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 – (delete below table if N/A)

GS ID of Programme	GS12239
Title of Programme	Amazi Meza Rwanda Water Supply Project for Schools - PoA
Version of POA-DD applicable to this monitoring report	1.5
Name and GS ID of fully Validated CPA/VPAs (i.e. non compliance check)	GS 12239 VPA-1 Amazi Meza Rwanda Water Supply Project For Schools

Key Project Information

GS ID (s) of Project (s)	GS12240
Title of the project (s) covered by monitoring report	GS 12239 VPA-1 Amazi Meza Rwanda Water Supply Project For Schools
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	PoA-DD v1.6 VPA-DD V1.5
Version number of the monitoring report	1.5
Completion date of the monitoring report	11/12/2024
Date of project design certification	17/11/2024
Date of Last Annual Report	NA
Monitoring period number	1st
Duration of this monitoring period	26/06/2023-31/03/2024 (Both days included)
Project Representative	Evan Thomas, CEO, Virridy Carbon LLC evan.thomas@virridy.com
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	Methodology For Emission Reductions From Safe Drinking Water Supply, v1.0

Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
13 Climate Action (mandatory)	Amount of GHGs emissions avoided or sequestered	7,665 tCO_2e	tCO_2e GS-VERs
6 Clean water and sanitation	Proportion of population using safely managed drinking water services	100%	Proportion
7 Affordable and clean energy	Number of beneficiaries: Individuals	133,156	People
8 Decent Work and Economic Growth	Total number of jobs created (during Distribution and monitoring, and Evaluation)	11	Permanent Jobs

Table 2 – Product Vintages

		Amount Achieved
Start Dates	End Dates	VERS
26/06/2023	31/12/2023	2,284
01/01/2024	31/03/2024	5,381

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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According to the World Health Organization and the United Nations Children's Fund, unsafe water, along with poor sanitation and hygiene, are the main contributors to an estimated 4 billion cases of diarrhea disease annually (with nearly being 1.7 billion cases in children) causing 1.4 million deaths[1]. This project activity addresses the lack of safe drinking water in certain schools in Rwanda and the resulting negative impacts on students' health and learning.

The objectives of this Gold Standard VPA are:

(i) Provide water treatment to Schools in Rwanda to address microbiological contamination, and;

(ii) Avoid CO_2e emissions associated with water treatment.

(iii) The geographic location of the VPA (installation of the water fillers) is within the geographic boundaries of the Host Country Rwanda.

(iv) The baseline scenario is assumed to be that users would have boiled water for drinking in the absence of the project activity. Mostly, biomass is used as fuel for boiling water at the baseline scenario.

The project is managed and implemented by Virridy Carbon LLC, the Coordinating Management Entity (CME). Virridy, through its wholly owned subsidiary Virridy Rwanda LTD, will distribute, install, and service low greenhouse gases (GHG) emitting water purification systems at point-of-collection (POC) to provide safe drinking water (SDW) for institutional application at schools (mostly, primary and secondary schools; other educational institutions can be included[2]) in approximately one thousand (1,000) schools countrywide as part of the whole programme; one hundred fifty four

[1] World Health Organization, 2014. Preventing diarrhea through better water, sanitation and hygiene. Available at: https://www.who.int/publications/i/item/9789241564823
World Health Organization, 2024. Diarrhoeal disease. Available at: https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease
Triple Threat How disease, climate risks, and unsafe water, sanitation and hygiene create a deadly combination for children. New York: United Nations Children's Fund (UNICEF), 2023. Available at: https://www.unicef.org/media/137206/file/triple-threat-wash-EN.pdf

[2] See more details below about the eligibility criteria for educational institution to join the grouped project.

(154) schools included in the present VPA. The specific location of the schools and water purification systems are recorded including GPS coordinates.

The technology is installed free of charge. In exchange for the installation and maintenance of the project technology, each school will sign a carbon waiver[3] relinquishing full and uncontested legal ownership of the carbon credits produced by the project and transferring the rights to Virridy Carbon LLC.[4]

Schools are identified based on a set of criteria, with the top criterion being that the water currently being provided to students is determined to be unsafe through microbiological testing.[5] The water purification systems installed are the LifeStraw® Community.

LifeStraw® Community is a point-of-use microbiological water purifier designed for routine use in educational settings. The LifeStraw® Community includes a LifeStraw® Ultrafiltration Membrane with a lifetime filtration capacity of 70,000 – 100,000 liters, which can be replaced[6].

The water purification systems reduce both the use of and demand for firewood and other fuels used to boil water for drinking, leading to a reduction and/or demand for carbon dioxide emissions. The project aims to reduce the energy demand and respective carbon emissions from the selected schools by the project activity for whom the common practice of water treatment for drinking is or would have been water boiling, considering the emission factor of the baseline energy source mix, including the displacement of Non-Renewable Biomass (NRB). The project accounts for purified water consumed for drinking.

[3] Evidence document "16_Samples of Carbon Waivers" is provided to the VVB.
[4] To ensure there is no dispute over the certified emission reductions and to demonstrate the legal ownership of the emission reductions lies with the CME, the CME has pursued Memorandums of Understanding (MoUs) with Districts, and Carbon Rights Waiver with the technology provider. Both supporting documents "17_District MOUs" and "Carbon Credits Assignment Letter Technology Suppliers v1 Rev" are provided to the VVB.
[5] The CME perform the microbiological testing by following the guidance on the document "22_Water Quality Test Technical Specifications", provided to the VVB.
[6] LifeStraw® Community specs. Available at: https://lifestraw.com/products/lifestraw-community

The VPA location is Rwanda with the first project technologies installed on June 26, 2023. The VPA has been fully implemented and includes 1,273 LifeStraw® Community with installations taking place from 26/06/2023 to 23/02/2024.[7] The technologies became operational at the time of each installation.

This is a small-scale project activity. The quantification impact methodology[8] applied ("GS Methodology For Emission Reductions From Safe Drinking Water Supply" version 1.0) describes the small scale. This project applies Type III definition: GHG emission reductions for small scale projects shall not exceed more than 60,000 tons CO_2e in any year of the crediting period. During this monitoring period the project complied with the small-scale threshold by achieving 7,665 tCO_2e.

The CME confirms this specific VPA is not part of an ETS[9], has not participated in any other GHG program, has not been rejected by other GHG program, and cannot/will not claim nor account emission reductions (ERs) for the same vintage in another standard other than GS nor any other carbon market mechanism (regulated or voluntary). The proposed project activity does not overlap, displace or is considered redundant to the main national sectoral policies for mitigation of GHG. Rwanda NDCs[10] do not include planes to avoid emissions from boiling water, no regulation or policy was identified that prevents water boiling as purification method, neither found a policy that seeks the reduction of firewood consumption form cooking or water boiling. A review of the key references relating to the provision of safe drinking water in Rwanda reveal there are no mandatory laws or specific requirements to foster the installation of water filtration technologies.[11] This translates to no double counting occurs with national climate policies or programs. The implementation of the PoA and the VPA is a voluntary action by the CME.

[7] Details are available in the file "31_Filter Installation Database".
[8] Reference to GS4GG "Principles and Requirements" version 1.2, and "GHG emission reductions & sequestration product requirements" version 2.3, where the small scale is defined in the footnote 14 of paragraph 3.4.2 of the methodology applied.
[9] At the date of the validation of the VPA (20 November 2024), there is not an ETS operating in Rwanda, nor one under development, neither one under consideration. See ICAP ETS map available in the following link: (link opened on 20 November 2024): https://icapcarbonaction.com/es/ets
[10] The Sectors covered by the NDCs are: energy; industrial processes and product use (IPPU); waste; and agriculture , forestry and other land use (AFOLU) but excluding sources from forestry and other land use. Information taken from NDC partntership available in the following link (link opened on 07 Jun 2024): https://ndcpartnership.org/country/rwa

[11] Details available in the VPA Desing Document.

