Gold Standard for the Global Goals

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

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

This document contains the following Sections

KEY PROJECT INFORMATION

Programme of Activity Information

GS ID of Programme	**GS10959**
Title of Programme	Safe Water Programme in Africa and Asia
Version of POA-DD applicable to this monitoring report	05
Name and GS ID of fully Validated CPA/VPAs (i.e. non compliance check)	GS10959 VPA01 Safe Water Project in Rwanda I GS10959 VPA02 Safe Water Project in Rwanda II GS10959 VPA03 Safe Water Project in Rwanda III GS10959 VPA04 Safe Water Project in Rwanda IV GS10959 VPA05 Safe Water Project in Rwanda V GS10959 VPA06 Safe Water Project in Rwanda VI GS10959 VPA07 Safe Water Project in Bangladesh I GS10959 VPA08 Safe Water Project in Bangladesh II GS10959 VPA09 Safe Water Project in Bangladesh III GS10959 VPA10 Safe Water Project in Bangladesh IV

Key Project Information

GS ID (s) of Project (s)	GS 11098, GS 11133, GS 11134, GS 11135, GS 11136, GS 11137
Title of the project (s) covered by monitoring report	GS10959 VPA01 Safe Water Project in Rwanda I GS10959 VPA02 Safe Water Project in Rwanda II GS10959 VPA03 Safe Water Project in Rwanda III GS10959 VPA04 Safe Water Project in Rwanda IV GS10959 VPA05 Safe Water Project in Rwanda V GS10959 VPA06 Safe Water Project in Rwanda VI
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	08

Version number of the monitoring report	05
Completion date of the monitoring report	20/02/2023
Date of project design certification	19/08/2021
Date of Last Annual Report	N/A
Monitoring period number	1st
Duration of this monitoring period	VPA No. / Start date / End date VPA01 / 27/11/2021 / 24/07/2022 VPA02 / 26/11/2021 / 24/07/2022 VPA03 / 26/11/2021 / 24/07/2022 VPA04 / 09/01/2022 / 24/07/2022 VPA05 / 12/12/2021 / 24/07/2022 VPA06 / 10/01/2022 / 24/07/2022
Project Representative	Ji BAO
Host Country	Rwanda
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	Technologies and Practices to Displace Decentralized Thermal Energy Consumption (Version 3.1)
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	VPA No.	Amount Achieved	Units/ Products
SDG 13 Climate Action	Reduce emission from water boiling by non-renewable biomass	VPA01	30,311	VERs
		VPA02	34,531	
		VPA03	34,877	

		VPA04	22,813	
		VPA05	33,293	
		VPA06	22,686	
		Total	178,511	
SDG 3 – Good Health and Well-Being	Reduce the incidence of waterborne illness within the project area		38.45%	Percentage
SDG 5 – Gender Equality	Reduce the time spent to fetch and purify water by women and girls		51.11%	Percentage
SDG 6 – Clean Water and Sanitation	Provide safe water to local residents	VPA01	33,750	Number of persons
		VPA02	31,855	
		VPA03	32,320	
		VPA04	33,221	
		VPA05	33,514	
		VPA06	32,314	
		Total	196,974	

Table 2 – Product Vintages

			Amount Achieved
VPA No.	**Start Dates**	**End Dates**	**VERs**
VPA01	27/11/2021	31/12/2021	4,420
	01/01/2022	24/07/2022	25,891
VPA02	26/11/2021	31/12/2021	5,158
	01/01/2022	24/07/2022	29,373
VPA03	26/11/2021	31/12/2021	5,210

	01/01/2022	24/07/2022	29,667
VPA04	09/01/2022	24/07/2022	22,813
VPA05	12/12/2021	31/12/2021	2,959
	01/01/2022	24/07/2022	30,334
VPA06	10/01/2022	24/07/2022	22,686
		Total	**178,511**

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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Many people in rural area of Rwanda rely on boreholes to provide clean water. Unfortunately, a lot of boreholes have fallen into disrepair because maintenance has been poorly managed due to lack of capacity, organization or fund. The VPAs, which are the VPA01 to VPA06 for PoA GS 10959 "Safe Water Programme in Africa and Asia" (Hereinafter referred to as "the PoA"), consist of the maintenance of 251 boreholes in Southern Province of Rwanda. The CME cooperates with local NGO, Association Rwandaise pour le Développement Endogène (Hereinafter referred to as "ARDE"), to implement the VPAs for providing safe water to local communities and ensure the water quality to meet the related requirements of Rwanda and Gold Standard for the Global Goals. The project boundary is the boundary of communities that use the boreholes maintained by the project activity.

Before the implementation of the project, local communities in the project location used fossil fuel and/or non-renewable biomass (Hereinafter referred to as "NRB") to boil water for purification. Therefore, the baseline scenario is that fossil fuel and/or NRB is used to boil water as means of water purification in the absence of the project activity. As a result, water purification through boiling with wood made local people vulnerable to the negative effects of poor indoor air quality. In Rwanda, 31% of its population lack access to clean water and about 3,000 children die each year from diarrhea. Boiling water with wood also resulted in significant greenhouse gas emissions through the use of non-renewable biomass, causing deforestation and threatening biodiversity. In addition, usually in local communities it is women and girls that take the unpaid work of fetching and purifying water, which minimizes their time for rest and study, and even their opportunities to have paid jobs.

The project provides a solution to mitigate the above problems. The fund from sale of carbon credits generated by the project makes it sustainable and extendable.

A.2. Location of project

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The project is located in Southern Province of Rwanda. The 251 boreholes spread over Muhanga District, Kamonyi District, Nyanza Distrct, Nyamagabe Distrct and Ruhango

Distrct. The geographic coordinates of Geographic coordinates of Southern Province are shown as follows.

Table 1: Geographic coordinates of Southern Province

Name of Province	Eastmost	Southmost	Westmost	Northmost
Southern Province	2°6’7”S 30°1’15”E	2°50’24”S 29°22’16”E	2°28’55”S 29°15’53”E	1°43’53”S 29°40’7”E

Figure 1: Southern Province of Rwanda

A.3. Reference of applied methodology

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Technologies and Practices to Displace Decentralized Thermal Energy Consumption (Version 3.1)

A.4. Crediting period of project

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The crediting period for each VPA is:

GS 11098: 27/11/2021-26/11/2026, twice renewable to a total of 15 years

GS 11133: 26/11/2021-25/11/2026, twice renewable to a total of 15 years

GS 11134: 26/11/2021-25/11/2026, twice renewable to a total of 15 years

GS 11135: 09/01/2022-08/01/2027, twice renewable to a total of 15 years

GS 11136: 12/12/2021-11/12/2026, twice renewable to a total of 15 years

GS 11137: 10/01/2022-09/01/2027, twice renewable to a total of 15 years

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

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The major borehole maintenance activity is to repair broken hand pumps. India Mark V Hand Pump is used in the VPA. The India Mark V hand pump incorporates the latest R & D in hand pump technology. It is based on non-corrodible below-ground components, using modern lightweight engineering plastics such as uPVC Riser Pipes and Fibre Reinforced Glass (FRG) Connecting Rods.

