



**GS1247 Improved Kitchen Regimes Multi-Country PoA
Gatsibo Borehole Projects
GS3430, GS3431, GS3432, GS3433, GS4202, GS4203**

Monitoring Report



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Monitoring Report Information

Monitoring Period	MP 1 – 04/11/2014-05/02/2016
Reference number of the project activity	GS3430, GS3431, GS3432, GS3433, GS4202, GS4203
Version number of the monitoring report	4
Completion date of the monitoring report	05/02/2016
Prepared By	Eszter Hegyi

Project Summary

In partnership with Likano Project Development GmbH, Open Circle Investments Pty Ltd and CO2balance UK Ltd is implementing a number of Micro-Scale Voluntary Project Activities under PoA 1247 in the districts of Gatsibo which are eligible under the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption. Local people typically use wood fuel on inefficient three stone fires for cooking and water purification, which results in the release of greenhouse gas emissions from the combustion of wood. This can be avoided if a technology that does not require fuel (wood or fossil) supplies clean water desired by households.

Gatsibo is a largely rural District in which local people typically use wood fuel on inefficient three-stone fires to purify their drinking, cleaning and washing water. This process results in the release of greenhouse gas emissions from the combustion of wood. This can be avoided if a technology that does not require fuel (wood or fossil), supplies the clean water desired by households. Many existing boreholes are owned by community groups and have fallen into disrepair because maintenance programmes have been poorly managed, or proven too expensive. In this project co2balance UK Ltd., Likano Project Development GmbH and Open Circle Investments Pty Ltd work with community groups and a local NGO partner, Rwandans4Water in Gatsibo District, to identify broken down boreholes and renovate them so that they deliver clean, safe water and breakdowns are fixed rapidly.

The date of rehabilitation was confirmed by a Repair Confirmation Form which was signed by the mechanic employed by the local NGO partner, carrying out the repair along with an elected representative of the community group owners of the borehole. The date of rehabilitation was used as the start date of operation and crediting for each borehole; we have conservatively assumed that the first day of crediting is not counted.

The number of days each borehole credited for in this monitoring period was multiplied by the number of people using the borehole to give the total number of project technology days for that borehole. The individual project technology days for each borehole were totaled to give the total number of project technology days for this monitoring period.

In total 54 boreholes were rehabilitated as part of six VPAs between the 4th November 2014 and 1st September 2015. The date of rehabilitation, the project ID, location and number of people served by each borehole is given in the table below, which forms the project database.

Borehole ID	Date of Rehabilitation	Lat	Long	Number of people using borehole	Mode of use
GS3430					
GAT010	05/11/2014	-1.79623	30.38889	726	Domestic
GAT011	04/11/2014	-1.81366	30.37515	583	Domestic
GAT012	10/11/2014	-1.66539	30.41101	503	Domestic
GAT013	04/06/2015	-1.68831	30.43399	325	Domestic
GAT014	04/06/2015	1.6457	30.4235	692	Domestic

GAT015	01/06/2015	1.80356	30.40954	824	Domestic
GAT016	05/06/2015	1.7552	30.3639	583	Domestic
GAT017	05/06/2015	1.70231	30.41547	627	Domestic
GAT018	06/06/2015	1.61215	30.38777	521	Domestic
GS3431					
GAT019	06/06/2015	1.62592	30.4311	600	Domestic
GAT020	08/06/2015	1.73264	30.39679	605	Domestic
GAT021	08/06/2015	1.59851	30.46499	479	Domestic
GAT022	09/06/2015	-1.6129	30.46591	500	Domestic
GAT023	03/06/2015	-1.79045	30.37594	519	Domestic
GAT024	01/06/2015	-1.79594	30.37632	427	Domestic
GAT025	09/06/2015	-1.643	30.4351	882	Domestic
GAT026	03/06/2015	-1.77015	30.34641	623	Domestic
GAT027	02/06/2015	-1.77091	30.35111	514	Domestic
GS3432					
GAT028	02/06/2015	-1.77097	30.35395	526	Domestic
GAT029	10/06/2015	-1.6406	30.39029	626	Domestic
GAT030	10/06/2015	-1.60261	30.42379	438	Domestic
GAT031	11/06/2015	-1.58999	30.39139	545	Domestic
GAT032	11/06/2015	-1.58672	30.3437	857	Domestic
GAT033	12/06/2015	-1.81343	30.44441	1058	Domestic
GAT034	12/06/2015	-1.701261	30.446767	507	Domestic
GAT035	13/06/2015	-1.6312	30.4297	725	Domestic
GAT036	13/06/2015	-1.62834	30.43798	519	Domestic
GS3433					
GAT037	15/06/2015	-1.7264	30.3922	589	Domestic
GAT038	16/06/2015	-1.6637	30.4354	506	Domestic
GAT039	17/06/2015	-1.656	30.4256	556	Domestic
GAT040	17/06/2015	-1.60402	30.33127	444	Domestic
GAT041	18/06/2015	-1.65979	30.43514	524	Domestic
GAT042	19/06/2015	-1.54559	30.35735	921	Domestic
GAT043	26/08/2015	-1.7418	30.38926	655	Domestic
GAT044	21/08/2015	-1.79851	30.36953	239	Domestic
GAT045	21/08/2015	-1.79506	30.36255	252	Domestic
GS4202					
GAT046	24/08/2015	-1.79391	30.3562	185	Domestic
GAT047	27/08/2015	-1.79285	30.35239	188	Domestic
GAT048	26/08/2015	-1.62962	30.37743	1013	Domestic
GAT049	19/08/2015	-1.64673	30.45684	468	Domestic
GAT050	25/08/2015	-1.66785	30.41568	529	Domestic
GAT051	20/08/2015	-1.80712	30.31485	463	Domestic
GAT052	20/08/2015	-1.80419	30.31039	595	Domestic
GAT053	01/09/2015	-1.85073	30.46383	519	Domestic
GAT054	21/08/2015	-1.80172	30.42948	485	Domestic
GS4203					
GAT055	19/08/2015	-1.59373	30.51485	823	Domestic

