF_{fuel} (non-CO_2)$
Unit	tCO ₂ /TJ

Description	Non-CO ₂ emission factor arising from use of wood-fuel in baseline scenario (includes production, transport and use)
Source of data	Calculated from IPCC defaults 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	IPCC defaults
Purpose of data	EF _{fuel} was used in accordance with the methodology as a methodology default value. For project activities starting from 01/01/2013, the most update figure of 8.692 is used for this parameter as per guidance from the GS TAC and GS Guidance.
Additional comments	

Relevant SDG Indicator	SDG 13
Data/parameter:	NCV _{fuel}
Unit	TJ/ton
Description	Net calorific value of the fuels used in the baseline.
Source of data	IPCC defaults
Value(s) applied)	0.0156
Choice of data or measurement methods and procedures	IPCC defaults
Purpose of data	NCV _{fuel} was used in accordance with the methodology as a methodology default value.
Additional comments	

Relevant SDG Indicator	SDG 13
Data/parameter:	fNRB
Unit	Non-Renewability Fraction
Description	Non-renewability status of woody biomass fuel in scenario i during year y
Source of data	The NRB assessment has been carried out by an independent consultant in accordance with the methodology.
Value(s) applied)	0.92
Choice of data or measurement methods and procedures	NRB assessment
Purpose of data	Quantitative NRB assessment was used in accordance with the methodology. NRB is fixed for the project unless reassessed in future as per PP requirements.
Additional comments	

Relevant SDG Indicator	SDG 13
Data/parameter:	W _{b,y}
Unit	T/L
Description	Mass of woody biomass combusted in the baseline per household per day
Source of data	Kitchen Performance Tests

Value(s) applied)	0.000900352
Choice of data or measurement methods and procedures	Measured by baseline KPT
Purpose of data	To measure wood saved as a result of the project
Additional comments	

Relevant SDG Indicator	SDG 13
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)	0.0385
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	To establish the number of households who, if they had access to a means of purifying water, would purify using a non-GHG emitting method (such as chlorination tablets) and thus calculate an accurate suppressed demand figure.
Additional comments	

D.2. Data and parameters monitored

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

Relevant SDG Indicator	SDG 3 (Good Health and Wellbeing)
Data/parameter:	P _{safe}
Unit	Number
Description	Number of additional persons consuming safe water in the project activity compared to the baseline scenario.
Measured/calculated/default	Calculated
Source of data	Household lists; Usage Survey

Value(s) of monitored parameter	GS5329: 1582 GS5330: 1665 GS5331: 1661 GS5332: 1685 GS5335: 1673 GS5336: 1673 GS5337: 1659 GS5338: 1675 GS5437: 1677 GS5438: 1648 GS5439: 1653 GS5440: 1675 GS5441: 1645
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Annually
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.
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	To calculate the additional number of persons consuming safe water in the project activity compared to the baseline scenario
Additional comments:	

Relevant SDG Indicator	SDG 5
Data/parameter:	TR _y
Unit	Percentage
Description	Total reduction time spent collecting water for project activity in year y (%)
Measured/calculated/default	Calculated
Source of data	Project Survey
Value(s) of monitored parameter	43%
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	Calculate the average amount of time spent collecting water in the project scenario and compare to the pre-project scenario

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QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	To quantify whether the project has contributed to a reduction in the amount of time spent collecting water compared to the pre-project scenario
Additional comments:	

Relevant SDG Indicator	SDG 5
Data/parameter:	Usage of time saved on water collection
Unit	Percentage
Description	Uses of time saved which was previously spent on water collection
Measured/calculated/default	Measured
Source of data	Project Survey
Value(s) of monitored parameter	1. (Unpaid) Domestic work (including cooking and caring for family members): 62% 2. Income generating activities: 26% 3. Religious activities: 1% 4. Social and leisure activities: 11% 5. Education and training: 0% 6. Other (Specify): 0%
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	Ask users how time saved on water collection in the project scenario, as opposed to the baseline scenario, is now being used
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	To quantify how time which was previously spent on water collection is now being used.
Additional comments:	

Relevant SDG Indicator	SDG 6
Data/parameter:	P _{access}
Unit	Number
Description	Number of additional persons having access to safe water in the project activity compared to the baseline scenario.
Measured/calculated/default	Calculated
Source of data	Household lists; Usage Survey