Technology:

Table 2: Manufacturer's specifications of India Mark V Hand Pump

Specification	Capacity
Stoke Length	175 mm
Open Top Cylinder	65mm
Number of persons can be served	1,000-1,500
Lifetime	20 years

Figure 2: Photo of India Mark V Hand Pump

There are 251 boreholes repaired in the project. In the monitoring period, the boreholes were maintained by the CME and VPA implementer, functioning well to provide enough clean water to over 190,000 local people.

There are no deviations or delays compared to information in Design Certified PDD.

Table 3: Milestone for implementation of the project

Time	Main action
23/03/2021	Time of First Submission Date
19/08/2021	Date of project design certification
03/09/2021	Local stakeholder consultation meeting
15/11/2021	Starting sign Donation and Carbon Transfer Agreements with villages
11/2021	Starting repair boreholes
26/11/2021	The first borehole was repaired
16/05/2022-24/05/2022	The first time of water quality test
26/07/2022-18/08/2022	Water consumption field test was conducted
25/07/2022-25/08/2022	Project survey was conducted

The dates of each borehole repaired are recorded in Excel table "1-SDG Outcomes Calculation Form-MP1st". The locations, quantity of users, days out of work of each borehole are recorded too. During this monitoring period, a few boreholes have been out of work for several days, which is excluded for calculating emission reduction. The information of each VPA is shown as follows:

Table 4: Information of each VPA

VPA No.	Rehabilitation date of the first borehole in the VPA	End date of MP1	Number of boreholes rehabilitated
01	27/11/2021	24/07/2022	42
02	26/11/2021	24/07/2022	42
03	26/11/2021	24/07/2022	38
04	09/01/2022	24/07/2022	46
05	12/12/2021	24/07/2022	42
06	10/01/2022	24/07/2022	41
		Total	251

Number of Days out of work after rehabilitation for project boreholes during this monitoring period according to the maintenance log:

Borehole ID	**Number of Days out of work after rehabilitation**
IR30	6

IR93	6
IR100	14
IR110	16
IR112	5
IR119	7
IR121	11
IR123	10
IR124	7
IR125	13
IR128	12
IR141	5
IR71	8
IR77	16
IR78	10
IR79	12
IR82	8
IR83	3
IR87	12
IR95	7
IR137	4
IR271	6
IR158	6

There was no change from the project design that was envisaged at design certified VPA-DD in the monitoring period.

B.1.1 Forward Action Requests

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FAR # 1: During the verification the VVB shall check that the emission reductions are not claimed for the case when the borehole water is used for any other purpose than the above stated consumption (limited to drinking, cooking and basic personal hygiene).

Reply: During the water consumption field test, only water from drinking, food preparation and basic hygiene were counted. The cap value for water consumption

(7L/day) was also applied. So no emission reduction is claimed for other purpose than the above.

FAR # 2: The PD shall submit all 'Carbon Transfer Form' in order to confirm on the full and uncontested legal ownership of the carbon rights produced by the project at the time of verification.
Reply: The PD has submitted all signed "Donation and Carbon Transfer Agreement" with MR during the verification. It has been confirmed on the full and uncontested legal ownership of the carbon rights produced by the project at the time of verification.

FAR # 3: The PD is requested to submit all the "Donation and carbon transfer agreements" and evidence that the people who signed the agreements were authorized by the whole communities during verification.
Reply: The PD has submitted all signed "Donation and Carbon Transfer Agreement" and "Community Authorization" with MR during the verification.

FAR # 4: The project developer shall conduct the physical stakeholder consultation meetings when the COVID-19 situation eases.
Reply: The physical stakeholder meeting was conducted on 03/09/2021 as per the registered VPA-DD.

FAR # 5: The PP is requested to provide the evidence for monitoring of number of actual users for each borehole. The PP shall monitor the accessibility of local people to all nearby boreholes from the proposed project and other existing boreholes.
Reply: The water management committees have confirmed that the number of the end users counted in the project only use the project boreholes rather than other existing boreholes. Households who use other water sources (i.e. non-project boreholes) have been excluded from the number recorded in the MR and the project area. This situation is also reflected in the document "Sworn Statement" which has been submitted.

FAR # 6: The VVB shall interview the local users to confirm that the water testing results are communicated to them regularly in line with the WQT test interval.
Reply: The PD has communicated to users with water testing results regularly in line with the WQT test interval.

FAR # 7: The treatment capacity limits of project technology/source (lit./day), model of each pump, yield test result (litre/min), daily production is required to be monitored to ensure that the water consumption level applied for emission reductions must not be greater than the treatment capacity of the project technology/sources. PD shall also show if there Is another water supply system (stream, pond, etc.) apart from hand pump for other uses of water. VVB shall also verify this.
Reply: The PD has conducted a test on capacity of project borehole. It needed about 100 seconds to fill an empty 20L bucket. So in a whole day it can supply 9,000L of water, which is in accord with the estimation in the reply to the reviewer during design review. It can meet the requirement for at least 1,000 persons as per the water consumption field test. The video has been submitted. After the implementation of the project, end users do not use other water supply system except rain water for cleaning room and stream or river water for washing clothes.

B.2. Post-Design Certification changes

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

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N/A.

B.2.2. Corrections

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N/A.

B.2.3. Changes to start date of crediting period

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N/A.

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

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N/A.

B.2.5. Changes to project design of approved project

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N/A.

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

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ARDE is in charge of the implementation of the monitoring plan and reporting to the CME. The executive director of ARDE is responsible for supervising the whole monitoring procedure. The water and environment department is responsible for conducting baseline and project surveys as well as reporting to the executive director. The CME is in charge of designing the monitoring plan and completing the monitoring report.

Training about monitoring plan has been provided to ARDE, including survey method, data record and analysis. The monitoring plan has been carried out by qualified personnel trained for quality assurance and quality control. The CME inspects ARDE to confirm that the personnel are qualified and the monitoring plan is properly implemented.

A figure about the operational and management structure for monitoring is shown as the following:

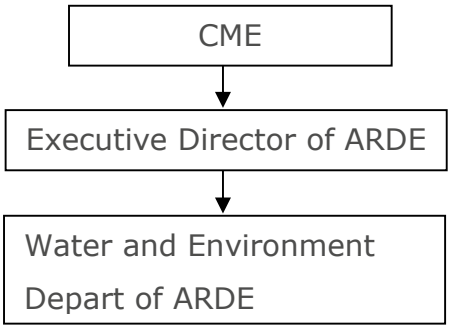

Figure 3: Operational and Management Structure for Monitoring

Borehole database

The records of the information collected in an electronic database for enabling the unique identification of the project boreholes has been kept. The database includes the following information:

- Unique identification number of each borehole
- Date of rehabilitation of each borehole
- Quantity of boreholes rehabilitated

- GPS location of each borehole
- Model of the pump for each borehole
- The total number of people obtaining their water from each borehole
- Maintenance log recorded by trained staff

All the monitoring related data will be kept by the CME and ARDE for at least two years after the crediting period or the last issuance of the project.