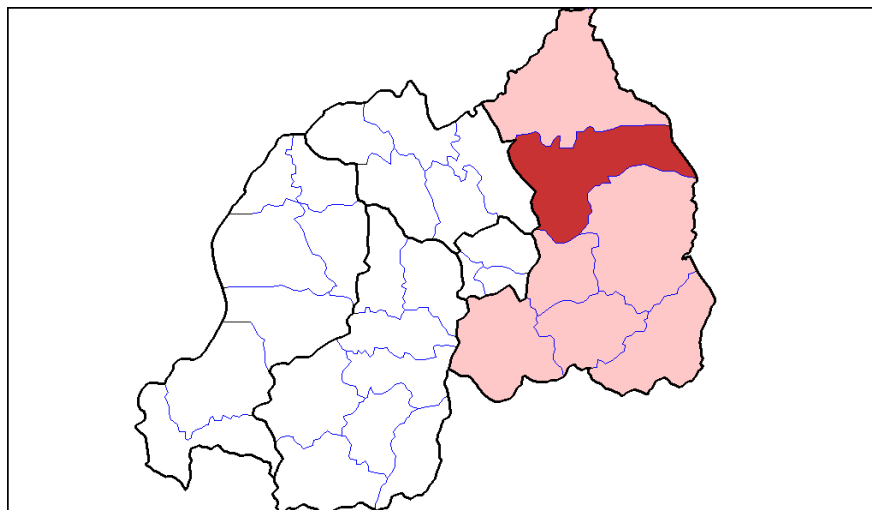
GAT056	26/08/2015	-1.67042	30.45224	488	Domestic
GAT057	28/08/2015	-1.67283	30.39238	434	Domestic
GAT058	28/08/2015	-1.67588	30.38931	388	Domestic
GAT059	18/08/2015	-1.66049	30.40731	445	Domestic
GAT060	24/08/2015	-1.78246	30.40674	533	Domestic
GAT061	18/08/2015	-1.66005	30.46137	820	Domestic
GAT062	31/08/2015	-1.67711	30.40872	431	Domestic
GAT063	27/08/2015	-1.67564	30.46383	436	Domestic

Project Location

This project is located in Gatsibo District, Eastern Province of Rwanda. Below is the geographic reference to allow unique identification of the project boundary. The target area and the fuel collection area are defined as being contained within project boundary, with the outer limits of the project boundary being clearly defined below. As the majority of beneficiaries collect their wood fuel locally in close proximity to their homesteads, the woodfuel collection area and target area are considered the same.



Map 1 Country map of Rwanda



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Map 2 Eastern Province and Gatsibo district within (dark red)

Hydrography of Rwanda

Rwanda is a country located in the Great Lakes Region of Africa. Its topography gradually rises from the East at an average altitude of 1,250 m to the North and West where it culminates in a mountain range called “Congo-Nile Ridge” varying from 2,200 m to 3,000 m and a volcano formation, the highest volcano being 4,507 m high (*Rwanda Natural Resources Authority, 2011*). This topography is characterized by a vast number of hills and mountains, a fact which results in high soil erosion and loss of water. Rwanda possesses a dense hydrographical network. Lakes occupy 128,190 ha; rivers cover an area of 7,260 ha and water in wetlands and valleys cover a total of 77,000 ha (*Ministry of Lands, Environment, Forests, Water and Mines (MINITERE), 2004*).

Water Infrastructure of Rwanda

Where water is accessible from easily and freely available unprotected sources (unprotected springs, open wells, surface water bodies) an (unknown) part of the population tends to use these sources, at least for purposes other than human consumption (drinking and cooking). According to the Rwanda Ministry of Infrastructure (2010) the sustainable operation and management of rural water supply infrastructure is one of the key challenges of this sub-sector. Approximately one third of the existing infrastructure (about 850 rural water systems) needs rehabilitation.