Value(s) of monitored parameter	GS5329: 2926 GS5330: 3079 GS5331: 3071 GS5332: 3116 GS5335: 3093 GS5336: 3094 GS5337: 3068 GS5338: 3098 GS5437: 3100 GS5438: 3047 GS5439: 3056 GS5440: 3097 GS5441: 3042
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Annually
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.
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	To calculate the additional number of persons having access to safe water in the project activity compared to the baseline scenario
Additional comments:	

Relevant SDG Indicator	SDG 6
Data/parameter:	Quality of Treated Water
Unit	Parameters as per the national Malawi water quality standard MS 733:2005
Description	Laboratory Tests
Measured/calculated/default	Measured
Source of data	Water quality tests
Value(s) of monitored parameter	Pass
Monitoring equipment	-
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	
QA/QC procedures:	
Purpose of data:	Ensure water is safe for human consumption without treatment using the baseline technology

Additional comments:	The recognised laboratory has certified each water supply in line with national standards MS 733:2005 which also adheres to the WHO guidelines.
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Relevant SDG Indicator	SDG 13
Data/parameter:	Np,y
Unit	Project Technology Days
Description	Number of persons consuming water supplied by project scenario p through year y
Measured/calculated/default	Calculated
Source of data	Borehole Project Database
Value(s) of monitored parameter	GS5329: 1,198,660 GS5330: 1,261,440 GS5331: 1,258,155 GS5332: 1,276,405 GS5335: 1,267,280 GS5336: 1,267,645 GS5337: 1,257,060 GS5338: 1,269,105 GS5437: 1,270,200 GS5438: 1,248,300 GS5439: 1,251,950 GS5440: 1,268,740 GS5441: 1,246,475
Monitoring equipment	Borehole Project Database
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Borehole users * Total crediting days
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	Calculate ERs
Additional comments:	

Relevant SDG Indicator	SDGs 3, 6 & 13
Data/parameter:	Up,y
Unit	Percentage
Description	Usage rate in project scenario p through year y
Measured/calculated/default	Measured
Source of data	Annual Usage Survey
Value(s) of monitored parameter	98%

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Monitoring equipment	The usage survey has been carried out by staff from in-country partner United Purpose to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	$Up,y = \text{Number of users of the borehole} / \text{Total number of households surveyed}$
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	Calculate ERs
Additional comments:	

Relevant SDG Indicator	SDGs 3 & 13
Data/parameter:	Qp,y
Unit	Litres per person per day
Description	Quantity of safe water supplied in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	Measured
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	7.5 (capped), 9.76 (actual)
Monitoring equipment	The WCFT is carried out by staff from in-country partner United Purpose to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
Measuring/reading/recording frequency:	Biennial
Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT is carried out by staff from in-country partner United Purpose to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	Calculate ERs
Additional comments:	

Relevant SDG Indicator	SDGs 3 & 13
Data/parameter:	Qp,cleanboil,y
Unit	Litres per person per day
Description	Quantity of safe water boiled in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	Measured
Source of data	WCFT
Value(s) of monitored parameter	0
Monitoring equipment	The WCFT is carried out by staff from in-country partner United Purpose to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
Measuring/reading/recording frequency:	Biennial
Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT is carried out by staff from in-country partner United Purpose to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	Calculate ERs
Additional comments:	

Relevant SDG Indicator	SDGs 3 & 13
Data/parameter:	Qp,rawboil,y
Unit	Litres per person per day
Description	The raw of unsafe water that is still boiled after installation of the water treatment technology
Measured/calculated/default	Measured
Source of data	WCFT
Value(s) of monitored parameter	0
Monitoring equipment	The WCFT is carried out by staff from in-country partner United Purpose to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
Measuring/reading/recording frequency:	Annual

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Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT is carried out by staff from in-country partner United Purpose to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	Calculate ERs
Additional comments:	

Relevant SDG Indicator	SDG 13
Data/parameter:	LEp,y
Unit	tCO2e per year
Description	Leakage in project scenario p during year y
Measured/calculated/default	Measured
Source of data	Baseline and monitoring surveys
Value(s) of monitored parameter	0
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	N/A
QA/QC procedures:	Guidance is always provided to all members of the projects team by senior project staff on the procedure and importance of collecting accurate monitoring information. Quality of data uploaded is assured by cross-checking against scans of the survey sheets by another member of the projects team to ensure no data entry errors have occurred.
Purpose of data:	Calculate ERs
Additional comments:	