Every village which agrees to participate in the project has established a Water Management Committee (Hereinafter referred to as "WMC"). The members of the WMC are respectable persons elected by villagers.

Borehole maintenance

After the rehabilitation of the boreholes, the WMC is responsible for reporting all the problems of the boreholes to the CME and ARDE. And there are trained local staff of ARDE working with the WMC. If the borehole is out of work, the trained local staff shall get there as soon as possible. They can solve common faults. If they can't solve the problem, the CME and ARDE will offer more technical support and the issues can quickly be resolved through this direct line of communication.

In the case of repair is necessary, the total number of days when the borehole is out of work is recorded. This information is then used to adjust person·days for emission reductions calculation. During the monitoring period, there were a few boreholes out of work for a few days. The person·days has been adjusted.

Ongoing monitoring studies

The following ongoing monitoring studies have been conducted. The results are given in the parameter boxes in Section D.2. As per "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)", the 95/10 rule should be applied for cross VPA sampling.

- **Water consumption field test (Hereinafter referred to as "WCFT")**(Parameters $Q_{p,y}$, $Q_{p,rawboil,y}$ and $Q_{p,cleanboil,y}$)- Completed at least biennially. The survey was conducted by local staff who trained before the survey in line with methodological requirements. The WCFT distinguished between quantity of raw or unsafe water that is still boiled and quantity of safe

water boiled after the implementation of the borehole rehabilitation project. Surveyors assessed the volume of water with jerricans. This process was repeated each day until an average daily use figure has been calculated, based on household size. The WCFT was conducted in four consecutive working days. Only water for drinking, cooking and basic personal hygiene was counted. As per the methodology, results of each household were capped at 7L. Hence the result of $Q_{p,y}$ is 6.66L. The result of WCFT is recorded in Excel table "3-Data Recording Form for WCFT", and has been submitted too. We used multi-stage sampling according to "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)" to conduct Project Survey. We calculated through Equation (77) on Page 62 of "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)" and concluded that 3 was the minimum number of boreholes should be sampled to satisfy the 95/10 rule of applied methodology. Hence, we randomly chose 8 villages of 8 boreholes. We randomly selected 20 households from each village, 160 households in total in 8 villages.

- **Quality of the treated water -** The quality of the treated water is assessed to ensure that it fits human consumption. The standard used to assess the water quality meets requirements of the applied methodology. It is conducted quarterly, with the first test conducted within 6 months of the project start date. At least once every two years, the water quality test should be performed in accredited laboratories. The samples were selected by Simple Random Sampling. We used equation (1) of "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)" to calculate the sample size. The result is 18.78. Furthermore, according to paragraph 14 of "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)", a minimum sample size of 30 shall be chosen. We chose 35 samples out of 226 boreholes (which have been implemented before May, 2022) to ensure the precision. We also used CDM

sample size calculator[1] for checking the precision of the sampling. The following result shows that it meets the requirement:

Calculator to check if the precision has been met or not after a sampling survey is conducted		
Input	**Value**	**Notes**
Actual sample size	35	
Sample proportion	1.0000	
Standard error of the proportion	0.0000	
Precision associated with a proportion	0.0000	
Relative precision	0.0%	

The water quality test has been made in the IPRC Kigali Engineering Laboratory during this monitoring period on 16/05/2022-24/05/2022. The detailed results of each test have been submitted as a separate document.

- **Usage Survey -** The Usage Survey is included in the Project Survey, there is no individual questionnaire for Usage Survey. The Project Survey was carried out between 25/07/2022 to 25/08/2022. The result from the usage survey is 100% used to calculate emission reductions.
- **Project Survey –** We used multi-stage sampling according to "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)" to conduct Project Survey. We calculated through Equation (77) on Page 62 of "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)" and concluded that 7 was the minimum number of boreholes should be sampled to satisfy the 95/10 rule of applied methodology. Hence, we randomly chose 8 villages of 8 boreholes. We randomly selected 20 households from each village, 160 households in total in 8 villages. Data collected during the project surveys explores the following characteristics:

- General information - Name, address, telephone number etc.

[1] https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fcdm.unfccc.int%2Ffilestorage%2Fe%2Fx%2Ft%2Fextfile-20150813144045637-Meth_guid48Calculator.xlsx%2FMeth_guid48Calculator.xlsx%3Ft%3DVHR8cm5rMmoxfDBG9EVaDsQHTLcuUyHkmRLI&wdOrigin=BROWSELINK

- Household socio-demographic information.
- Water use characteristics.

  During this monitoring period the Project Survey has been conducted between 25/07/2022 to 25/08/2022. A more detailed description of the results is made in a separate document "2-Data Recording Form for Project Survey", and has been submitted too.

- **Leakage -** The PDD has described what sources of leakage were relevant to the VPA and what have been discounted.

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

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

The displaced baseline technology is three stones. It is not reused outside the project boundary because it is still used for cooking after the implementation of the Project. This leakage source can therefore be discounted.

b) Non-project users who previously used lower emitting energy sources with NRB or fossil fuels saved under the project activity.

The costs of low emitting water purification technologies, such as filtration and chlorination, are much higher than boiling with wood fuel. Users of these technologies are not price sensitive. Therefore, the implementation of the Project does not lead these users to boil water with wood fuel, even if the price of wood fuel becomes cheaper because of the reduction of demand caused by the Project. 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.

Considering that the project only saves 97,059 tons ($B_{b,y}$) of biomass annually while the total amount of above-ground biomass of Rwanda is 75 million tons[2], the Project does not affect NRB fraction.

[2] Table 18, Global Forest Resources Assessment 2015

d) The VPA population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.
The space heating effect of boiling water is negligible. Therefore it is highly unlikely that some other form of heating will be adopted for compensating the space heating effect of boiling 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.

The project does not promote any new technology with high efficiency. It does not stimulate people to boil water.

Therefore, a value of 0 is applied for leakage during this monitoring period.
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.

Hygiene campaign - The project runs less than one year. Hygiene campaign has not been held in this monitoring period. It will be held in next few months before the completing of one year.