Organisational Structure

Likano Project Development GmbH and Open Circle Investments Pty Ltd are the project financier while CO2balance UK Ltd, is the managing entity and is responsible for communication with the Gold Standard. The two project implementers work together with a local NGO, Rwandans4Water and local project field staff from FAPDR who handle monitoring data collection and processing.

Two local project partners Rwandas4Water and FAPDR are responsible for the rehabilitation and maintenance of the boreholes, as well as the collection of the data to support this process. A permanent project officer is located at the project sites to oversee and coordinate the work completed by the contractors. The project officer is also responsible for coordinating the WASH programme, conducting monitoring exercises and identifying any maintenance works. All data that is collected in the field is processed at the the NGOs’ Kigali office then sent to the CO2balance UK project manager.

Continent	Country	Region	District	Sector	Sub-Location	Geographical Reference	
Africa	Rwanda	Eastern Province	Gatsibo	N/A	N/A	-1.62	30.20

Description of monitoring system

All surveys are administered by trained CO2balance staff and partner NGOs that are local to the area and conversant in the local dialects to ensure that the responses are consistent and not biased by any regional language barriers. Each participant is provided with a briefing on the purpose of the survey and is assured that no individual names are used in the analysis.

The results of the surveys are collated in excel spreadsheets and stored on a central server in an electronic format then is sent to the UK head office for data analysis. The documentation procedure devised ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in the Kigali 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. 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 90/10 precision (90% confidence interval and 10% margin of error). The RSG 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
- GPS location of the borehole
- Model of the borehole
- Quantity of boreholes installed
- The total number of people obtaining their water from each borehole
- Mode of use: commercial/domestic

The total number of households using each borehole has been determined through the lists supplied by the community group and district officials. Rwandans4Water further conducts studies to screen and determine the exact number of people the rehabilitated boreholes. Using this method, the total number of people using each borehole has been fixed and hence a figure for person days can be calculated.

Ongoing Monitoring Studies

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

- **Water consumption field test** (Equation parameters $Q_{p,y}$ and $Q_{p,rawboil,y}$) – Completed prior to first verification and then biennially.
- **Quality of the treated water** - The quality of the treated water will be assessed to ensure that it is fit for human consumption. The parameters used to assess the water quality will be in line with Rwandan standards for potable water and all parameters will be shown to be within levels considered acceptable for domestic human consumption as per the WHO guidelines.
- **Usage Survey** - As all boreholes have been installed within 1 year of the start of the crediting period and are expected to last the lifetime of the project, minimum samples of 30 for different aged technologies will not be necessary. Therefore the annual usage survey will be conducted using a minimum sample size of 100.
- **Project Survey** – Conducted on 100 households, surveying end users currently using project technologies to explore changes in project scenario over time
- **Leakage** - The PDD has described which sources of leakage detailed within the methodology are relevant to this project and which have been discounted.

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

Cross Sampling

The project proponent has elected to cross-sample technologies across all its homogenous borehole VPAs located within the districts of the Eastern Province including Gatsibo. 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 were applied to the following surveys;

- Project surveys
- Usage Surveys
- Water Consumption Field Tests

The surveys have been conducted so as to ensure that they are within the end date of the respective monitoring periods for the VPAs.

Fixed Parameters

The following data was fixed at validation.

Data / Parameter:	C_j
Data 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 used:	Baseline study. Credible literature, studies, survey, reports, relevant to the project target area
Value applied:	9.6%
Justification of the choice of data or description of measurement methods and procedures actually applied:	The portion of safe water users is determined through the baseline project survey and refers to the number of users that already use safe water from water sources such as boreholes.
Any comment:	-

Data / Parameter:	$EF_{b,co2}$
Data unit:	tco_2/TJ
Description:	co_2 emission factor arising from use of fuels in baseline scenario
Source of data used:	IPCC default value
Value applied:	112
Justification of the choice of data or description of measurement	Deemed valid by Methodology

methods and procedures actually applied:	
Any comment:	-

Data / Parameter:	$EF_{b,non\ CO_2}$
Data unit:	tCO_2/TJ
Description:	Non- CO_2 emission factor arising from use of fuels in baseline scenario
Source of data used:	IPCC default value
Value applied:	8.692
Justification of the choice of data or description of measurement methods and procedures actually applied:	Deemed valid by Methodology
Any comment:	-

Data / Parameter:	EF_{p,CO_2}
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor arising from use of fuels in project scenario
Source of data used:	IPCC default value
Value applied:	112
Justification of the choice of data or description of measurement methods and procedures actually applied:	Deemed valid by Methodology
Any comment:	-

Data / Parameter:	$EF_{p,non\ CO_2}$
Data unit:	tCO_2/TJ
Description:	Non- CO_2 emission factor arising from use of fuels in project scenario
Source of data used:	IPCC default value
Value applied:	8.692
Justification of the choice of data or description of measurement methods and procedures actually applied:	Deemed valid by Methodology
Any comment:	-

Data / Parameter:	NCV_b
Data unit:	TJ/ton
Description:	Net calorific value of the fuels used in the baseline