A.2. Location of project

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The geographic boundaries within which project technologies are installed within the political boundaries of the Host Country of Rwanda.

- Rwanda: 1.9403° S, 29.8739° E

The project activities are implemented in several schools in the following districts:

- Kamonyi
- Gakenke
- Musanze
- Muhanga

The CME has recorded GPS coordinate of each filter installed. Detailed information about location of project technology is made available to the validator.[12]

[12] Details available in the document "31_Filter Installation Database (with Districts)"

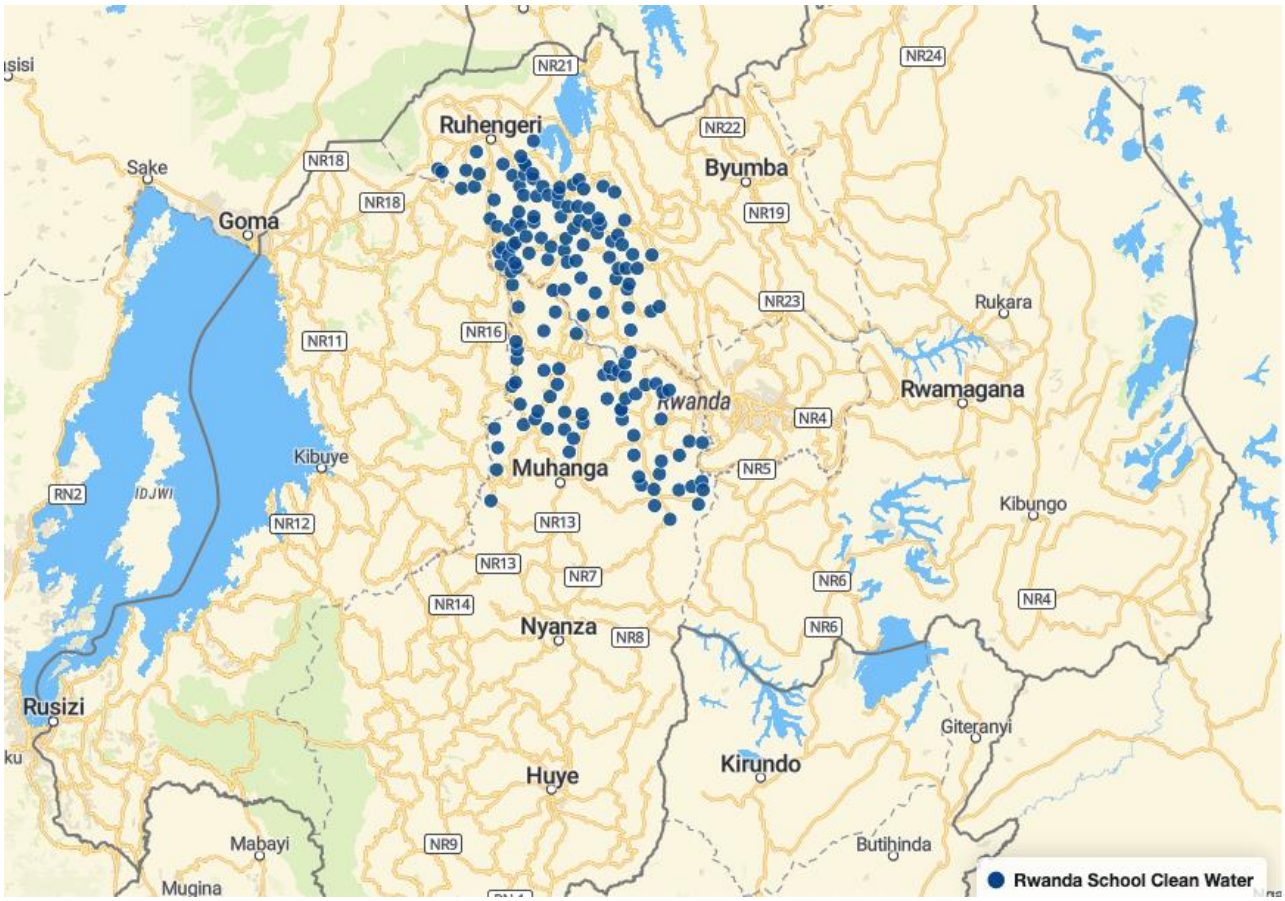

Figure 1. Location of the Schools included in this VPA.

The VPA is implemented in a location within the geographic boundaries of Rwanda. The GPS location coordinates of each filter and each school (premises) included in the project has been recorded and made available to the verifier.

A.3. Reference of applied methodology

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Selected GHG baseline and monitoring methodology: GS Methodology For Emission Reductions From Safe Drinking Water Supply, v1.0 https://globalgoals.goldstandard.org/standards/429_V1.0_EE_SWS_Emission-reductions-from-Safe-Drinking-Water-Supply.pdf

Other applicable tools:

- CDM Methodological Tool 30 "Calculation of the fraction of non-renewable biomass" version 4.0 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v4.0.pdf

- Guidelines for sampling and surveys for CDM project activities and programmes of activities, version 04.0
  https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20151023152925068/Meth_GC48_%28ver04.0%29.pdf

Other rules observed:

APPLICATION OF SUPPRESSED DEMAND, PROJECT TYPE AND APPLICABLE SCALE THRESHOLD (RU 2020 PR- GHG V1.2)
https://globalgoals.goldstandard.org/standards/RU_2020-SSC-Application-of-Suppressed-Demand.pdf

A.4. Crediting period of project

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26/06/2023 – 25/06/2028

5 years

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

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VPA1 is fully implemented. Since project inception as of 26/06/2023, 1,273 filters (LifeStraw® Community) have been installed in 154 schools across Rwanda in the districts of Gakenke (604 filters in 75 schools), Kamonyi (303 filters in 35 schools), Muhanga (213 filters in 30 schools), and Musanze (153 filters districts in 14 schools. Each filter installed has a record of its GPS coordinate. The technologies became operational at the time of each installation. Installations took place from 26/06/2023 to 13/03/2024.[13] The project is serving 133,156 people (students and schools' staff).

Virridy Carbon LLC. office manages all activities related to carbon finance, certification and Gold Standard compliance, including the management of monitoring activities. Filter installation and operations are managed from Virridy Rwanda LTD office in

[13] Details are available in the file "31_Filter Installation Database (with Districts)".

Kigali, Rwanda. As of 31 March 2024, 11 Direct Employees in Rwanda, 5 direct employees in USA, 3 suppliers are operating under Virrdy's regimes in Rwanda.

The management system covered in the PoA had already been implemented at the time of verification, including:

- Roles and responsibilities: Management hierarchy has been defined to ensure the proper project implementation and operation. The diagram below summarizes the roles and responsibilities of each involved entity in the programme.

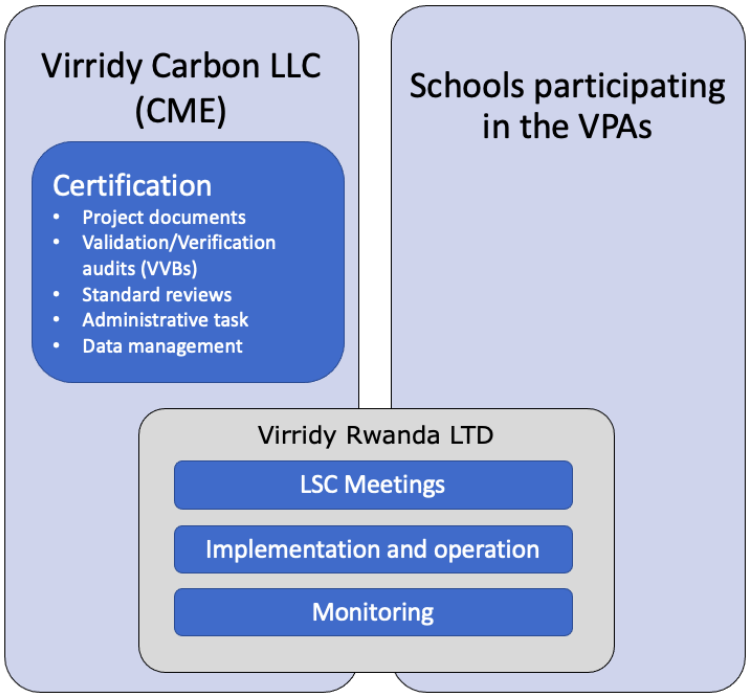

Figure 2. Roles and responsibilities

- Records and documentation control processes: Documentation is maintained as described in the PoA, with data collection performed from the Virridy Rwanda office; Gold Standard documentation and reporting are conducted from its U.S. office with support of a specialized consultant.
- Procedure to avoid double counting: Filters are identified with a unique asset ID created in the mWater electronic database at the time of installation. Each school is identified with a unique identifier and GPS coordinates. Only schools with no water treatment system in place for students are included in the programme.