SECTION D. DATA AND PARAMETERS

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

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SDG13

Data/parameter	C_j
Unit	Percentage
Description	Percentage of users of project technology who were already in baseline using a non-boiling safe water supply
Source of data	Baseline survey in registered PDD
Value(s) applied	0.0083

Choice of data or Measurement methods and procedures	The data is obtained through baseline survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The Baseline Survey was conducted by representative and random sampling during from 08/06/2021 to 15/06/2021. The result is 0.0083.
Purpose of data	Calculation of baseline and project emissions (SDG 13) as well as number of persons consuming safe water supplied by the Project (SDG 6)
Additional comment	Also used for SDG 6

Data/parameter	X_{boil}
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 survey in registered PDD
Value(s) applied	0
Choice of data or Measurement methods and procedures	The data is obtained through baseline survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The Baseline Survey was conducted by representative and random sampling during from 08/06/2021 to 15/06/2021. The result is 0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	$W_{b,y}$
Unit	t/L
Description	Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representatives of baseline scenario b during year y
Source of data	Default value
Value(s) applied	0.0004

Choice of data or Measurement methods and procedures	The default value of $W_{b,y}$ for firewood as per "Application of TPDDTEC Methodology to Safe Water Supply Projects"
Purpose of data	Calculation of baseline emissions
Additional comment	Should be updated if ongoing monitoring surveys show that baseline water boiling technologies change over time.

Data/parameter	$\mathbf{W_{p,y}}$
Unit	t/L
Description	Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representatives of project scenario p during year y
Source of data	Default value
Value(s) applied	0.0004
Choice of data or Measurement methods and procedures	According to the baseline and project survey, the same water boiling technology is applied in the baseline and project scenarios. So $W_{b,y}$ and $W_{p,y}$ are equal
Purpose of data	Calculation of project emissions
Additional comment	Should be updated if ongoing monitoring surveys show that baseline water boiling technologies change over time.

Data/parameter	$\mathbf{f_{NRB,b,y}}$
Unit	Percentage
Description	Fraction of biomass used that can be established as non – renewable biomass in the baseline scenario b during year y
Source of data	As per the "TOOL30: Calculation of the fraction of non-renewable biomass, version 3.0". Please refer to registered PDD.
Value(s) applied	96.82%
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**$EF_{b,fuel,co2}$**
Unit	tCO_2/TJ
Description	CO_2 emission factor of fuels used in the baseline scenario
Source of data	IPCC default value for Wood: IPCC 2006 Guidelines for National Greenhouse gas Inventories Chapter 2: Stationary Combustion Page 2.23 Table 2.5
Value(s) applied	112
Choice of data or Measurement methods and procedures	According to the baseline survey, wood is the only fuel used in the baseline scenario.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**GWP_{CH4}**
Unit	-
Description	Global warming potential for CH_4
Source of data	IPCC Fifth Assessment Report: Climate Change 2014
Value(s) applied	28
Choice of data or Measurement methods and procedures	As per "IPCC Fifth Assessment Report: Climate Change 2014", the value is 28.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**GWP_{N2O}**
Unit	-
Description	Global warming potential for N_2O
Source of data	IPCC Fifth Assessment Report: Climate Change 2014
Value(s) applied	265
Choice of data or Measurement methods and procedures	As per "IPCC Fifth Assessment Report: Climate Change 2014", the value is 265.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**$EF_{b,fuel,non\ co2}$**
Unit	tCO_2/TJ
Description	Non CO_2 emission factor of fuels used in the baseline scenario
Source of data	IPCC default value for Wood: IPCC 2006 Guidelines for National Greenhouse gas Inventories Chapter 2: Stationary Combustion Page 2.23 Table 2.5 IPCC Fifth Assessment Report: Climate Change 2014
Value(s) applied	9.46
Choice of data or Measurement methods and procedures	According to the baseline survey, wood is the only fuel used in the baseline scenario. As per "IPCC 2006 Guidelines for National Greenhouse gas Inventories", the default emission factor of CH_4 and N_2O for stationary combustion is 0.3t/TJ and 0.004t/TJ, respectively. As per "IPCC Fifth Assessment Report: Climate Change 2014", the global warming potential for CH_4 and N_2O is 28 and 265, respectively. So $EF_{b,non\ co2} = 0.3\times28+0.004\times265 = 9.46$.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**$NCV_{b,fuel}$**
Unit	TJ/ton
Description	Net calorific value of the fuels used in the baseline
Source of data	IPCC default value for wood IPCC (2006) "IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 1, Introduction, Page 1.19, Table 1.2
Value(s) applied	0.0156
Choice of data or Measurement methods and procedures	According to the baseline survey, wood is the only fuel used in the baseline scenario.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**$f_{NRB,p,y}$**
Unit	Percentage

Description	Fraction of biomass used that can be established as non – renewable biomass in the project scenario p during year y
Source of data	As per the "TOOL30: Calculation of the fraction of non-renewable biomass, version 3.0". Please refer to registered PDD.
Value(s) applied	96.82%
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data/parameter	**$EF_{p,fuel,co2}$**
Unit	tCO_2/TJ
Description	CO_2 emission factor of fuels used in the project scenario
Source of data	IPCC default value for Wood: IPCC 2006 Guidelines for National Greenhouse gas Inventories Chapter 2: Stationary Combustion Page 2.23 Table 2.5
Value(s) applied	112
Choice of data or Measurement methods and procedures	According to the project survey, wood is the only fuel used in the project scenario.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/parameter	**$EF_{p,fuel,non\ co2}$**
Unit	tCO_2/TJ
Description	Non CO_2 emission factor of fuels used in the project scenario
Source of data	IPCC default value for Wood: IPCC 2006 Guidelines for National Greenhouse gas Inventories Chapter 2: Stationary Combustion Page 2.23 Table 2.5 IPCC Fifth Assessment Report: Climate Change 2014
Value(s) applied	9.46

Choice of data or Measurement methods and procedures	According to the project survey, wood is the only fuel used in the project scenario. As per IPCC 2006 Guidelines for National Greenhouse gas Inventories, the default emission factor of CH_4 and N_2O for stationary combustion is 0.3t/TJ and 0.004t/TJ, respectively. As per IPCC Fifth Assessment Report: Climate Change 2014, the global warming potential for CH_4 and N_2O is 28 and 265, respectively. So $EF_{b,non\ co2}$ = $0.3\times28+0.004\times265 = 9.46$.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/parameter	**$NCV_{p,fuel}$**
Unit	TJ/ton
Description	Net calorific value of the fuels used in the project scenario
Source of data	IPCC default value for wood IPCC (2006) "IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 1, Introduction, Page 1.19, Table 1.2
Value(s) applied	0.0156
Choice of data or Measurement methods and procedures	According to the project survey, wood is the only fuel used in the project scenario.
Purpose of data	Calculation of project emissions
Additional comment	-

SDG 3

Data/parameter	**I_b**
Unit	Percentage
Description	Waterborne illness incidence in the baseline scenario
Source of data	Baseline survey in the registered PDD
Value(s) applied	38.45%
Choice of data or Measurement methods and procedures	The data is obtained through baseline survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The Baseline Survey was conducted by representative and random sampling during from 08/06/2021 to 15/06/2021. The result is 38.45%.
Purpose of data	Calculation of reduction of waterborne illness incidence