Source of data used:	IPCC default value
Value applied:	0.0156
Justification of the choice of data or description of measurement methods and procedures actually applied:	Deemed valid by Methodology
Any comment:	-

Data / Parameter:	NCV_p
Data unit:	TJ/ton
Description:	Net calorific value of the fuels used in the project
Source of data used:	IPCC default value
Value applied:	0.0156
Justification of the choice of data or description of measurement methods and procedures actually applied:	Deemed valid by Methodology
Any comment:	-

Data / Parameter:	$f_{NRB,i,y}$
Data unit:	Fractional non-renewability
Description:	Non-renewability status of woody biomass fuel in scenario i during year y
Source of data used:	CDM Default National Figure
Value applied:	0.98
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	-

Data / Parameter:	$W_{b,y}$
Data unit:	T/litre
Description:	Quantity of fuel that is used to treat 1 litre of water in the baseline scenario b during year y
Source of data to be used:	Baseline Water Boiling Test
Value of data applied for the purpose of calculating expected emission reductions	0.0007363
Description of measurement	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: <i>Technologies and</i>

methods and procedures to be applied:	<i>Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
Any comment:	

Data / Parameter:	$W_{p,y}$
Data unit:	T/litre
Description:	Quantity of fuel that is used to treat 1 litre of water in the project scenario p during year y
Source of data to be used:	Baseline Water Boiling Test
Value of data applied for the purpose of calculating expected emission reductions	0.0007363
Description of measurement methods and procedures to be applied:	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: <i>Technologies and Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
Any comment:	

Data / Parameter:	Non Suppressed demand
Data 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 used:	Baseline study. Credible literature, studies, survey, reports, relevant to the project target area
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	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.
Any comment:	-

Monitored Parameters

As outlined in section 5.2 the following parameters are monitored in line with the methodological requirements and monitoring plan. The results are given in the parameter boxes below followed by an analysis of the surveys in section 8.

Data / Parameter:	N p,y
Data unit:	Project Technology Days
Description:	Number of persons consuming water supplied by project scenario p through year y
Source of data to be used:	Borehole Project Database
Value of data applied for the purpose of calculating expected emission reductions	1,701,512 – GS3430 1,257,659 – GS3431 1,388,184 – GS3432 1,013,391 – GS3433 734,181 – GS4202 794,786 – GS4203
Description of measurement methods and procedures to be applied:	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 for each VPA in this monitoring period.
Any comment:	

Data / Parameter:	U p,y
Data unit:	Percentage
Description:	Usage rate in project scenario p through year y
Source of data to be used:	Annual Usage Survey
Value of data applied for the purpose of calculating expected emission reductions	100
Description of measurement methods and procedures to be applied:	The usage survey has been carried out by staff trained by CO2balance and local in-country partner FAPDR to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by the project developers.
Any comment:	

Data / Parameter:	Qp,y
Data 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
Source of data to be used:	Water Consumption Field Test (WCFT)
Value of data applied for the purpose of calculating expected emission reductions	5.07
Description of measurement	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT was carried out by

methods and procedures to be applied:	staff trained by CO2balance and local in-country partner FAPDR to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by project developers
Any comment:	The WCFT test showed 8.5 litres of safe water consumed per person per day, however was capped at 5.07 (at the stage of pre-issuance) as one specific parameter measured is subject to TAC approval.

Data / Parameter:	Qp,cleanboil,y
Data 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
Source of data to be used:	Water Consumption Field Test (WCFT)
Value of data applied for the purpose of calculating expected emission reductions	1.52
Description of measurement methods and procedures to be applied:	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by staff trained by CO2balance and local in-country partner FAPDR to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by project developers.
Any comment:	

Data / Parameter:	Qp,rawboil, y
Data unit:	Litres per person per day
Description:	The raw of unsafe water that is still boiled after installation of the water treatment technology
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions	0
Description of measurement methods and procedures to be applied:	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by staff trained by CO2balance and local in-country partner FAPDR to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by project developers.

Any comment:	
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Data / Parameter:	Quality of Treated Water
Data unit:	Parameters as per national standards
Description:	Performance of the treatment technology
Source of data to be used:	Laboratory Tests
Value of data applied for the purpose of calculating expected emission reductions	Pass
Description of measurement methods and procedures to be applied:	The Kigali based recognised laboratory has certified each water supply in line with national standards which also adheres to the WHO guidelines.
Any comment:	

Data / Parameter:	LE _{p,y}
Data unit:	tCO ₂ e per year
Description:	Leakage in project scenario p during year y
Source of data to be used:	Baseline and monitoring surveys
Value of data applied for the purpose of calculating expected emission reductions	0
Description of measurement methods and procedures to be applied:	Assessed every two years using baseline and monitoring surveys
Any comment:	

Survey Analysis

Water Consumption Field Test

The Water Consumption Field Test was carried out on a randomly selected sample of households from the borehole user list. In line with the CDM Guidelines on Sampling, the following equations were used to estimate the sample size required to achieve the confidence/precision required by the methodology (90/10).

$$n \geq \frac{z^2 \times N \times V}{(N-1) \times \text{precision}^2 + z^2 \times V}$$

Where:

$$V = \left(\frac{SD}{\text{mean}} \right)^2$$

The tests were conducted over the course of 4 days in November, 2015 (1 day preparation and 3 days measurement) in people’s homes following a similar method as the Kitchen Performance Test. 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 week days (weekdays) and an overall average per household was calculated.