The present VPA deployed the LifeStraw® Community technology. This is a point-of-use microbiological water purifier intended for routine use in community, educational and institutional settings. It can serve four people simultaneously and includes a built-in 25-liter safe storage container. It includes a LifeStraw® Ultrafiltration Membrane with a lifetime filtration capacity of 70,000 – 100,000 liters, which can be replaced. LifeStraw® water purifiers are rigorously tested by independent laboratories (including an ISO certified lab) to meet protocols established by the US Environmental Protection Agency (EPA) and NSF International/ANSI[14]. Additionally, the LifeStraw® Max has been certified under the Rwanda Standards Board (RSB) to meet national water quality standard.

LifeStraw® Community specs[15]:

LifeStraw® Community	
Dimensions (assembled)	558 x 558 x 850 mm (22” x 22” x 33.5” in)
Weight (without water)	8 kg (17 lbs)
Others	Uses no chemicals, thus leaves no bad taste or odor in purified water. **Does not require electrical power or batteries.**
Includes	LifeStraw® Membrane Ultrafilter

[14] Additional Filtration Specifications: Meets US NSF/ANSI P231 drinking water standards for the reduction of viruses, bacteria and parasites, Meets the highest drinking water requirements for WHO and US EPA. Further details on Lab information can be found in the following link (opened on 07 Jun 2024): https://cdn.shopify.com/s/files/1/2631/0778/t/4/assets/LifestrawCommunity-EvidenceDossier-1544004763279.pdf?6021742932617323678SSIER%20(PDF)

[15] Detailed information on LifeStraw® Community and LifeStraw® Ultrafiltration Membrane (such as Product Support Guide & FAQs, Performance Data Sheet, User Manual, Lab Information) can be found at the “Resources” section. Available at: https://lifestraw.com/products/lifestraw-community

LifeStraw® Ultrafiltration Membrane specs[16]:

LifeStraw® Ultrafiltration Membrane	
Standards	WHO 3-star rating for comprehensive protection. Meets US EPA & NSF P231 drinking water standards for the removal of viruses, bacteria, and parasites. Meets NSF 42 standards for chlorine reduction. Meets NSF 53 standards for reduction of lead.
Removes	99.999% of bacteria *(Brucella melitensis, Campylobacter jejuni, Francisella tularensis, Pseudomonas aeruginosa, Shigella, Staphylococcus aureus, Vibrio cholerae (Cholera), Vibrio parahaemolyticus, Yersinia enterocolitica, Yersinia pestis,* ***Enteropathogenic Escherichia coli (E. coli)****, Haemophilus influenzae, Klebsiella pneumoniae, Legionella pneumophila, Mycobacterium tuberculosis, Mycoplasma pneumoniae, Burkholderia pseudomallei, Salmonella enterica, Salmonella typhi (Typhoid), Streptococcus pneumoniae, Streptococcus pyogenes, Leptospira).* 99.999% of parasites *(Ascaris lumbricoides, Cryptosporidium spp., Entamoeba histolytica, Giardia intestinalis (Beaver Fever), Naegleria gruberi, Schistosoma mansoni, Taenia saginata).* 99.999% of viruses

[16] Ibid

	(Adenoviridae, Astroviridae, Calicivirus, Enterovirus, Hepatovirus A (Hepatitis A), Influenzavirus, Norovirus, Human parainfluenza viruses (HPIVs), Paramyxovirus, Human parvovirus B19, Rhinovirus, Rotavirus, Alphavirus, Rubivirus (Rubella)) 99.999% of microplastics
Reduces	Turbidity (silt, sand, cloudiness)
Pore size	0.02 micron
Filtration rate	2.5 L / min.
Lifetime	Filters 70,000-100,000 liters over its lifetime. The LifeStraw® Ultrafiltration Membrane can be replaced.
Safety	**When the purifier reaches the end of its lifetime, the membrane clogs naturally, thus eliminating the possibility of anyone drinking contaminated water.**

Figure 3. LifeStraw® Community

B.1.1 Forward Action Requests

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TBD based on FARs from Validation, if any.

B.2. Post-Design Certification changes

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No post-design certification changes for the present VPA.

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

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No temporary deviations for the present VPA.

B.2.2. Corrections

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No corrections are applicable for the present VPA.

B.2.3. Changes to start date of crediting period

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No changes of the crediting period are applicable for the present VPA.

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

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No permanent changes are applicable for the present VPA.

The programme does not apply standardized baselines.

B.2.5. Changes to project design of approved project

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No changes to the project design.

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

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Virrdy's, both Virridy Carbon LLC (CME) and Virridy Rwanda LTD, monitoring and follow-up procedures includes different stages to ensure identification of schools, installation, and proper use of filtering technology.

Schools Identification: Virridy Rwanda LTD and the Ministry of Education signed a memorandum of understanding to install and service water purification systems in schools countrywide with beneficiaries estimated at over two million people including students and teachers. The PoA addresses critical access to safe water, whilst contributing to pollution reduction through the benefits of carbon financing. The project has signed MOUs with different districts confirming cooperation for the project implementation.[17] The Government of Rwanda has the commitment to avail to partner with Virridy Rwanda LTD in promotion of access to safe water in schools countrywide, whereas Virridy Carbon LLC and Virridy Rwanda LTD have the responsibility to install, manage and monitor water purification installations at selected schools using crediting-based certification for the emission reductions as part of the financing structure that makes possible the programme. Virridy Rwanda LTD screens schools to join the programme based on the eligibility criteria set up in the VPA-DD.

Installation Records: Virridy Carbon LLC and Virridy Rwanda LTD maintain an accurate and complete installation record, which is managed and backed up electronically through the mWater[18] platform. The information collected includes the following:

[17] The MOUs will be available for the VVB upon request.

[18] mWater is a leading, free operating system for WASH in low-resource regions. It is a flexible data management platform used in over 190 countries by utilities, governments, and civil society organizations.

mWater is an online software platform that Virridy subscribes to and uses for survey data collection, management and analysis as well as asset management and mapping. Only Virridy staff have access to the data and its management within this platform - each user has to create an account, be added to our organization in mWater, and be given specific access/capabilities based on their user type and how it relates to data and asset management. For example, the filter installation team has access to filter asset management while the baseline survey team has access to the baseline and water quality surveys.

- School ID
- School Name
- School Address (and other contact details)
- District
- Sector
- GPS coordinates
- Installation date
- No. of Filters installed
    - Serial number of each filter installed
- No. of People (staff and students)
- No. of Students (male and female)

Training Activities and Hygiene campaign: At the time of the installation, Virridy Rwanda LTD train school staff appointed how to use and basic maintaining of the water purification system[19] including:

- Assembling (components of the filter)
- Filling capacity
- Maintenance (cleaning, backwash, etc.)
- Minor troubleshooting

The training takes place following a meeting with the headmaster in which the memorandum of understanding is signed. The training takes place with a small group of 2-4 staff members and 2-4 students appointed by the school to receive training on how to use and basic maintaining of the water purification system. It lasts over about one hour and a half.