Additional comment	-

SDG 5

Data/parameter	T_b
Unit	Hour
Description	Time spent to fetch and purify water by women and girls per household per day in the baseline scenario
Source of data	Baseline survey in the registered PDD
Value(s) applied	0.90
Choice of data or Measurement methods and procedures	The data is obtained through baseline survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The Baseline Survey was conducted by representative and random sampling during from 08/06/2021 to 15/06/2021. The result is 0.90.
Purpose of data	Calculation of percentage reduction of time spent to fetch and purify water by women and girls
Additional comment	-

D.2 Data and parameters monitored

>>

SDG 13

Data/parameter	$Q_{p,y}$
Unit	Litres per person per day
Description	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day
Source of data	Water consumption field test
Value(s) applied	6.66
Measurement methods and procedures	The data obtained by WCFT through sampling survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of

	activities (Version 04.0)". The WCFT was conducted by CME and ARDE from 26/07/2022-18/08/2022. The actual value is 8.96L. According to the applied methodology, the cap value for full-day premises is 7. So we capped this value as 7 for each household participating in the WCFC. As an average value for all households, the result is 6.66.
Monitoring frequency	At least biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$Q_{p,rawboil,y}$
Unit	Litres per person per day
Description	Quantity of raw or unsafe water that is still boiled after installation of the water treatment technology.
Source of data	Water consumption field test
Value(s) applied	0
Measurement methods and procedures	The data is obtained by water consumption field test through sampling survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The WCFT was conducted by the CME and ARDE from 26/07/2022-18/08/2022 and the result is 0.
Monitoring frequency	At least biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of baseline and project emissions
Additional comment	

Data / Parameter	$Q_{p,cleanboil,y}$
Unit	Litres per person per day

Description	Quantity of safe (treated, or from safe supply) water boiled in the project scenario p, after installation of project technology
Source of data	Water consumption field test
Value(s) applied	0
Measurement methods and procedures	The data is obtained by water consumption field test through sampling survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The WCFT was conducted by the CME and ARDE from 26/07/2022-18/08/2022 and the result is 0.
Monitoring frequency	At least biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of project emissions
Additional comment	

Data / Parameter	**Quality of the treated water**
Unit	-
Description	As a first option, projects shall meet host country standards (where available) for treated water quality. Where national standards are not available, projects shall meet WHO standard of less than 1 Colony Forming Unit (CFU) of E.Coli /100 ml.
Source of data	Water quality test
Value(s) applied	Pass
Measurement methods and procedures	As per the local laboratories' methods and procedures. The 95/10 precision rule must be followed in calculating the sample size required for testing water quality.

Monitoring frequency	Quarterly. The first test has been conducted within 6 months of the project start date. The water quality test has been made in the Water Quality Testing Laboratory of the IPRC Kigali. The lab collected the samples from the water sources. At least once every two years, the water quality test should be performed in accredited laboratories.
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions
Additional comment	-

Data / Parameter	$U_{p,y}$
Unit	Percentage
Description	Usage rate in project scenario p during year y
Source of data	Annual usage survey
Value(s) applied	100%
Measurement methods and procedures	It is determined by usage survey in this monitoring period with sampling survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". And the Project Survey and Usage Survey have been conducted together using the same sample, thus there is no separate documents. Please refer to document "2-Data Recording Form for Project Survey".
Monitoring frequency	Annually; the above value is valid from 26/11/2021 to no later than 25/11/2022 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions (SDG 13) and number of persons consuming safe water supplied by the Project (SDG 6)
Additional comment	A single usage parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario as per

	Section 3.1 of the applied methodology. Also used for SDG 6.

Data / Parameter	**$N_{p,y}$**
Unit	Persons.days
Description	Number of person.days consuming water supplied by project scenario p through year y
Source of data	D16-22 of sheet SDG13 of Excel table "1-SDG Outcomes Calculation Form-MP1st"
Value(s) applied	Each VPA is shown as follows:
Measurement methods and procedures	Sum of the total number of people using each borehole in the VPA multiplied by the number of operating days in the monitoring period. The number of days when the boreholes are in operation is monitored through project survey. The number of days when the boreholes are out of use is not taken into account for calculating $N_{p,y}$.
Monitoring frequency	At least biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of baseline emissions and project emissions
Additional comment	-

VPA No.	Persons.days
01	6,238,172
02	7,106,802
03	7,177,865
04	4,695,103
05	6,851,892
06	4,669,012
Total	36,738,846

Data / Parameter	**$LE_{p,y}$**
Unit	tCO_2e per year

Description	Leakage in project scenario p during year y
Source of data	Baseline and monitoring surveys
Value(s) applied	0
Measurement methods and procedures	The result is 0 and the details are shown in Section E.3.
Monitoring frequency	Biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions
Additional comment	-

SDG 3

Data / Parameter	$I_{p,y}$
Unit	Percentage
Description	Waterborne illness incidence in the project scenario during year y
Source of data	B127 of Excel table "2-Data Recording Form for Project Survey"
Value(s) applied	0
Measurement methods and procedures	The data is obtained by project survey through sampling survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The project survey was conducted by the CME and ARDE from 25/07/2022-25/08/2022 and the result is 0.
Monitoring frequency	At least biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of reduction of waterborne illness incidence
Additional comment	

SDG 5

Data / Parameter	$T_{p,y}$
Unit	Hour
Description	Time spent to fetch and purify water by women and girls per household per day in the project scenario during year y
Source of data	B128 of Excel table "2-Data Recording Form for Project Survey"
Value(s) applied	0.44
Measurement methods and procedures	The data is obtained by project survey through sampling survey as per the applied methodology as well as "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)". The project survey was conducted by the CME and ARDE from 25/07/2022-25/08/2022 and the result is 0.44.
Monitoring frequency	At least biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of percentage reduction of time spent to fetch and purify water by women and girls
Additional comment	

SDG 6

Data / Parameter	$P_{p,y}$
Unit	Number
Description	Number of persons consuming water within the project area during year y
Source of data	Project survey
Value(s) applied	Each VPA is shown as follows:

VPA No.	$P_{p,y}$
01	33,750
02	31,855

	03 | 32,320 04 | 33,221 05 | 33,514 06 | 32,314 Total | 196,974
Measurement methods and procedures	The data is obtained from WMC of each borehole as per Document "Sworn Statement"
Monitoring frequency	At least biennially; the above value is valid from 26/11/2021 to no later than 25/11/2023 as per the applied methodology
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of number of persons consuming safe water supplied by the project
Additional comment	

Data / Parameter	**Hygiene campaigns**
Unit	-
Description	Hygiene campaigns carried out among project technology users.
Source of data	Annual hygiene campaigns results
Value(s) applied	The VPAs operate for less than one year. Hygiene campaign has not been held in this monitoring period. It will be held in next few months before the completion of one year operation after the start of the VPAs.
Measurement methods and procedures	Questionnaires and interviews are used in hygiene campaigns to assess hygienic handling of clean water.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Assessment of achievement of SDG 6
Additional comment	Any major changes in the health status of the water users as a result of contaminated water (e.g. an outbreak of water related disease) must be reported.