Usage Survey

A usage survey was conducted on a randomly selected sample of 100 households drawn from the borehole user records. The results of the usage survey confirmed that usage of boreholes for both respondents and their family was 100%.

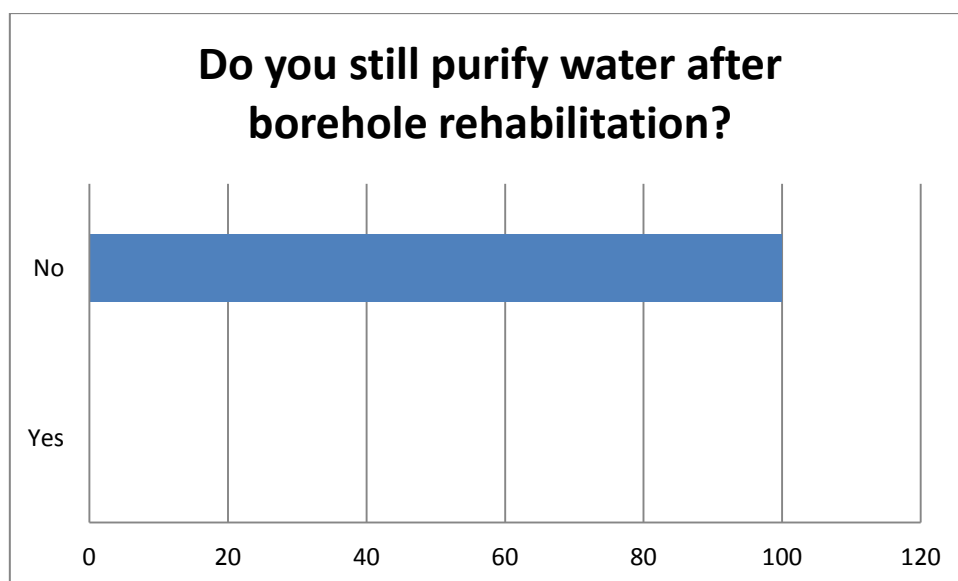
Project Survey Analysis

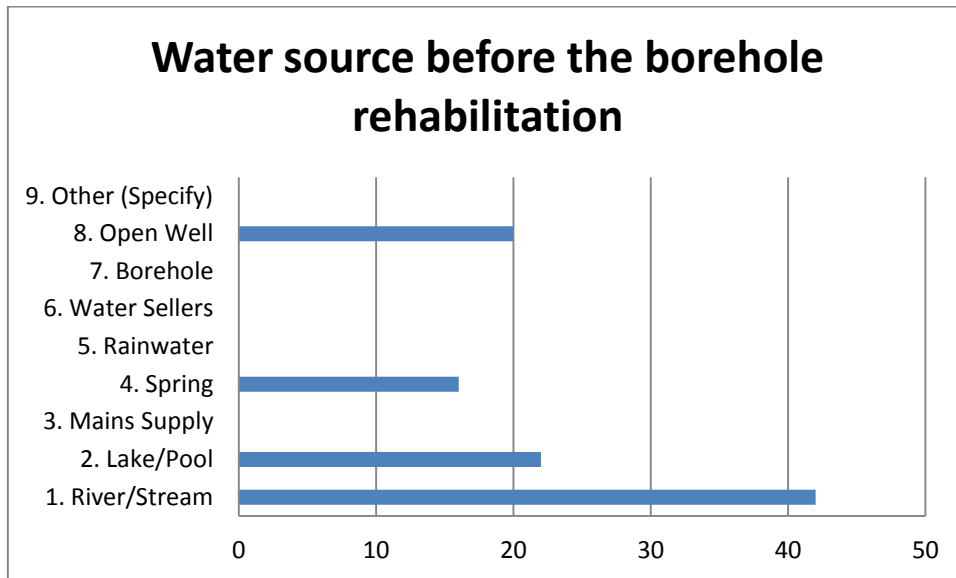
Project surveys were conducted on a sample of at least 100 randomly selected households to explore changes in the project scenario (demographics, water use and purification practices etc) over time.