D.3. Implementation of sampling plan

The project proponent has elected to cross-sample technologies across all its homogenous borehole VPAs located within the districts of Dowa and Kasungu. In this monitoring period, cross-sampling was conducted across VPAs 91-104 and 112-116. In accordance with the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1, the survey samples are randomly selected from the borehole user record. Each borehole user is assigned a unique random number which is then sorted in order from lowest to highest; the first nth HHs are selected for the survey. The size of the RSG is dependent on the methodological requirements and variance of the parameter being monitored to ensure the parameters measured satisfy 90/30 precision (90% confidence interval and 30% margin of error). The RSG is reselected for every monitoring period to ensure the selection remains random.

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Thus, the random sampling procedure is as follows; Following 90/30 precision, achieved using Raosoft Sample Size Calculator, it was found that 8 of the 190 boreholes across the Dowa and Kasungu districts would need to be selected for inclusion in the surveys. 8 boreholes were selected by generating a random list of numbers, using the Research Randomizer online resource. An aggregate list was then generated of users of the 8 selected boreholes, and these were ordered according to a random list of numbers, again using Research Randomizer. The first 120 users were selected for the Project Survey and Usage Survey (a selection of 100, with an extra 20 as buffer), which were conducted between 29/10/2019 and 06/11/2019. The same process was conducted for the WCFT, in which the first 60 boreholes selected, with surveys conducted between 29/10/2019 and 04/11/2019.

The Random sampling described above took place on 13/09/2019.

Water Quality tests are conducted for each verification as supporting documentation to confirm that each borehole is functioning. Cross sampling is applied to the following surveys:

- Project surveys – Completed annually.
- Usage Surveys – Completed annually.
- Water Consumption Field Tests – Completed biennially.

The surveys have been conducted to ensure that they are within the end date of the respective monitoring periods for each VPA and they satisfy the sampling requirements in the methodology.

SECTION E. Calculation of SDG outcomes

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

SDG 3 - Good Health and Wellbeing

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

C_j	Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.
$P_{b, boil}$	Percentage of persons boiling water for purification in the baseline scenario.

Number of persons consuming safe water in the baseline scenario:

GS5329: 1702

GS5330: 1791

GS5331: 1786

GS5332: 1812

GS5335: 1799

GS5336: 1800

GS5337: 1785

GS5338: 1802

GS5437: 1803

GS5438: 1772

GS5439: 1777

GS5440: 1801

GS5441: 1770

SDG 5 - Gender Equality

The average % decrease per household in time spent gathering firewood ($T_{b,y}$) 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. The baseline indicators are detailed in Section D.1 and are as follows:

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

Baseline time spent collecting water per household per day (hours) = $T_{b,y} = 1.53$

SDG 6 (Clean Water and Sanitation)

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

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

The number of persons having access to safe water in the baseline scenario:

GS5329: 358

GS5330: 380

GS5331: 376

GS5332: 381

GS5335: 379

GS5336: 379

GS5337: 376

GS5338: 379

GS5437: 380

GS5438: 373

GS5439: 374

GS5440: 379

GS5441: 373

SDG 13 (Climate Action)

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

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

Where:

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

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- NRB = Country-specific default value for the fraction of non-renewable biomass.
- EF_{b,fuel,co2} = Emissions factor of fuel consumed in the baseline scenario (CO₂).
- EF_{b,fuel,nonco2} = Emissions factor of fuel consumed in the baseline scenario (non- CO₂).
- NCV_{b,fuel} = Net calorific value of fuel consumed in the baseline scenario.

Resulting in the following:

- GS5329: 9,224 tCO₂e
- GS5330: 9,266 tCO₂e
- GS5331: 9,242 tCO₂e
- GS5332: 9,376 tCO₂e
- GS5335: 9,309 tCO₂e
- GS5336: 9,312 tCO₂e
- GS5337: 9,234 tCO₂e
- GS5338: 9,323 tCO₂e
- GS5437: 9,331 tCO₂e
- GS5438: 9,170 tCO₂e
- GS5439: 9,197 tCO₂e
- GS5440: 9,320 tCO₂e
- GS5441: 9,157 tCO₂e

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

SDG 3 - Good Health and Wellbeing

The outcome for SDG 3 is quantified as the additional number of persons consuming safe water and sanitation education in the project activity, compared to the baseline scenario (P_{safe}).