The first session of training includes the following topics:

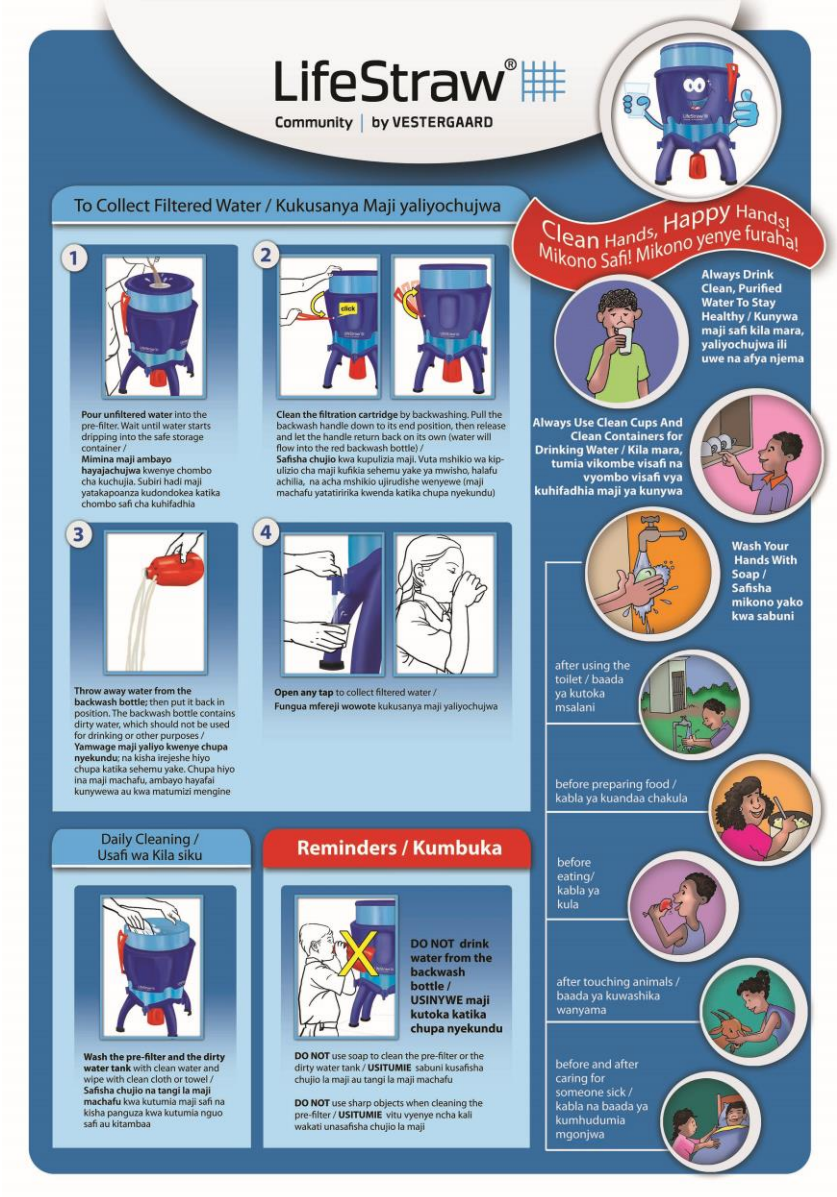
[19] The documents 'Checklist for a School Visit_2023.docx', 'Checklist – Use and Maintenance_2023.docx', and 'Wrap Up Checklist_2023.docx' are made available to the verifier as supporting evidence of the training done.

- Greetings and Questions (e.g. questions for pupils about experiences with waterborne diseases)
- Introduction of water purification system capacity and features
- Review of filter manual on use and regular maintenance, including demonstration
- Review of educational poster, including the importance of drinking safe water and proper handwashing
- Demonstration by each individual in the training of the educational poster and filter use
- Dos and Don'ts and how to address issues with the filter
- Heath Messages

The second session focuses on everyday use and maintenance schedules for the filters, including:

- Review of school's daily routine to identify when to fill filters to ensure that water is available for students during breaks and meals
- Completion of the Daily Filter Use worksheet including when filters will be filled and when daily backwashing will be conducted, as well as who will complete these tasks
- Review of Regular Maintenance worksheet, explaining each step and how to record

The image below is a sample of the posters hanging in each school as part of the hygiene campaigns.



Usage poster English and Kinyarwanda

The project campaign includes a didactic explanation of behavioral activities such as always drinking of clean purified water[20] (e.g. supplied by the project technology); use clean cups/containers for drinking water; hand washing with soap after using toilet, before preparing food, before eating, after touching animals, before and after

[20] The documents, 'Checklist – Small Group Session_2023.docx', and ''Checklist – Large Group Session_2023.docx' are made available to the verifier as supporting evidence of the hygiene campaigns done.

caring for sick people. These recommendations as well as instructions on filter use are reinforced through educational posters that are posted with filters during installation.

Although the schools' staff receive proper training to ensure the water purification systems operate correctly, the responsibility to maintain the project technology (e.g. filter cartridge replacement and repairs) lies on Virridy Rwanda LTD.

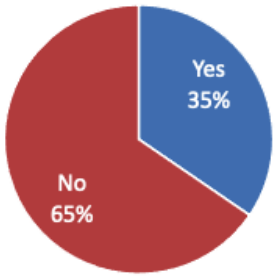
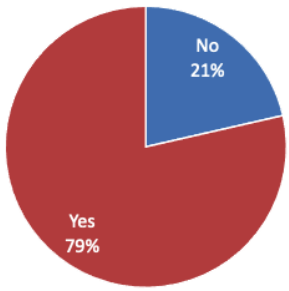
Summary results of the hygiene campaign: The training offered by the project to all the schools included in the MR make an emphasis of the importance to handle clean water, improvement of hygiene facilities and continuous awareness to enhance hygiene practices. All the schools engage with the awareness hygiene campaign and perform specific activities described below.
Reminders at the morning ceremonies of the following topics:

- Always drink clean and purified water
- Always use clean cups and clean containers for drinking water
- Wash hands with soap, after using the toilet, before preparing food, before eating and after touching animals, and before and after caring for someone sick.

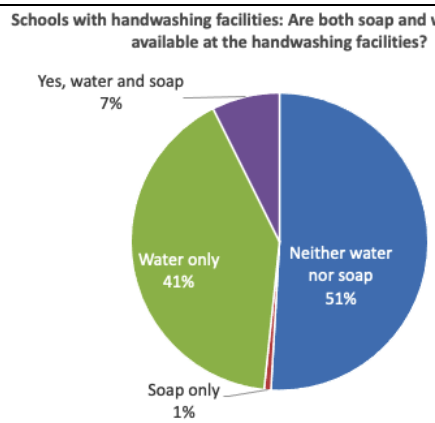
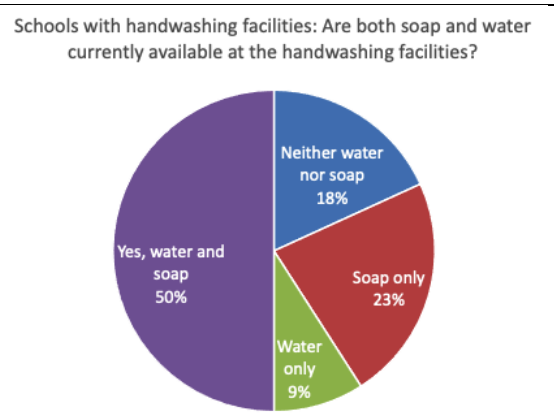
Some schools organized «The Water Club» which invites students to participate in the daily cleaning routine of the filters in the classroom and remind classmates about the importance of drinking safe water and hygiene habits. Those reminders take place during the morning ceremonies and during classes. This involvement of students enhances the hygiene habits. The same topics are communicated in the parents' meetings. During the verification site-visit, the headmasters interviewed shared anecdotes how before the project implementation, parent advised children to avoid drinking water at school because it was not safe, but now, parent encourage children to drink safe water from the filters. Furthermore, some parents send extra bottles for children to collect water from filters and bring it back home because it is safe drinking water. Also, some households nearby schools asked permission to collect water from the filters.