Data collected during the project surveys includes the following:

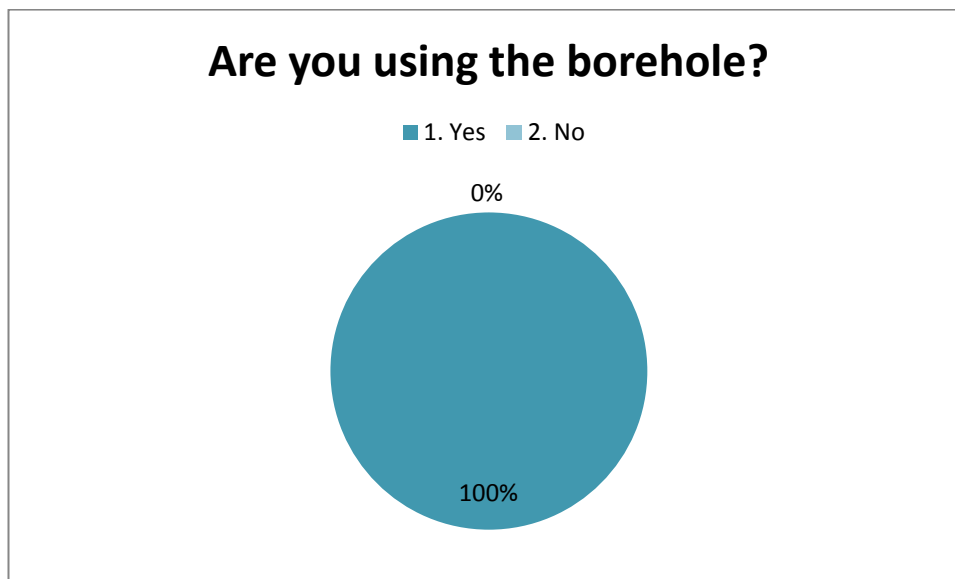
- General information - Name, address, telephone number etc.
- Household socio-demographic information.
- Water use and purification characteristics.
- Sources and availability of fuel.

The respondents obtained their water from one the 9 boreholes which were rehabilitated as part of the VPA.





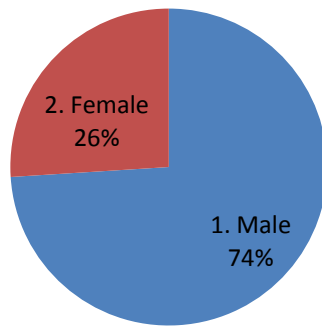
The results of the project survey confirm the outcome of the baseline surveys that none of the current borehole users had previously access to clean water. The results from the usage survey conducted on the same households showed that 100% of the respondents now collect their water from boreholes, which indicates a major improvement over the baseline. On average 5.6 people drinks the borehole water in the family and 100% of that is for personal use.



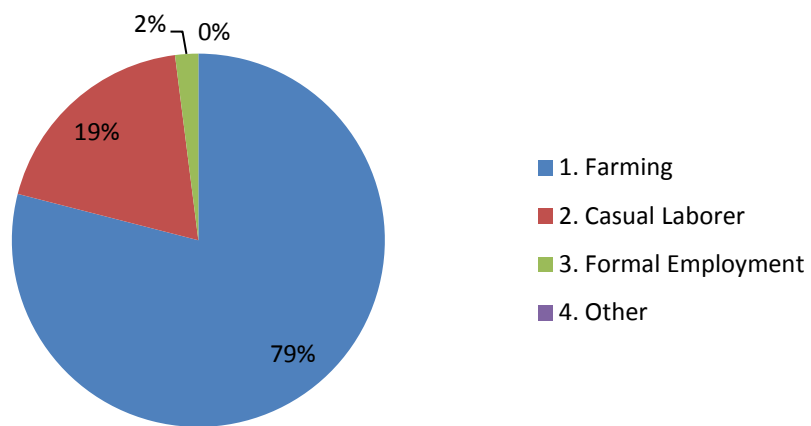
Socio-Demographic Characteristics

Analysis of the Project Survey results confirms that the socio-demographic characteristics such as gender, marital status, education and employment among the borehole users are the same, as shown in the following graphs.