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

Where:

- P_{safe} Number of additional persons consuming safe water in the project activity compared to the baseline scenario.
- P_y Number of persons consuming safe water in the project activity.
- C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.
- $P_{b,boil}$ Percentage of persons boiling water for purification in the baseline scenario.

- GS5329: $3284 * (1 - 0.09) * (1 - 0.47) = 1582$
- GS5330: $3456 * (1 - 0.09) * (1 - 0.47) = 1665$
- GS5331: $3447 * (1 - 0.09) * (1 - 0.47) = 1661$
- GS5332: $3497 * (1 - 0.09) * (1 - 0.47) = 1685$
- GS5335: $3472 * (1 - 0.09) * (1 - 0.47) = 1673$
- GS5336: $3473 * (1 - 0.09) * (1 - 0.47) = 1673$
- GS5337: $3444 * (1 - 0.09) * (1 - 0.47) = 1659$
- GS5338: $3477 * (1 - 0.09) * (1 - 0.47) = 1675$

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$$GS5437: 3480*(1 - 0.09)*(1 - 0.47) = 1677$$

$$GS5438: 3477*(1 - 0.09)*(1 - 0.47) = 1648$$

$$GS5439: 3430*(1 - 0.09)*(1 - 0.47) = 1653$$

$$GS5440: 3476*(1 - 0.09)*(1 - 0.47) = 1675$$

$$GS5441: 3415*(1 - 0.09)*(1 - 0.47) = 1645$$

SDG 5 - Gender Equality

The outcome for SDG 5 is quantified as the overall reduction in time spent collecting water by the project activity, compared to the baseline scenario (TR_y).

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

Where:

TR _y	Total reduction time spent collecting water for project activity in year y (%)
T _{b,y}	Time spent collecting water per household per day prior to project (hours)
T _{p,y}	Time spent collecting water per household per day in project (hours)

$$\text{All VPAs: } (1.53 - 0.88) / 1.53 = 0.43 \text{ (43\%)}$$

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 (P_{access}).

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

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

$$GS5329: 3284*(1 - 0.09)*1 = 2926$$

$$GS5330: 3456*(1 - 0.09)*1 = 3079$$

$$GS5331: 3447*(1 - 0.09)*1 = 3071$$

$$GS5332: 3497*(1 - 0.09)*1 = 3116$$

$$GS5335: 3472*(1 - 0.09)*1 = 3093$$

$$GS5336: 3473*(1 - 0.09)*1 = 3094$$

$$GS5337: 3444*(1 - 0.09)*1 = 3068$$

$$GS5338: 3477*(1 - 0.09)*1 = 3098$$

$$GS5437: 3480*(1 - 0.09)*1 = 3100$$

$$GS5438: 3477*(1 - 0.09)*1 = 3047$$

$$GS5439: 3430*(1 - 0.09)*1 = 3056$$

$$GS5440: 3476*(1 - 0.09)*1 = 3097$$

$$GS5441: 3415*(1 - 0.09)*1 = 3042$$

SDG 13 (Climate Action)

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The outcome for SDG 6 is quantified as the total CO2-e emissions reduced by the project and are the indicator to demonstrate that the project has raised capacity for effective climate change-related planning and management. See fixed parameters in section D.1.

For calculations, see Section E.3.

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

SDG 3 - Good Health and Wellbeing

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

$$GS5329: 3284 * (1 - 0.09) * (1 - 0.47) = 1582$$

$$GS5330: 3456 * (1 - 0.09) * (1 - 0.47) = 1665$$

$$GS5331: 3447 * (1 - 0.09) * (1 - 0.47) = 1661$$

$$GS5332: 3497 * (1 - 0.09) * (1 - 0.47) = 1685$$

$$GS5335: 3472 * (1 - 0.09) * (1 - 0.47) = 1673$$

$$GS5336: 3473 * (1 - 0.09) * (1 - 0.47) = 1673$$

$$GS5337: 3444 * (1 - 0.09) * (1 - 0.47) = 1659$$

$$GS5338: 3477 * (1 - 0.09) * (1 - 0.47) = 1675$$

$$GS5437: 3480 * (1 - 0.09) * (1 - 0.47) = 1677$$

$$GS5438: 3477 * (1 - 0.09) * (1 - 0.47) = 1648$$

$$GS5439: 3430 * (1 - 0.09) * (1 - 0.47) = 1653$$

$$GS5440: 3476 * (1 - 0.09) * (1 - 0.47) = 1675$$

$$GS5441: 3415 * (1 - 0.09) * (1 - 0.47) = 1645$$

SDG 5 - Gender Equality

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

$$\text{All VPAs: } (1.53 - 0.88) / 1.53 = 0.43 \text{ (43\%)}$$

SDG 6 (Clean Water and Sanitation)