D.3. Comparison of monitored parameters with last monitoring period

N/A.

D.4. Implementation of sampling plan

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a) Description of implemented sampling design

(1) Objectives and reliability requirements

The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following parameters over the course of the monitoring period. As per "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)", the 95/10 rule should be applied for cross VPA sampling.

(2) Target population

The target populations are boreholes maintained by the VPA01-06 and households consuming safe water provided by the VPA01-06. The target population of boreholes is 251, the target population of households is 49,057.

(3) Sampling method

Since VPA01-06 of PoA GS 10959 are in the same province, using same technologies and sharing same baseline scenario, representative and random cross VPA sampling is applied in these VPAs.

Multi-stage sampling combines the cluster and simple random sampling approaches in a two-stage sampling scheme which enables us to randomly select some boreholes and then randomly sample some households who using those boreholes. As with simple random sampling and cluster sampling, we are assuming homogeneity across boreholes in the usage of boreholes. We know that the 49,057 households are using 251 boreholes. $Q_{p,y}$, $Q_{p,rawboil,y}$, $Q_{p,cleanboil,y}$, $U_{p,y}$, $I_{p,y}$ and $T_{p,y}$ are sampled by multiple stage sampling, and water quality is sampled by simple random method.

(4) Sampling size

As per the applied methodology, the following guidelines are applied to calculate the sample size:

Group size < 300 (for water quality): Minimum sample size 30 or population size, whichever is smaller;

Group size > 1,000(for $Q_{p,y}$, $Q_{p,rawboil,y}$, $Q_{p,cleanboil,y}$, $U_{p,y}$, $I_{p,y}$ and $T_{p,y}$): Minimum sample size 100.

As per "Standard: Sampling and surveys for CDM project activities and programmes of activities (Version 09 .0)" and "Guidelines for sampling and surveys for CDM project activities and programmes of activities (Version 04.0)", the 95/10 rule are applied for cross VPA sampling.

The results are summarized in Excel tables "Data Recording Form for Project Survey" and "Data Recording Form for WCFT", which have been submitted.

(5) Sampling frame

The frame is a list of all households supplied by the boreholes in the project. The samples are selected from this list. The samples are randomly selected across the population. The entire target population has an equal chance of being selected, thus the samples selected are deemed to be representative of population.

b) Collected data

The following parameters are determined by sampling in this monitoring period:

Parameter	Description	Frequency
$Q_{p,y}$	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day	At least biennially
$Q_{p,rawboil,y}$	Quantity of raw or unsafe water that is still boiled after installation of the water treatment technology	At least biennially
$Q_{p,cleanboil,y}$	Quantity of safe (treated, or from safe supply) water boiled in the project scenario p, after installation of project technology	At least biennially
$U_{p,y}$	Usage rate in project scenario p during year y	Annually
$I_{p,y}$	Waterborne illness incidence in the project scenario during year y	Annually
$T_{p,y}$	Time spent to fetch and purify water by women and girls per household per day in the project scenario during year y	Annually
Water Quality	Performance of the treatment technology – less than 1 Colony Forming Unit (CFU) of E.Coli /100 ml of safe water	Quarterly

The main survey methods applied in the sampling plan include hardcopy questionnaires, face to face interview and telephone interview. The potential of refusals and other means of non-responses have been taken into account for calculation of sample size. Meanwhile, in order to minimize the rates of non-response and answer bias, the questionnaires have been designed by professional team and widely tested before use. The CME and ARDE are in charge of the implementation of the sampling plan. The Usage Survey is included in the Project Survey, so there is no individual questionnaire for Usage Survey. The Project Survey was carried out between 25/07/2022 to 25/08/2022. The data collected from the surveys was compiled into the "Data Recording Form for Project Survey" Excel table. The WCFT was carried out between 26/07/2022 to 18/08/2022. The data collected from the surveys was compiled into the "Data Recording Form for WCFT" Excel table. Two documents have been submitted.

c) Analysis

Data obtained from the samples were used to estimate values for the parameters described above. The Column P of "2- Data Recording Form for Project Survey" Excel table shows 100% of sample households use Borehole; the Column AB shows women and girls spend 0.44 hour to fetch water every day.

The values have been used to calculate the SDG outcomes:

Parameter	Meaning	Value	Unit
$U_{p,y}$	Cumulative usage rate for technologies in project scenario p during year y, based on cumulative installation rate and drop off rate	100%	percentage
$I_{p,y}$	Waterborne illness incidence in the project scenario during year y	0	Percentage
$T_{p,y}$	Time spent to fetch and purify water by women and girls per household per day in the project scenario during year y	0.44	h
$Q_{p,y}$	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day	6.66	L
$Q_{p,rawboil,y}$	Quantity of raw or unsafe water that is still boiled after installation of the water treatment technology	0	L

$Q_{p,cleanboil,y}$	Quantity of safe (treated, or from safe supply) water boiled in the project scenario p, after installation of project technology	0	L
Water Quality	Performance of the treatment technology – less than 1 Colony Forming Unit (CFU) of E.Coli /100 ml of safe water	Meet the requirement	

Please refer to the "1-SDG Outcomes Calculation Form-MP1st" Excel table.

d) Demonstration that the required confidence/precision level has been met

As calculated in above (4) of (a), the minimum number of boreholes to be sampled for Project Survey and WCFT is five. Since we have sampled six boreholes, the required 95/10 confidence level has been met has been met.

e) Demonstration that the samples were randomly selected and are representative of the population

The samples were randomly selected using random number generating function of Excel. The entire target population has an equal chance of being selected. Therefore, the samples selected are representative of the population.

SECTION E. CALCULATION OF SDG IMPACTS

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

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SDG 13: Climate Action

Baseline Scenario Fuel Consumption Calculation:

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

Where:

$B_{b,y}$ Quantity of fuel consumed in baseline scenario b during the year in tons

X_{boil} 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; the applied value is 0 as per section D.1.

C_j Percentage of users of project technology who were already in baseline scenario using a non-boiling safe water supply; the applied value is 0.0083 as per section D.1.

$N_{p,y}$ Number of person.days consuming water supplied by project scenario p through year y; the applied value as per Section D.2.

$W_{b,y}$ Quantity of fuel in tons required to treat 1 litre of water using technologies representative of baseline scenario b in year y as per baseline water boiling Test; the applied value is 0.0004 as per Section D.1.

$Q_{p,y}$ Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day; the applied value is 6.66 as per Section D.1.

$Q_{p, rawboil,y}$ Quantity of raw water boiled in the project scenario p per person per day; ; the applied value is 0 as per Section D.1.