The project has focused effort respect to regular and correct use of amenities prevents infections from water-related diseases, as well to prevent infections from

water-related diseases. The graphs below summarized the results from this monitoring period.[21]

	
Availability of Handwashing facilities at baseline scenario	Availability of Handwashing facilities at project scenario

Handwashing facilities at schools increased from 35% to 79%.

	
Availability of soap and water at baseline scenario	Availability of soap and water at project scenario

Schools with handwashing facilities that have both, soap and water, increased from 7% to 50%.

[21] The sample size included 14 schools in the four districts (2 in Muhanga, 3 in Kamonyi, 7 in Gakenke, 2 in Musanze) where 115 filters have been installed.

Monitoring survey: A sampling plan was implemented for the monitored data. The sampling plan was aligned with the 'Guideline Sampling and surveys for CDM project activities and programmes of activities', Version 04.0.[22] The approach followed is the stratified random sampling. A minimum of 90% confidence interval and a 10% margin of error requirement was achieved for the sampled parameters. The districts have been used as strata.[23]

The sample size of combined usage and project survey conducted included 14 schools and 115 water filters. The project survey had been conducted between 04/03/2024 and 12/03/2024. Local Management Staff from Virridy Rwanda LTD, a team of trained staff, carried out data collection on filter usage, hygiene practices, water quality test, and other indicators for reporting.

Water Quality Test: The water quality test resulted in 98%[24] of the filters tested providing safe water.

Organizational structure of monitoring:

Entity	Role
Virridy Carbon LLC (CME)	The CME is responsible for overall management, implementation, and operation of VPAs. The monitored data is assessed and reviewed in line with GS guidelines for preparing Design Documents and Monitoring Reports.
Virridy Rwanda LTD	Local Management Staff is responsible for the physical implementation including installation, post-installation services, and technical assistance to schools. The filter assembling is responsibility of Virridy Rwanda LTD with technical support of Virridy Carbon LLC. Local Management Staff is responsible for ensuring the database of the filters installed is correct and complete,

[22] https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20151023152925068/Meth_GC48_%28ver04.0%29.pdf
[23] Details available below in Section D.4; and in the document "Amazi Meza Rwanda_Installs_23 Feb 2024 Stratified Random Selection" available to the VVB.
[24] A stratified sampling approach based on district location resulted in a sampling of 14 schools and sample size of 115 filters used for the water quality test. 113 resulted safe drinking water (98%), 2 resulted unsafe (2%). Details available in the document "24_Water Quality Test Results" provided to the VVB.

	including schools' details, unique identification of each installed filter, training records, maintenance records, and carbon waivers. Local Management Staff is responsible for the monitoring including the training schools, monitoring surveys, and water quality tests.
Gold Standard and the VVB	Gold Standard and the VVB ensure that the project adheres to the requirements set-forth by GS4GG. Both will ensure that there is any overestimation of emission reduction during the project cycle.
Schools	Are responsible to use properly the water filter systems, keep communication with Virridy Rwanda LTD and provide information about usage.

SECTION D. DATA AND PARAMETERS

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

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SDG13

a. Related to water quality

Parameter ID	**SDWS 2**
Data/parameter	Project technology description
Unit	NA
Description	<table><tr><th>Product</th><th>Manufacturer</th></tr><tr><td>LifeStraw Community</td><td>LifeStraw</td></tr></table>
Source of data	Manufacturer specifications
Value(s) applied	Further details can be found in section B.1 of this document. The complete specifications have been made available to the verifier.

Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	This parameter is fixed ex-ante & shall be updated at CP renewal.

Parameter ID	**SDWS 4**
Data/parameter	Regulatory Framework for safe water supply
Unit	N/A
Description	East African Standard, Potable Water Specification, EAS 12: 2014 specifies the Microbiological requirements, Chemical and physical limits for quality of drinking water supplies.
Source of data	Rwanda Standard, East African Standard, Potable Water Specification, EAS 12: 2014
Value(s) applied	

Type of microorganism	Potable water
Total Coliforms in 100 ml	0
E. coli in 100 ml	0
Note: For each individual sample, coliform should be estimated in terms of the "Most Probable Number" in 100 ml of drinking water, which is often designated as MPN index or Coli index. Occurrence of E. coli (fecal coli) in consecutive samples, in less than 100 ml of drinking water is an indication of fecal pollution and hence a dangerous situation needing urgent rectification.	

Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	This parameter is fixed ex-ante & shall be updated at CP renewal.

Parameter ID	**SDWS 5**
Data/parameter	Water sources in the project boundary
Unit	N/A
Description	The water sources identified at the project boundary are classified as improved and unimproved. The baseline surveys are used to define water sources in detail.
Source of data	Baseline Survey
Value(s) applied	As per the baseline survey the water sources in project boundary are:
Choice of data or Measurement methods and procedures	Baseline survey was carried out in line with the methodology and described in the VPA-DD, section B.4
Purpose of data	For parameter C_b calculation

Water Sources	**%[25]**
Borehole or tubewell	1.0
rainwater collection	90.0
Eligible schools supplying water by utility	1.0
protected spring	85.0
unprotected spring	2.0

[25] May total more than 100% because schools can have more than one source.

Additional comment	This parameter is fixed ex-ante & shall be updated at CP renewal.

b. Related to emission reductions

Parameter ID	**SDWS 6**
Data/parameter	Stove technologies used in the project boundary
Unit	NA
Description	The proportion of different stove types used in premises in the geographical area of the project. The project only covers one type of end-user: Schools institutional premise. The stoves are determined for this premise type.
Source of data	Baseline Survey
Value(s) applied	**Type of stove** / **Proportion** 3-stone: 27.1 Imbabura: 5.1 Muvero: 35.6 Muvero (good conditions): 8.5 Rondereza: 23.7
Choice of data or Measurement methods and procedures	The VPA-DD, Section B.4 explains how the baseline survey was conducted. The majority of the population surveyed is using traditional inefficient cookstoves consuming woody biomass. Only a few are using improved cookstoves.
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter is fixed ex-ante & shall be updated at CP renewal.

Parameter ID	**SDWS 7**
Data/parameter	Expected technical life of project technology
Unit	Years

Description	The expected technical life of an individual project technology is defined in the VPA-DD, section A.3. The details include the life of the different product types used.
Source of data	Manufacturer specifications
Value(s) applied	<table><tr><td>Product</td><td>Lifetime[26]</td></tr><tr><td>LifeStraw Community</td><td>6</td></tr></table>
Choice of data or Measurement methods and procedures	Manufacturer specifications
Purpose of data	Calculation of project life
Additional comment	In cases where the life span of the water purifier technologies is shorter than the crediting period of the PoA, the project proponent shall ensure that the units are replaced in order to continue claiming emission reductions. There are measures in place to ensure that end users have access to replacement purification systems of comparable quality. The technology/equipment will be replaced prior to the life span so that end users can access the same level of water purification. If no replacement or retrofitting is provided, emission reduction claims are limited to the expected technical life. The project has been running for nine (9) months since the installation of the first filter. No replacements, neither retrofit have taken place in this monitoring period.

Parameter ID	**SDWS 8**
Data/parameter	xf
Unit	Percentage of fuel f use in target population
Description	The proportion of each different cooking fuel f used in the project boundary by end-users:

[26] As specified by the manufacturer, considering periodic replacement of membrane ultrafilter and cartridge filters.