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

$$GS5329: 3284 * (1 - 0.09) * 1 = 2926$$

$$GS5330: 3456 * (1 - 0.09) * 1 = 3079$$

$$GS5331: 3447 * (1 - 0.09) * 1 = 3071$$

$$GS5332: 3497 * (1 - 0.09) * 1 = 3116$$

$$GS5335: 3472 * (1 - 0.09) * 1 = 3093$$

$$GS5336: 3473 * (1 - 0.09) * 1 = 3094$$

$$GS5337: 3444 * (1 - 0.09) * 1 = 3068$$

$$GS5338: 3477 * (1 - 0.09) * 1 = 3098$$

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GS5437: $3480 * (1 - 0.09) * 1 = 3100$

GS5438: $3477 * (1 - 0.09) * 1 = 3047$

GS5439: $3430 * (1 - 0.09) * 1 = 3056$

GS5440: $3476 * (1 - 0.09) * 1 = 3097$

GS5441: $3415 * (1 - 0.09) * 1 = 3042$

SDG 13 (Climate Action)

Emission Reductions Calculations per VPA:

GS5329			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	$EF_{b,fuel,co2}$	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	$EF_{b,fuel,non-co2}$	8.692	TCO ₂ /TJ
Net calorific value of fuel	$NCV_{,b,fuel}$	0.0156	TJ/T
Quantity of fuel consumed at baseline	$B_{b,y}$	7358.3	T
Baseline emissions per year	$BE_{b,y}$	12,826	tCO ₂ /y
Project emissions per year	$PE_{p,y}$	0	tCO ₂ /y
Usage rate	$U_{p,y}$	0.98	Fraction
Leakage	$LE_{p,y}$	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,086	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5330			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	$EF_{b,fuel,co2}$	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	$EF_{b,fuel,non-co2}$	8.692	TCO ₂ /TJ
Net calorific value of fuel	$NCV_{,b,fuel}$	0.0156	TJ/T
Quantity of fuel consumed at baseline	$B_{b,y}$	7,743.68	T
Baseline emissions per year	$BE_{b,y}$	13,497	tCO ₂ /y
Project emissions per year	$PE_{p,y}$	0	tCO ₂ /y
Usage rate	$U_{p,y}$	0.98	Fraction
Leakage	$LE_{p,y}$	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,719	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5331			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	$EF_{b,fuel,co2}$	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	$EF_{b,fuel,non-co2}$	8.692	TCO ₂ /TJ
Net calorific value of fuel	$NCV_{,b,fuel}$	0.0156	TJ/T
Quantity of fuel consumed at baseline	$B_{b,y}$	7,723.51	T

GS5331			
Baseline emissions per year	BE _{b,y}	13,462	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y
Usage rate	U _{p,y}	0.98	Fraction
Leakage	LE _{p,y}	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,686	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5332			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	EF _{b,fuel,co2}	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	EF _{b,fuel,non-co2}	8.692	TCO ₂ /TJ
Net calorific value of fuel	NCV _{b,fuel}	0.0156	TJ/T
Quantity of fuel consumed at baseline	B _{b,y}	7,835.55	T
Baseline emissions per year	BE _{b,y}	13,658	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y
Usage rate	U _{p,y}	0.98	Fraction
Leakage	LE _{p,y}	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,870	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5335			
NRB	NRB	0.92000	Fraction
Emissions factor fuel (co2)	EF _{b,fuel,co2}	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	EF _{b,fuel,non-co2}	8.692	TCO ₂ /TJ
Net calorific value of fuel	NCV _{b,fuel}	0.0156	TJ/T
Quantity of fuel consumed at baseline	B _{b,y}	7,779.53	T
Baseline emissions per year	BE _{b,y}	13,560	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y
Usage rate	U _{p,y}	0.98	Fraction
Leakage	LE _{p,y}	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,778	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5336			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	EF _{b,fuel,co2}	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	EF _{b,fuel,non-co2}	8.692	TCO ₂ /TJ
Net calorific value of fuel	NCV _{b,fuel}	0.0156	TJ/T
Quantity of fuel consumed at baseline	B _{b,y}	7,781.77	T
Baseline emissions per year	BE _{b,y}	13,564	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y