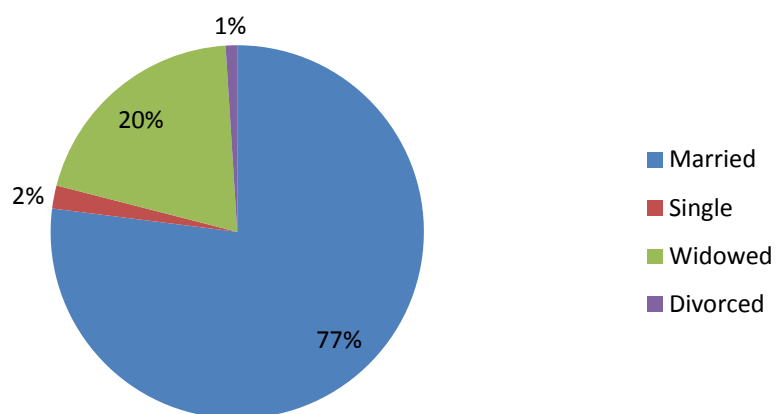
Gender

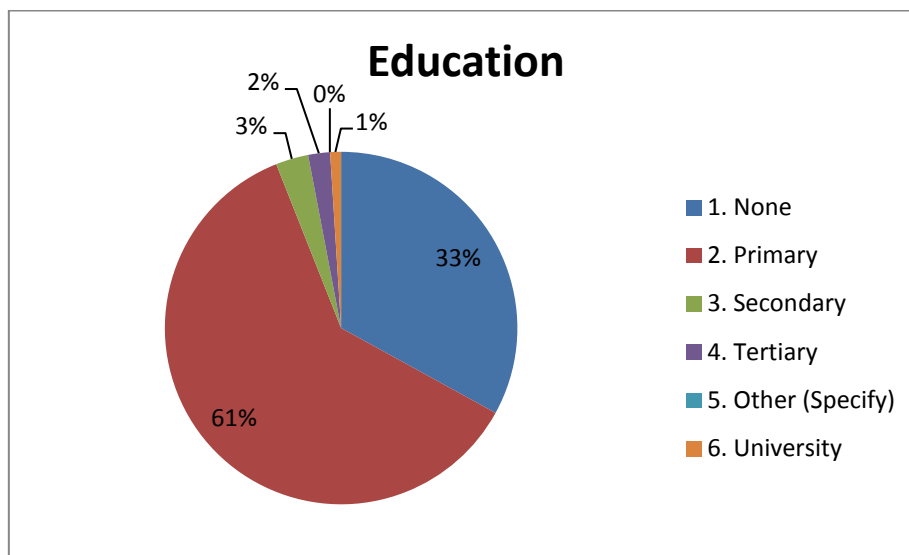


Household Income



Marital Status





Leakage Assessment

In line with the monitoring requirements, a leakage assessment is conducted biennially and has therefore not been included in this report.

Sustainable Development Indicators

The following indicators were considered of most importance to this project and were accordingly monitored:

No	1	
Indicator	Air quality	
Mitigation measure	None	
Chosen parameter	Total suspended matter (TSPM)- measured indirectly by wood consumption	
Current situation of parameter	As determined by research and field staff, traditional cooking Methods produce large amounts of TSPM .It is not justifiable to measure this quantitatively but it will be measured qualitatively as described below.	
Estimation of baseline situation of parameter	Quantitatively, the baseline situation is one which smoke is emitted by fires used to boil water.	
Future target for parameter	The project aims to reduce wood consumption and hence make a reduction in the defined parameter. This will be indicated by any reported reduction in wood fuel use in the project scenario as determined by surveys of the target population	
Way of monitoring	How	Project surveys, Usage surveys
	When	Annually
	By who	Expert surveying team
No	2	
Indicator	Human and institutional capacity	
Mitigation measure	Awareness raising programme is in place. WASH education is being conducted on a borehole level.	
Chosen parameter	Change in the number of WASH education programme held in the district	
Current situation of parameter	At the moment there are no trainings held for borehole users on the basic Water, Sanitation and Hygiene issues.	

Estimation of baseline situation of parameter	0	
Future target for parameter	1	
Way of monitoring	How	WASH training participant list or signed education agenda and programme by the education team, confirming that the training took place
	When	Once, at the beginning of the project
	By who	Rwandans4Water (in-country NGO partner)

Air quality : According to FAO, the best single indicator of the health hazard of combustion smoke is thought to be small particles, which contain many chemicals (source: <http://www.fao.org/docrep/009/a0789e/a0789e09.htm>). Reduction in wood consumption, as determined through comparison of project data to the baseline, reduces emissions of carbon monoxide as well as total suspended particulate matter and respirable suspended particulate matter exposure. Air quality in homes were monitored in the Project Survey (question 34), in which 100% of the respondents answered that they do not boil water anymore to purify water as rehabilitated boreholes provide clean water. Therefore we can conclude that there is an improvement of air quality in the households.

Awareness Raising Programme and WASH education: The main purpose of the project is to rehabilitate boreholes which are broken for various reasons and therefore not used for several years. The people in the project area in the meantime had to use water sources such as rivers/lakes and drink water that was not fit for human consumption. Question 12 in the project survey confirms that no project beneficiaries had access to clean water before the project, but now 100% said they were using clean water from the boreholes. To encourage the continuous use of the borehole, the in-country project partners, Rwandas4Water and FAPDR jointly held WASH sensitization programme on a borehole level right after the rehabilitation. Such trainings were not widely available for the rural population and at remote places where the rehabilitated boreholes could be found. The agenda of the meeting and the outcome has been confirmed and signed by the in-country partner and is uploaded as supporting document to the Markit registry.

Summary of Emissions Reductions Total

The total ERs for the monitoring period 04/11/2014-05/02/2016 for the 6 VPAs in this monitoring report shows gives the result of 30,085 as detailed below:

GS ID	ER total
GS3430	7430
GS3431	5492
GS3432	6062
GS3433	4425
GS4202	3206
GS4203	3471
SUM	30085

Summary of Emissions Reductions by Vintage and VPA

A breakdown of the emission reductions by vintage has been provided below:

GS3430

Total Emission Reductions for Monitoring Period 1

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1701512
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	5742

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1701512
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	1722

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	10,611
Project emissions per year	PEp,y	tCO2/y	3,181
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	7430

Emission Reductions Vintage 2014

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		99540
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	336

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		99540
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	101

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	621
Project emissions per year	PEp,y	tCO2/y	186
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	435