	- % among the target population if a single fuel is used for water boiling. - Weighted average on energy basis, if multifuel situation exists within premise. The project only covers one type of end-user: Schools institutional premise. The fuels used at stoves for this premise type are determined.
Source of data	Baseline survey
Value(s) applied	**Fuel** / **Percentage**[27] Biogas 1% Charcoal 1% Biomass 1% Wood 100% For simplification, only wood is considered as fuel used.
Choice of data or Measurement methods and procedures	The baseline survey is detailed in the VPA-DD, section B.4, as well the sampling plan is described in the VPA-DD, section B 7.2.
Purpose of data	Calculation of baseline scenario
Additional comment	NA

Parameter ID	**SDWS 9**
Data/parameter	$EF_{b,f,CO2}$
Unit	tCO2/TJ
Description	CO2 emission factor arising from use of fuels in baseline scenario
Source of data	IPCC defaults for wood and charcoal, the following defaults derived from the IPCC are applied: Wood: 112 tCO2/TJ
Value(s) applied	Wood: 112

[27] May total more than 100% because schools can have more than one type.

Choice of data or Measurement methods and procedures	Default methodology value for fuelwood is applied
Purpose of data	Calculation of baseline scenario
Additional comment	-

Parameter ID	**SDWS 10**
Data/parameter	EFb,f,non-CO2
Unit	tCO2e/TJ
Description	Non-CO2 emission factor from use of fuels, in case the baseline fuel is biomass or charcoal
Source of data	IPCC defaults for woody biomass, the following defaults derived from the IPCC are applied: AR5 GWP - Wood: 9.46 tCO2e/TJ
Value(s) applied	Wood: 9.46
Choice of data or Measurement methods and procedures	Default methodology value for woody fuel is applied
Purpose of data	Calculation of baseline scenario
Additional comment	-

Parameter ID	**SDWS 11**
Data/parameter	ηwb
Unit	%
Description	Weighted average efficiency of the baseline water boiling devices. Calculate the weighted average of the water boiling efficiency in the project boundary using the proportion of different stove types used and the stove efficiencies.
Source of data	As per methodology Emission Reductions from Safe drinking water supply version 1.0, the following default

	values are be applied to calculate the weighted average of the water boiling efficiency in the project boundary: - Three-stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system, that is without either a grate or a chimney: default efficiency 10%. – Other conventional systems using woody biomass: default efficiency 20%. - Improved cookstoves: manufacturer specification, or if not available, default efficiency 30%.
Value(s) applied	**Type of stove** / **Default efficiency** 3-stone / 10% Imbabura / 10% Muvero / 10% Muvero (good conditions/carbon project) / 10% Rondereza / 10%
Choice of data or Measurement methods and procedures	Baseline survey
Purpose of data	Calculation of Baseline scenario
Additional comment	This parameter is fixed Ex-ante & shall be updated at CP renewal.

Parameter ID	**SDWS 12**
Data/parameter	Cb
Unit	Percentage
Description	Proportion of project end-users who in the baseline were already using safe water, either from an improved water source, or from a water treatment method other than boiling
Source of data	Baseline survey
Value(s) applied	0%

Choice of data or Measurement methods and procedures	Assume this is zero because all schools have at least one contaminated water source and aren't boiling water after filter installation
Purpose of data	Calculation of baseline emissions
Additional comment	The safe water sources and percentages is consistent with the information reported for parameter Water sources in the project boundary (SWDS 5).

Parameter ID	**SDWS 13**
Data/parameter	qi
Unit	Litres per hour
Description	Capacity of the institutional water treatment technology
Source of data	Manufacturer specifications
Value(s) applied	**Product**: LifeStraw Community; **Capacity (L/h)**: 27.2
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	The capacity value is based on average flow rate defined by the manufacturer through a longevity performance test. This parameter is fixed Ex-ante & shall be updated at CP renewal.

D.2 Data and parameters monitored

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SDG 13

a. Related to water quality

Parameter ID	**SDWS 18**
Data / Parameter	Mq,y
Unit	Fraction

Description	Ongoing water quality indicated as the fraction of the samples that pass microbial quality standard requirements specified in relevant microbial quality standard for drinking water of the host country. In case a national standard is not available, the water quality shall comply with WHO Guideline values for verification of microbial quality i.e., all water directly intended for drinking must not have detectable E.Coli in any 100 ml sample i.e., less than 1 Colony Forming Unit (CFU) of E.Coli /100 ml
Source of data	Testing of water at the exits of the treatment technology for a representative sample of end-users
Value(s) applied	0.98
Measurement methods and procedures	-
Monitoring frequency	Annual sampling, and the first round of testing was conducted at least after six months from the start date.
QA/QC procedures	Field testing kits based on Most Probable Number method. The field testing kits used by the project met the following requirements: a. Testing kits must be approved by national agency or meet standards set by relevant international organisation e.g. US-EPA, and b. Testing kits have been tested for their accuracy and robustness prior to application for project level monitoring, including an independent laboratory evaluation. See the document 'Laboratory evaluation of portable water quality testing kits' file: 22_Water Quality Test Technical Specifications.pdf, made available to the verifier. The CME used stratified sampling approach based on district location. A random sampling of 14 schools and sample size of 115 filters was used for the water quality test.
Purpose of data	To meet claims under SDG 6.1.1. Level of Service and Project contributions: Water quality
Additional comment	If the proportion of samples not meeting Safe Drinking Water Quality Standards exceeds a threshold, no emission reductions will be claimed for the corresponding monitoring period. Thresholds: - Project or VPA year 1: 20% - Project or VPA year 2: 15% - Project or VPA year 3 or above: 10%

	When the crediting period is renewed, the year number count continues, i.e. the second crediting period would encompass year 6, year 7, year 8, etc. Additionally, when the threshold is exceeded, the project shall provide an explanation for why this occurred and provide a remediation plan. The 98% of the filters installed met passed the water quality test. No thresholds exceeded. Details available in the document "24_Water Quality Test Results" provided to the VVB.

Parameter ID	**SDWS 19**
Data/parameter	SDG Claims: SDG 13 Climate Action: Amount of GHGs emissions avoided or sequestered SDG 6 Clean water and sanitation: Proportion of population using safely managed drinking water services SDG 7 Affordable and clean energy: Number of beneficiaries: Individuals SDG 8 Decent Work and Economic Growth: Total number of jobs created (during Distribution and monitoring, and Evaluation)
Unit	SDG 13 Climate Action: tCO2e SDG 6 Clean water and sanitation: Proportion SDG 7 Affordable and clean energy: People SDG 8 Decent Work and Economic Growth: Permanent Jobs
Description	SDG 13 Climate Action: Amount of GHGs emissions avoided or sequestered

	SDG 6 Clean water and sanitation	Proportion of population using safely managed drinking water services
	SDG 7 Affordable and clean energy	Number of beneficiaries: Individuals
	SDG 8 Decent Work and Economic Growth	Total number of jobs created (during Distribution and monitoring, and Evaluation)
Source of data		
	SDG 13 Climate Action	Emission Reductions Calculations
	SDG 6 Clean water and sanitation	Installation Database
	SDG 7 Affordable and clean energy	Installation Database
	SDG 8 Decent Work and Economic Growth	Management Records (contracts)
Value(s) applied		
	SDG 13 Climate Action	Amount of GHGs emissions avoided or sequestered	11,903 tCO2e Proportion
	SDG 6 Clean water and sanitation	Proportion of population using safely managed drinking water services	98% People
	SDG 7 Affordable and clean energy	Number of beneficiaries: Individuals	133,156 People
	SDG 8 Decent Work and Economic Growth	Total number of jobs created (during Distribution and monitoring, and Evaluation)	11 Permanent Jobs (breakdown details are below in "Additional comment")
Choice of data or Measurement methods and procedures		
	SDG 13 Climate Action	ERs calculated based on the GS METHODOLOGY FOR

		EMISSION REDUCTIONS FROM SAFE DRINKING WATER SUPPLY
	SDG 6 Clean water and sanitation	Based on the Parameter $M_{q,y}$ SDWS18 following the GS METHODOLOGY FOR EMISSION REDUCTIONS FROM SAFE DRINKING WATER SUPPLY
	SDG 7 Affordable and clean energy	Based on the Parameter HNp,y SDWS25 following the GS METHODOLOGY FOR EMISSION REDUCTIONS FROM SAFE DRINKING WATER SUPPLY
	SDG 8 Decent Work and Economic Growth	Report from project director supported by the contracts.
Purpose of data	Calculation of the SDGs claim	
Additional comment	SDG 8 Decent Work and Economic Growth	

Year	Permanent jobs created	Trainings
2023	10	6
2024	1	2
Total	11	8

Parameter ID	**SDWS 20**
Data / Parameter	Water hygiene education campaigns
Unit	NA
Description	Hygiene campaigns carried out among project safe water end-users.
Source of data	Report of annual hygiene campaigns results
Value(s) applied	- Handwashing facilities at schools increased from 35% at baseline to 79% at project. - Schools with handwashing facilities that have both, soap and water, increased from 7% at baseline to 50% at project.