GS5336			
Usage rate	$U_{p,y}$	0.98	Fraction
Leakage	$LE_{p,y}$	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,781	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5337			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	$EF_{b,fuel,co2}$	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	$EF_{b,fuel,non-co2}$	8.692	Tco ₂ /TJ
Net calorific value of fuel	$NCV_{,b,fuel}$	0.0156	TJ/T
Quantity of fuel consumed at baseline	$B_{b,y}$	7,716.79	T
Baseline emissions per year	$BE_{b,y}$	13,451	tCO ₂ /y
Project emissions per year	$PE_{p,y}$	0	tCO ₂ /y
Usage rate	$U_{p,y}$	0.98	Fraction
Leakage	$LE_{p,y}$	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,675	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5338			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	$EF_{b,fuel,co2}$	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	$EF_{b,fuel,non-co2}$	8.692	Tco ₂ /TJ
Net calorific value of fuel	$NCV_{,b,fuel}$	0.0156	TJ/T
Quantity of fuel consumed at baseline	$B_{b,y}$	7,790.73	T
Baseline emissions per year	$BE_{b,y}$	13,579	tCO ₂ /y
Project emissions per year	$PE_{p,y}$	0	tCO ₂ /y
Usage rate	$U_{p,y}$	0.98	Fraction
Leakage	$LE_{p,y}$	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,796	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5437			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	$EF_{b,fuel,co2}$	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	$EF_{b,fuel,non-co2}$	8.692	Tco ₂ /TJ
Net calorific value of fuel	$NCV_{,b,fuel}$	0.0156	TJ/T
Quantity of fuel consumed at baseline	$B_{b,y}$	7,797.46	T
Baseline emissions per year	$BE_{b,y}$	13,591	tCO ₂ /y
Project emissions per year	$PE_{p,y}$	0	tCO ₂ /y
Usage rate	$U_{p,y}$	0.98	Fraction
Leakage	$LE_{p,y}$	0	tCO ₂ /y

GS5437			
Percentage of suppressed demand users		96.15%	
Overall ERs		12,807	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5438			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	EF _{b,fuel,co2}	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	EF _{b,fuel,non-co2}	8.692	TCO ₂ /TJ
Net calorific value of fuel	NCV _{b,fuel}	0.0156	TJ/T
Quantity of fuel consumed at baseline	B _{b,y}	7,663.02	T
Baseline emissions per year	BE _{b,y}	13,357	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y
Usage rate	U _{p,y}	0.98	Fraction
Leakage	LE _{p,y}	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,586	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5439			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	EF _{b,fuel,co2}	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	EF _{b,fuel,non-co2}	8.692	TCO ₂ /TJ
Net calorific value of fuel	NCV _{b,fuel}	0.0156	TJ/T
Quantity of fuel consumed at baseline	B _{b,y}	7,685.42	T
Baseline emissions per year	BE _{b,y}	13,396	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y
Usage rate	U _{p,y}	0.98	Fraction
Leakage	LE _{p,y}	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,623	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5440			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	EF _{b,fuel,co2}	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	EF _{b,fuel,non-co2}	8.692	TCO ₂ /TJ
Net calorific value of fuel	NCV _{b,fuel}	0.0156	TJ/T
Quantity of fuel consumed at baseline	B _{b,y}	7,788.49	T
Baseline emissions per year	BE _{b,y}	13,575	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y
Usage rate	U _{p,y}	0.98	Fraction
Leakage	LE _{p,y}	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	

GS5440			
Overall ERs		12,792	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