As a result, $B_{b,y}$ is shown as follows:

VPA No.	$B_{b,y}$
01	16,480.56
02	18,775.38
03	18,963.12
04	12,403.94
05	18,101.94
06	12,335.01
Total	97,059.95

Baseline Emission Reductions:

$$BE_{b,y} = B_{b,y} *((f_{NRB,b,y} * EF_{b,fuel,CO2}) + EF_{b,fuel,non-CO2}) * NCV_{b,fuel} \quad (2)$$

Where:

$BE_{b,y}$ Baseline emissions during year y

$B_{b,y}$ Quantity of fuel consumed in baseline scenario b during the year in tons; the applied value as per calculation in this section above;

$f_{NRB,b,y}$ Fraction of biomass used that can be established as non-renewable biomass in baseline scenario b during year y; the applied value is 0.9682 as per section D.1.

$EF_{b,fuel,CO2}$ CO_2 emission factor of fuels used in the baseline scenario; the applied value is 112 as per section D.1.

$EF_{b,fuel,non-CO2}$ Non-CO_2 emission factor of fuels used in the baseline scenario; the applied value is 9.46 as per section D.1.

$NCV_{b,fuel}$ Net calorific value of fuels used in the baseline scenario; the applied value is 0.0156 as per section D.1.

As a result, $BE_{b,y}$ is shown as follows:

VPA No.	$BE_{b,y}$
01	30,311
02	34,531
03	34,877
04	22,813
05	33,293
06	22,686
Total	178,511

SDG 3: Good health and well-being

The outcome of SDG 3 is quantified as the reduction of waterborne illness incidence compared to baseline scenario. The waterborne illness incidence in the baseline scenario is 38.45% according to Baseline Survey.

SDG 5: Gender equality

The outcome of SDG 5 is quantified as percentage reduction of time spent to fetch and purify water by women and girls. The time spent to fetch and purify water by

women and girls per household per day in the baseline scenario is 0.90 hour according to Baseline Survey.

SDG 6: Clean Water and Sanitation

The outcome of SDG 6 is quantified as number of persons consuming safe water supplied by the project, the direct outcome is calculated, see section E.2.

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

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SDG 13: Climate Action

Project Scenario Fuel Consumption Calculation

$$B_{p,y} = (1 - C_j) * N_{p,y} * W_{p,y} * (Q_{p,rawboil,y} + Q_{p,cleanboil,y}) \quad (3)$$

Where:

$B_{p,y}$ Quantity of fuel f consumed in project scenario p during the year y in tons

C_j Percentage of users of project technology who were already in baseline scenario using a non-boiling safe water supply; the applied value is 0 as per section D.1.

$N_{p,y}$ Number of person.days consuming water supplied by project scenario p through year y; the applied value as per Section D.2.

$W_{p,y}$ Quantity of fuel in tons required to treat 1 litre of water using technologies representative of baseline scenario b in year y as per baseline water boiling Test; the applied value is 0.0004 as per Section D.1.

$Q_{p,rawboil,y}$ Quantity of raw water boiled in the project scenario p per person per day; the applied value is 0 as per Section D.2.

$Q_{p,cleanboil,y}$ Quantity of safe water boiled in the project scenario p per person per day in year y; the applied value is 0 as per Section D.2.

As a result, $B_{p,y} = 0$ t

Project Emission Reductions:

$$PE_{p,y} = B_{p,y} * ((f_{NRB,p,y} * EF_{p,fuel,CO2}) + EF_{p,fuel,non-CO2}) * NCV_{p,fuel} \quad (4)$$

Where:

$BE_{b,y}$ Baseline emissions during year y

$PE_{p,y}$ Project emissions during year y

$B_{p,y}$ Quantity of fuel consumed in project scenario p during the year y in tons; the applied value is 0 as per calculation in this section above;

$f_{NRB,p,y}$ Fraction of biomass used that can be established as non-renewable biomass in project scenario p during year y; the applied value is 0.9682 as per section D.1.

$EF_{b,fuel,non\text{-}CO2}$ Non-CO_2 emission factor of fuels used in the baseline scenario; the applied value is 9.46 as per section D.1.

$EF_{p,fuel,CO2}$ CO_2 emission factor of fuels used in the project scenario; the applied value is 112 as per section D.1.

$EF_{p,fuel,non\text{-}CO2}$ Non-CO_2 emission factor of fuels used in the project scenario; the applied value is 9.46 as per section D.1.

$NCV_{p,fuel}$ Net calorific value of fuels used in the project scenario; the applied value is 0.0156 as per section D.1.

ER_y Overall emission reductions achieved by the project activity during year y

$U_{p,y}$ Cumulative usage rate for technologies in project scenario p during year y, based on cumulative installation rate and drop off rate; the applied value is 100% as per section D.2.

$LE_{p,y}$ Leakage from project scenario p during year y; the applied value 0 as per section D.2.

As a result, $PE_{p,y}$= 0 tCO_2e

SDG 3: Good health and well-being

The outcome of SDG 3 is quantified as the reduction of waterborne illness incidence compared to baseline scenario, which is calculated as follows:

$$I_{r,y} = I_b - I_{p,y} \quad (5)$$

Where:

$I_{r,y}$ Reduction of waterborne illness incidence in year y

I_b Waterborne illness incidence in the baseline scenario; the applied value is 38.45% as per section D.1.

$I_{p,y}$ Waterborne illness incidence in the project scenario during year y; the applied value is 0 as per section D.2.

As a result, $I_{r,y}$ = 38.45%

SDG 5: Gender equality

The outcome of SDG 5 is quantified as percentage reduction of time spent to fetch and purify water by women and girls, which is calculated as follows:

$$T_{r,y} = (T_b - T_{p,y})/T_b \quad (6)$$

Where:

$T_{r,y}$ Percentage reduction of time spent to fetch and purify water by women and girls in year y

T_b Time spent to fetch and purify water by women and girls per household per day in the baseline scenario; the applied value is 0.90 as per section D.1.

$T_{p,y}$ Time spent to fetch and purify water by women and girls per household per day in the project scenario during year y; the applied value is 0.44 as per section D.2.

As a result, $T_{r,y}$ = 51.11%

SDG 6: Clean Water and Sanitation

The outcome of SDG 6 is quantified as number of persons consuming safe water supplied by the Project, which is calculated as follows:

$$P_y = P_{p,y} * (1-C_j) * U_{p,y} \quad (7)$$

Where

P_y Number of additional persons consuming safe water supplied by the Project compared to the baseline scenario during year y

$P_{p,y}$ Number of persons consuming water within the project area during year y; the applied value as per section D.2.

C_j Percentage of users of project technology who were already in baseline scenario using a non-boiling safe water supply; the applied value is 0.0083 as per section D.1.

$U_{p,y}$ Cumulative usage rate for technologies in project scenario p during year y; the applied value is 100% as per section D.2.

As a result, P_y is shown as follows:

VPA No.	P_y
01	33,750
02	31,855
03	32,320
04	33,221
05	33,514
06	32,314
Total	196,974

E.3. Calculation of leakage

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As per the applied methodology and the registered VPA DD, the leakage is expected to be 0, which can be ignored.