Measurement methods and procedures	The following guidelines apply for conducting these campaigns[28] - Hygiene refers to access to sanitation amenities, equipment and infrastructure, as well as to the behavior in respect to regular and correct use of such amenities. It also refers to behavior that prevents infections from water-related diseases. - The project developer shall report the activities conducted each year in a detailed "Report of annual hygiene campaigns results" and summarize the results in the project monitoring reports. - 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 and, if relevant, a strategy put in place to address it through the subsequent hygiene campaign. - The detailed method used to assess hygienic handling of clean water must be provided with the PDD and verified by the VVB. - The details of the method should be adjusted to suit the circumstances of each project and also to suit learning year on year. The impacts of the hygiene campaign have been assessed using the WHO/UNICEF Joint Monitoring Programme Core questions for drinking water and hygiene to determine the fraction of the households and institutions where Safe water and Hygiene practices are found to fulfill "safely managed" or "basic" requirements. In-person or telephone survey was conducted covering the core questions for drinking water and core questions for hygiene. For sampling requirements, follow section 4.2 |General requirements for sampling, below.

[28] Guidance on hygiene technologies, training, and surveys appropriate for rural communities and institutions in low-income areas can be found in many publications. Some examples are:
- "Safe Water Storage", Centres for Disease Control and Prevention, 2012
- "Water, Sanitation, and Hygiene Improvement, Training Package for the Prevention of Diarrheal Disease, Guide for Training Outreach Workers" USAID Hygiene Improvement Project, 2009
- "A manual on hygiene promotion", Water, Environment and Sanitation Technical Guidelines Series No. 6, United Nations Children's Fund (UNICEF). The London School of Hygiene and Tropical Medicine (LSHTM), 1999
- "Water, sanitation and hygiene standards for schools in low-cost settings", edited by John Adams, Jamie Bartram, Yves Chartier, Jackie Sims, World Health Organization, 2009

Monitoring frequency	Annual
QA/QC procedures	The fraction of the households where Safe water and Hygiene practices are found to fulfill "safely managed" or "basic" requirements is expected to increase over time as a result of the hygiene campaigns.
Purpose of data	Monitoring of SDG 6
Additional comment	The sample size included 14 school where 115 filters have been installed.

b. Related to emission reductions

Parameter ID	**SDWS 21**
Data/parameter	fNRB,f,y
Unit	Percentage
Description	Fractional non-renewability status of woody biomass fuel during year y, in case the baseline fuel is biomass
Source of data	Assessment based on CDM Methodological tool 30: Calculation of the fraction of non-renewable biomass, Version 04.0
Value(s) applied	84.85%
Choice of data or Measurement methods and procedures	The value was calculated as per CDM Tool 30 "Calculation of The fraction of Non-renewable Biomass" (Version 04.0). Other reference documents: 2019 Refinement to IPCC 2006 Global Forest Resources Assessment 2020 Rwanda Global Forest Resources Assessment 2015 Forest Product Conversion Factors 2020 FAOSTAT on Forest Production and Trade (http://www.fao.org/faostat/en/#data/FO)
Purpose of data	Calculation of baseline scenario
Additional comment	The fNRB value will remain fixed during the crediting period.

Parameter ID	SDWS 22
Data / Parameter	$Xcleanboil,y$
Unit	Percentage
Description	Proportion of project end-users that boil safe (treated, or from safe supply) water after installation of project technology in year y.
Source of data	Project survey
Value(s) applied	0 (ex-ante estimation)
Measurement methods and procedures	A project survey was carried out to determine the value using sampling plan as detailed in section D.4
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	For sampling, follow section D.4 This parameter is also involved in the ERs calculations.

Parameter ID	SDWS 24
Data / Parameter	$QPWp$
Unit	Liters/person/day
Description	Volume of drinking water per person per day for premises type p
Source of data	GS quantification methodology
Value(s) applied	- Full-day premises: 4 L/person/day - Boarding school: 4 L/person/day - Half-time premises: 3 L/person/day
Measurement methods and procedures	Option 1: Apply the default value per person. In the case of institutions, such as schools, the value should reflect the expected drinking water use per person while on the premises of the institution, in line with the following defaults: - Full-day premises: 4 L/person/day - Boarding school: 4 L/person/day - Half-time premises: 3 L/person/day
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Calculation of baseline scenario

Additional comment	This parameter is fixed Ex-ante & shall be updated at CP renewal. No sampling required. The installation of the filters has been communicated during periodic parents' meeting, and community meetings. Before filters' installation, it was common for parents to advise children to avoid drinking water at schools. Now, in some cases, parents send extra bottles for children to collect water from filters and bring it back home. Furthermore, households nearby schools asked permission to collect water from the filters. The default water consumption is considered conservative.

Parameter ID	**SDWS 25**
Data / Parameter	HNp,y
Unit	Number
Description	Number of individuals per premises type p in the project boundary in year y
Source of data	Baseline Survey
Value(s) applied	Average individual per school, including students and staff. Part-time school: 609 Full-time school: 867 (Boarding school): 619 Total **133,156** individuals considering 154 schools
Measurement methods and procedures	-
Monitoring frequency	Annual
QA/QC procedures	The value has been provided by the head-master based on the actual student population, teachers and supporting staff.
Purpose of data	Calculation of baseline emissions
Additional comment	The CME had chance to monitor data from 100% of the schools (154) included in the VPA to determine this parameter.

Parameter ID	SDWS 28
Data / Parameter	Np,y
Unit	Number
Description	Accumulated number of premises type p with at least one individual project technology in year y
Source of data	Distribution records
Value(s) applied	154
Measurement methods and procedures	Sales or distribution records to include: i. Date of sale/distribution ii. Geographic area of sale iii. Model/type of project technology sold iv. Quantity of project technologies sold School name, telephone number, and address.
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	Units shall not be counted in Np,y _after the end of their technical life, unless this is addressed by the measures to manage the cases where the expected technical life of the project technology is shorter than the crediting period, namely replacement or retrofit as described in the parameter SDWS 7.

Parameter ID	SDWS 29
Data / Parameter	Up,y
Unit	Percentage
Description	Usage rate of the project technology by premises type p during year y
Source of data	Project Survey of the premises using a project technology to determine the usage rate of the project technology during the year.
Value(s) applied	98%
Measurement methods and procedures	- Option 1: In-person survey of project premises (e.g. households, schools) covering all topics outlined in Annex - 1. Households that show at least once-in-two-days use may be counted as users. The resulting fraction is multiplied by 100% to get Up,y.

	In this monitoring period, only filters from age group 0_1 years old are included.
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	The minimum sample size for IWT – for individual technology age group was determined considering the project technology type and in line with the sampling approach applied. For minimum sample size requirements for different sampling approach to align with the 'Guidelines for sampling and surveys for CDM project activities and programmes of activities'. Specific report of usage per filter is installed in each schools are fulfilled on daily basis to track the usage of the filters installed.