GS5441			
NRB	NRB	0.92	Fraction
Emissions factor fuel (co2)	EF _{b,fuel,co2}	112	tCO ₂ /TJ
Emissions factor fuel (non-co2)	EF _{b,fuel,non-co2}	8.692	TCO ₂ /TJ
Net calorific value of fuel	NCV _{,b,fuel}	0.0156	TJ/T
Quantity of fuel consumed at baseline	B _{b,y}	7,651.81	T
Baseline emissions per year	BE _{b,y}	13,337	tCO ₂ /y
Project emissions per year	PE _{p,y}	0	tCO ₂ /y
Usage rate	U _{p,y}	0.98	Fraction
Leakage	LE _{p,y}	0	tCO ₂ /y
Percentage of suppressed demand users		96.15%	
Overall ERs		12,568	tCO ₂ -e
Overall ERs (capped)		10,000	tCO ₂ -e

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

Item	Baseline estimate	Project estimate	Net benefit
SDG 3	People consuming safe water in the baseline:	People consuming safe water in the project:	Additional people consuming safe water:
	GS5329: 1702	GS5329: 3284	GS5329: 1582
	GS5330: 1791	GS5330: 3456	GS5330: 1665
	GS5331: 1786	GS5331: 3447	GS5331: 1661
	GS5332: 1812	GS5332: 3497	GS5332: 1685
	GS5335: 1799	GS5335: 3472	GS5335: 1673
	GS5336: 1800	GS5336: 3473	GS5336: 1673
	GS5337: 1785	GS5337: 3444	GS5337: 1659
	GS5338: 1802	GS5338: 3477	GS5338: 1675
	GS5437: 1803	GS5437: 3480	GS5437: 1677
	GS5438: 1772	GS5438: 3420	GS5438: 1648
	GS5439: 1777	GS5439: 3430	GS5439: 1653
	GS5440: 1801	GS5440: 3476	GS5440: 1675
	GS5441: 1770	GS5441: 3415	GS5441: 1645
SDG 5	1.53 hours spent collecting water per HH per day	0.88 hours spent collecting water per HH per day	0.65 hours saved (43% reduction) on time spent collecting water

<p>SDG 6</p>	<p>People with access to safe water in the baseline:</p> <p>GS5329: 358</p> <p>GS5330: 380</p> <p>GS5331: 376</p> <p>GS5332: 381</p> <p>GS5335: 379</p> <p>GS5336: 379</p> <p>GS5337: 376</p> <p>GS5338: 379</p> <p>GS5437: 380</p> <p>GS5438: 373</p> <p>GS5439: 374</p> <p>GS5440: 379</p> <p>GS5441: 373</p>	<p>People with access to safe water in the project:</p> <p>GS5329: 3284</p> <p>GS5330: 3456</p> <p>GS5331: 3447</p> <p>GS5332: 3497</p> <p>GS5335: 3472</p> <p>GS5336: 3473</p> <p>GS5337: 3444</p> <p>GS5338: 3477</p> <p>GS5437: 3480</p> <p>GS5438: 3420</p> <p>GS5439: 3430</p> <p>GS5440: 3476</p> <p>GS5441: 3415</p>	<p>Additional people with access to safe water:</p> <p>GS5329: 2926</p> <p>GS5330: 3079</p> <p>GS5331: 3071</p> <p>GS5332: 3116</p> <p>GS5335: 3093</p> <p>GS5336: 3094</p> <p>GS5337: 3068</p> <p>GS5338: 3098</p> <p>GS5437: 3100</p> <p>GS5438: 3047</p> <p>GS5439: 3056</p> <p>GS5440: 3097</p> <p>GS5441: 3042</p>
<p>SDG 13</p>	<p>GS5329: 10,000 tCO2-e</p> <p>GS5330: 10,000 tCO2-e</p> <p>GS5331: 10,000 tCO2-e</p> <p>GS5332: 10,000 tCO2-e</p> <p>GS5335: 10,000 tCO2-e</p> <p>GS5336: 10,000 tCO2-e</p> <p>GS5337: 10,000 tCO2-e</p> <p>GS5338: 10,000 tCO2-e</p> <p>GS5437: 10,000 tCO2-e</p> <p>GS5438: 10,000 tCO2-e</p> <p>GS5439: 10,000 tCO2-e</p> <p>GS5440: 10,000 tCO2-e</p> <p>GS5441: 10,000 tCO2-e</p>	<p>GS5329: 0 tCO2-e</p> <p>GS5330: 0 tCO2-e</p> <p>GS5331: 0 tCO2-e</p> <p>GS5332: 0 tCO2-e</p> <p>GS5335: 0 tCO2-e</p> <p>GS5336: 0 tCO2-e</p> <p>GS5337: 0 tCO2-e</p> <p>GS5338: 0 tCO2-e</p> <p>GS5437: 0 tCO2-e</p> <p>GS5438: 0 tCO2-e</p> <p>GS5439: 0 tCO2-e</p> <p>GS5440: 0 tCO2-e</p> <p>GS5441: 0 tCO2-e</p>	<p>GS5329: 10,000 ERs</p> <p>GS5330: 10,000 ERs</p> <p>GS5331: 10,000 ERs</p> <p>GS5332: 10,000 ERs</p> <p>GS5335: 10,000 ERs</p> <p>GS5336: 10,000 ERs</p> <p>GS5337: 10,000 ERs</p> <p>GS5338: 10,000 ERs</p> <p>GS5437: 10,000 ERs</p> <p>GS5438: 10,000 ERs</p> <p>GS5439: 10,000 ERs</p> <p>GS5440: 10,000 ERs</p> <p>GS5441: 10,000 ERs</p>