However, to confirm that leakage can be deemed very low, the below described leakage assessment regarding the potential leakage sources (listed in the methodology TPDDTEC, pages 15) shall be completed every two years. During this monitoring period, $LE_{p,y}$ is estimated as follows:

Potential Influence Factor	Interpretation
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.	The displaced baseline technology is three stones. It has not be reused outside the project boundary because it still be used for cooking after the implementation of the project.
Non-project users who previously used lower emitting energy sources use the non-renewable biomass or fossil fuels saved under the project activity.	The costs of low emitting water purification technologies, such as filtration and chlorination, are much higher than boiling with wood fuel. Users of these technologies are not price sensitive. Therefore, the implementation of the VPA does not lead these users to boil water with wood fuel, even if the price of wood fuel becomes cheaper because of the reduction of demand caused by the project.

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.	Considering that the VPA only saves 97,059 tons ($B_{b,y}$) of biomass annually while the total amount of above-ground biomass of Rwanda is 75 million tons, the VPA does not affect NRB fraction.
The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.	The space heating effect of boiling water is negligible. Therefore it is highly unlikely that some other form of heating will be adopted for compensating the space heating effect of boiling water.
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.	The project does not promote any new technology with high efficiency. It does not stimulate people to boil water.

In conclusion, $LE_{p,y} = 0$

$$ER_y = (\Sigma BE_{b,y} - \Sigma PE_{p,y}) * U_{p,y} - \Sigma LE_{p,y} \quad (8)$$

As a result,

VPA No.	Start date	End date	ER_y
VPA01	27/11/2021	24/07/2022	30,311
VPA02	26/11/2021	24/07/2022	34,531
VPA03	26/11/2021	24/07/2022	34,877
VPA04	09/01/2022	24/07/2022	22,813
VPA05	12/12/2021	24/07/2022	33,293
VPA06	10/01/2022	24/07/2022	22,686
	Total		178,511

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

SDG	SDG Impact	GS ID	Baseline estimate	Project estimate	Net benefit
13	Reduce emission from water boiling by non-renewable biomass	GS 11098	30,311	0	30,311
		GS 11133	34,531	0	34,531

		GS 11134	34,877	0	34,877
		GS 11135	22,813	0	22,813
		GS 11136	33,293	0	33,293
		GS 11137	22,686	0	22,686
		Total	178,511	0	178,511
3	Reduce the incidence of waterborne illness within the project area		38.45%	0	38.45%
5	Reduce the time spent to fetch and purify water by women and girls		0.90hour	0.44hour	51.11%
6	Provide safe water to local residents	GS 11098	283	34,033	33,750
		GS 11133	267	32,122	31,855
		GS 11134	271	32,591	32,320
		GS 11135	279	33,500	33,221
		GS 11136	281	33,795	33,514
		GS 11137	271	32,585	32,314
		Total	1,652	198,626	196,974

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

SDG	GS ID	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values[3] achieved during this monitoring period
13	GS 11098	38,453 tCO_2e	30,311 tCO_2e
	GS 11133	38,613 tCO_2e	34,531 tCO_2e
	GS 11134	38,613 tCO_2e	34,877 tCO_2e
	GS 11135	31,563 tCO_2e	22,813 tCO_2e
	GS 11136	36,049 tCO_2e	33,293 tCO_2e
	GS 11137	31,403 tCO_2e	22,686 tCO_2e
3	GS 11098	18.45%	38.45%
	GS 11133	18.45%	38.45%
	GS 11134	18.45%	38.45%
	GS 11135	18.45%	38.45%
	GS 11136	18.45%	38.45%
	GS 11137	18.45%	38.45%
5	GS 11098	44.44%	51.11%
	GS 11133	44.44%	51.11%
	GS 11134	44.44%	51.11%
	GS 11135	44.44%	51.11%
	GS 11136	44.44%	51.11%

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

	GS 11137	44.44%	51.11%
6	GS 11098	32,726 persons	33,750 persons
	GS 11133	32,726 persons	31,855 persons
	GS 11134	32,726 persons	32,320 persons
	GS 11135	32,726 persons	33,221 persons
	GS 11136	32,726 persons	33,514 persons
	GS 11137	32,726 persons	32,314 persons

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

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According to approved PDD, annual emission reduction achieved by the project activity is 58,480 tCO_2e, this monitoring period is from 26/11/2021 to 24/07/2022. So, ex-ante emission reduction of each VPA for this monitoring period:

GS ID	Start date	End date	Values estimated in ex ante calculation of approved PDD
GS 11098	27/11/2021	24/07/2022	38,453
GS 11133	26/11/2021	24/07/2022	38,613
GS 11134	26/11/2021	24/07/2022	38,613
GS 11135	09/01/2022	24/07/2022	31,563
GS 11136	12/12/2021	24/07/2022	36,049
GS 11137	10/01/2022	24/07/2022	31,403
Total			214,694

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

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The actual value of SDG 3 is higher than estimated value due to several reasons:

a) clean water supplied by the project has a good quality, which has been proven by the water quality tests;

b) local people have developed a better healthy habit by the convenience of getting clean water and hygiene campaigns.

The actual value of SDG 5 is higher than estimated value because estimated value ex-ante was a conservative estimate, whereas monitored data is an accurate representation by sampling.

The actual values of SDG 6 are a little bit higher than the ex-ante estimated values in VPA 01, 04 and 05 because the ex-antes values are from a general conservative estimation, whereas monitored data is from the sum of the actual data from each project borehole.

The actual values of each VPA of SDG 13 are lower than estimated value because the rehabilitation of boreholes in each VPA took several months. But when we calculate the estimated emission reduction ex-ante, we use the first date the borehole was repaired of the VPA. The actual operating days of other boreholes are much shorter during this monitoring.

SECTION F. SAFEGUARDS REPORTING

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According to Section B.7 of Design Certified PDD, safety of water disinfectants used in the VPA should be monitored. But during this monitoring period, the water quality meets the relevant requirements, so we have not used water disinfectants. Hence no parameter needs to be monitored in this section.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

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

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We offer different ways of continuous input and grievance mechanism in accordance with PDD.

Method	Include all details of Chosen Method (s) so that they may be understood and, where relevant, used by readers.

Continuous Input / Grievance Expression Process Book (mandatory)	The offices of all the villages where the VPA has been implemented
GS Contact (mandatory)	help@goldstandard.org
Email	Mr. Ji BAO: baoji@icebergchina.com Mr. David BAZIRANKENDE: bazirankendebdavid@gmail.com
Cell Phone	Mr. David BAZIRANKENDE: +250728684787

During this monitoring period, no Inputs or Grievances has been received during this monitoring period.

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

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Not applicable. No stakeholder mitigations were agreed to be monitored.

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

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No legal contest or dispute has arisen.

Revision History

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