Emission Reductions Vintage 2015

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1408148
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4752

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1408148
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	1425

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,782
Project emissions per year	PEp,y	tCO2/y	2,633
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	6149

Emission Reductions Vintage 2016

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		193824
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	654

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		193824
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	196

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	1,209
Project emissions per year	PEp,y	tCO2/y	362
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	846

GS3431

Total Emission Reductions for Monitoring Period 1

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1257659
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4244

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1257659
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	1273

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb, fuel, co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV, b, fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	7,843
Project emissions per year	PEp,y	tCO2/y	2,351
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	5492

Emission Reductions Vintage 2015

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1072295
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	3619

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1072295
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	1085

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	6,687
Project emissions per year	PEp,y	tCO2/y	2,005
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	4682

Emission Reductions Vintage 2016

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		185364
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	626

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		185364
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	188

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TJ/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	1,156
Project emissions per year	PEp,y	tCO2/y	347
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	809

GS3432

Total Emission Reductions for Monitoring Period 1

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1388184
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	4685

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1388184
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	1405

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb, fuel, co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV, b, fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	8,657
Project emissions per year	PEp,y	tCO2/y	2,595
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	6062

Emission Reductions Vintage 2015

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1179348
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	3980

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1179348
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	1193

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	7,355
Project emissions per year	PEp,y	tCO2/y	2,205
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	5150

Emission Reductions Vintage 2016

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		208836
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	705

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		208836
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	211

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TJ/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	1,302
Project emissions per year	PEp,y	tCO2/y	390
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	912

GS3433

Total Emission Reductions for Monitoring Period 1

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		1013391
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	3420

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		1013391
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	1025

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb, fuel, co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV, b, fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	6,320
Project emissions per year	PEp,y	tCO2/y	1,895
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	4425

Emission Reductions Vintage 2015

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		844695
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	2851

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		844695
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	855

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	5,268
Project emissions per year	PEp,y	tCO2/y	1,579
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	3688

Emission Reductions Vintage 2016

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		168696
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	569

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		168696
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	171

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	Tco2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	1,052
Project emissions per year	PEp,y	tCO2/y	315
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	737

GS 4202

Total Emission Reductions for Monitoring Period 1

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		734181
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	2478

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		734181
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	743

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb, fuel, co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV, b, fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	4,579
Project emissions per year	PEp,y	tCO2/y	1,373
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	3206

Emission Reductions Vintage 2015

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		574161
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	1938

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		574161
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	581

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	3,581
Project emissions per year	PEp,y	tCO2/y	1,073
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	2507

Emission Reductions Vintage 2016

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		160020
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	540

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		160020
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	162

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TJ/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	998
Project emissions per year	PEp,y	tCO2/y	299
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	699

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Total Emission Reductions for Monitoring Period 1

Baseline Fuel Use (Bby)			
Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		794786
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	2682

Project Fuel Use (Pby)			
Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		794786
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	804

Constants			
NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb, fuel, co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TCO2/TJ	8.692
Net calorific value of fuel	NCV, b, fuel	TJ/T	0.0156

Emissions Reductions			
Baseline emissions per year	BEb,y	tCO2/y	4,957
Project emissions per year	PEp,y	tCO2/y	1,486
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	3471

Emission Reductions Vintage 2015

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		622058
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	2099

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		622058
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	629

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non	TCO2/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	3,879
Project emissions per year	PEp,y	tCO2/y	1,163
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	2716

Emission Reductions Vintage 2016

Baseline Fuel Use (Bby)

Portion using safe water	Cj	fraction	9.6%
Person Days	Njy		172728
Fuel to treat 1 litre of water using baseline tech	Wb,y	T/L	0.0007363
Quantity safe water litres consumed in project scenario supplied by project technology	Qp,y	L/pd	5.07
Quantity of raw water boiled in addition to project technology water	Qp, raw, y	L/pd	0
Quantity fuel consumed in baseline scenario	Bb,y	T	583

Project Fuel Use (Pby)

Portion of safe users	Cj	fraction	9.60%
Person Days	Njy		172728
Fossil fuel required to treat 1 litre for water in project scenario	Wp,y	T/L	0.0007363
Quantity of raw water boiled in addition to project tech water	Qp, raw, y	L/pd	0
Quantity of safe water boiled	Qp, cleanboil, y	L/pd	1.52
Quantity of fuel consumed in project scenario per HH	Bp,y	T	175

Constants

NRB	NRB	Fraction	0.98
Emissions factor fuel (co2)	EFb,fuel,co2	tCO2/TJ	112
Emissions factor fuel (non-co2)	EFb, fuel, non-co2	TJ/TJ	8.692
Net calorific value of fuel	NCV,b,fuel	TJ/T	0.0156

Emissions Reductions

Baseline emissions per year	BEb,y	tCO2/y	1,077
Project emissions per year	PEp,y	tCO2/y	323
Usage rate	Up,y	fraction	1
Leakage	LEp,y	tCO2/y	0
Emission Reductions	Ery	tCO2/y	754