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

Estimates taken from Transition Annex as the project began prior to transition.

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
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<p>SDG 3</p>	<p>GS5329: 1657 GS5330: 1665 GS5331: 1661 GS5332: 1685 GS5335: 1673 GS5336: 1673 GS5337: 1659 GS5338: 1675 GS5437: 1677 GS5438: 1648 GS5439: 1653 GS5440: 1675 GS5441: 1645</p>	<p>GS5329: 1582 GS5330: 1665 GS5331: 1661 GS5332: 1685 GS5335: 1673 GS5336: 1673 GS5337: 1659 GS5338: 1675 GS5437: 1677 GS5438: 1648 GS5439: 1653 GS5440: 1675 GS5441: 1645</p>
<p>SDG 5</p>	<p>SDG 5: at least 0.5 hours per trip per household time saved.</p>	<p>0.65 hours saved (43% reduction) on time spent collecting water per trip per household.</p>
<p>SDG 6</p>	<p>GS5329: 2502 GS5330: 2513 GS5331: 2507 GS5332: 2543 GS5335: 2525 GS5336: 2526 GS5337: 2505 GS5338: 2529 GS5437: 2531 GS5438: 2487 GS5439: 2495 GS5440: 2528 GS5441: 2484</p>	<p>GS5329: 2926 GS5330: 3079 GS5331: 3071 GS5332: 3116 GS5335: 3093 GS5336: 3094 GS5337: 3068 GS5338: 3098 GS5437: 3100 GS5438: 3047 GS5439: 3056 GS5440: 3097 GS5441: 3042</p>

SDG 13	GS5329: 9,224 tCO2e	GS5329: 10,000 tCO2e
	GS5330: 9,266 tCO2e	GS5330: 10,000 tCO2e
	GS5331: 9,242 tCO2e	GS5331: 10,000 tCO2e
	GS5332: 9,376 tCO2e	GS5332: 10,000 tCO2e
	GS5335: 9,309 tCO2e	GS5335: 10,000 tCO2e
	GS5336: 9,312 tCO2e	GS5336: 10,000 tCO2e
	GS5337: 9,234 tCO2e	GS5337: 10,000 tCO2e
	GS5338: 9,323 tCO2e	GS5338: 10,000 tCO2e
	GS5437: 9,331 tCO2e	GS5437: 10,000 tCO2e
	GS5438: 9,170 tCO2e	GS5438: 10,000 tCO2e
	GS5439: 9,197 tCO2e	GS5439: 10,000 tCO2e
	GS5440: 9,320 tCO2e	GS5440: 10,000 tCO2e
	GS5441: 9,157 tCO2e	GS5441: 10,000 tCO2e

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

Concerning SDG 5, the slightly higher outcome is likely due to a conservative estimate made in the ex-ante calculations.

Concerning SDG 6, the higher outcome is due to achieving a slightly higher usage rate than expected.

Concerning SD3, GS5329, the discrepancy is due to the removal of the Simenti borehole from this VPA, which broke down before WQTs could be conducted, and was found to be non-repairable. Had this borehole still been functional, the estimated value would have been achieved.

SECTION F. Stakeholder inputs and legal disputes

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

>> No input or grievances were received in 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

>> No input or grievances were received in previous monitoring periods.

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

No legal contests or disputes have arisen during the monitoring period.