Parameter ID	**SDWS 30**
Data / Parameter	tp,y
Unit	Hours per day
Description	Usage time of the project technology by premises type p in year y
Source of data	Based on official schools working hours defined by Ministry of Education Rwanda (click here)
Value(s) applied	8 Hours
Measurement methods and procedures	NA
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	The official working hours are from 9:00am to 5:00pm, in most cases, children, teachers and supporting staff arrive at 8:00am and leave at 5:30pm. Many headmasters (schools' principals) report to having filled and ready the filters before children arrive, which extends the hours filters are used per day. The installation of the filters has been communicated during periodic parents' meeting, and community meetings. Before filters' installation, it was common for

	parents to advise children to avoid drinking water at schools. Now, in some cases, parents send extra bottles for children to collect water from filters and bring it back home. Furthermore, households nearby schools asked permission to collect water from the filters. These practices extend the hours of use per day, thus, the 8 hours per day defined are considered conservative.

Parameter ID	**SDWS 31**
Data / Parameter	DPp,y
Unit	Days
Description	Average days the project technology is present for end-users in the premises p in year y
Source of data	MINEDUC School Calendar[29]
Value(s) applied	207
Measurement methods and procedures	This parameter will be based on the official data made public by the Ministry of Education
Monitoring frequency	Annual
QA/QC procedures	The days must also be limited by the number of school days in the period, considering weekends and holidays.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Parameter ID	**SDWS 32**
Data / Parameter	DNp,y
Unit	Number
Description	Average number of individual project technologies in each project premises type p in year y
Source of data	Sales or distribution records.
Value(s) applied	8.21

[29] MINEDUC 2021-2022 and 2022-2023 School Calendars available in the following link: https://www.mineduc.gov.rw/index.php?eID=dumpFile&t=f&f=26973&token=25e04b17718bfdf251599175b5922b44e68478a6

Measurement methods and procedures	Based on the distribution records of "Quantity of project technologies installed", calculate the average number of project devices per premises.
Monitoring frequency	Annually
QA/QC procedures	NA
Purpose of data	Calculation of baseline emissions
Additional comment	The project only covers one type of end-users: institutions (schools). The CME had chance to monitor data from 100% of the schools (154) included in the VPA to determine this parameter.

Parameter ID	**SDWS 35**
Data / Parameter	LEy
Unit	tCO2e per year
Description	Leakage emissions during year y
Source of data	Sources established by following Leakage emissions section
Value(s) applied	Null
Measurement methods and procedures	Assessment
Monitoring frequency	Every two years
QA/QC procedures	NA
Purpose of data	Calculation of leakage emissions
Additional comment	No specific parameters are defined for leakage assessment.

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

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
$Xcleanboil,y$	0%	N/A
Mq,y	0.98	N/A
$QPWp$	- Full-day premises: 4 L/person/day - Boarding school: 4 L/person/day	N/A
HNp,y	862.21	N/A
DNp,y	8.21	N/A

tp,y	8 Hours per day	N/A
DPp,y	77.14 Days	N/A
Up,y	98%	N/A
Np,y	154	N/A
SDG 7 Number of beneficiaries: Individuals	1	N/A
SDG 6 Clean water and sanitation: Proportion of population using safely managed drinking water services	98%	N/A
SDG 8 Decent Work and Economic Growth: Total number of jobs created (during Distribution and monitoring, and Evaluation)	11 Permanent Jobs	N/A

This is the first monitoring period, there is no data available from previous periods.

D.4. Implementation of sampling plan

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Sampling Methodology

A statistically valid sample was used to determine parameter values as per the relevant requirements for sampling in the "Guidelines for Sampling and surveys for CDM project activities and programme of activities, version 4.0"[30]. A minimum of 90% confidence interval and a 10% margin of error requirement was achieved for the sampled parameters.

[30] https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20151023152925068/Meth_GC48_%28ver04.0%29.pdf

The sampling was defined under the stratified approach to ensure representativeness. The districts have been used as strata (see sheet 'Stratified Per District').

Sampling Size

The sample size of combined usage and project survey conducted included 14 schools and 115 water filters. The sample size was calculated as follows:

The equation for the total sample size is:

$$n \geq \frac{1.645^2 NV}{(N-1)\times 0.1^2 + 1.645^2 V}$$ Equation (4)

Where: $V = \frac{SD^2}{\bar{p}^2} = \frac{\text{overall variance}}{\bar{p}^2}$ and $\bar{p}$ is the overall proportion.

V	0.05	
SD^2	0.0475	Overall variance
$\bar{p}^2$	0.95	Overall proportion

To then decide on the number of filters in the sample that come from each school we could use proportional allocation, where the proportions of units from the different schools in the sample are the same as the proportions in the population. This gives:

$$n_i = \frac{g_i}{N} \times n$$ where i=1,…,k and k **is the number of schools in the area**

Where:

g_i	=	Size of the i^{th} group (district) where i=1,…,k
N	=	Population total

We use the figures from Table 2 above to calculate the overall variance, (the variance of a proportion is calculated as: p(1-p)) and proportion of cookstoves still in operation.

$$SD^2 = \frac{(g_a \times p_a(1-p_a)) + p_b(g_b \times (1-p_b)) + (g_c \times p_c(1-p_c)) + \cdots + (g_k \times p_k(1-p_k))}{N}$$ Equation (5)

SD^2	0.05	Overall variance

$$\overline{p} = \frac{(g_a \times p_a) + (g_b \times p_b) + (g_c \times p_c) + \ldots + (g_k \times p_k)}{N}$$ Equation (6)

$\overline{p}^2$	0.95

Therefore:

$$V = \frac{SD^2}{\overline{p}^2}$$ Equation (9)

V	0.05

This then needs to be divided up according to the proportion of each school type to get the number of filters that should be sampled in from each school type.

General equation $n_i = \frac{g_i}{N} \times n$ Equation (11)

Sample Size Statistically Representative

School Type	$\frac{g_i}{N} \times n$ Sample size	Number of Samples after Round Up
Gakenke	6.39	7
Kamonyi	2.98	3
Muhanga	1.19	2
Musanze	1.19	2

The samples are pickup on random basis from the installation records.

The sample size calculated was crosschecked against the Calculator CDM Guideline: sampling and surveys for CDM project activities and programmes of activities v03.1

The sample size calculated under the stratified sampling following the CDM Calculators indicates the same sample size (14 schools under CDM VS 14 schools under our own calculation). This serves a crosscheck to ensure the sample size calculated is correct.

Based on the district's proportions, a random selection is done assigning random numbers to each record, then sorting ascending and picking up the top schools from the list from each district until completing the samples required as per the sample size.

The full calculation (excel spreadsheet) of the sample size is made available to the VVB, including screen shots of the random number assignments.

The CME carried out a sampling-based monitoring for the following parameters:

- 'DNp,y = Average number of individual project technologies in each project premises type p in year y';
- 'HNp,y = Number of individuals per premises type p (e.g. household, school) in year y';
- 'Up,y = Usage rate of the project technology'; and
- 'Mq,y = Modifier for the water quality in year y'
- The average and proportion results from sampling were used to calculate the ERs (see the Sampling based Results above).

Also, the CME had chance to monitored data from 100% of the schools (154) included in the VPA to determine the following parameters:

- 'DNp,y = Average number of individual project technologies in each project premises type p in year y';
- 'HNp,y = Number of individuals per premises type p (e.g. household, school) in year y';

The CME calculated the ERs using 100% of the monitoring data for 'DNp,y ' and 'HNp,y' in combination with sampling approach for 'Up,y' and 'Mq,y'. The calculated ERs are 7,665.45 tCO2e.
Also, the CME calculated the ERs using a sampling-based approach for all the parameters and the ERs calculated are 7,730.22.

Both approaches provide a very similar result (there is a difference of 14.79 tonnes in absolute terms), which indicates the sampling-based approach is indeed

representative of the whole population. However, because the 100% approach is considered more accurate, exhaustive, and slightly lower than the sampling-based result, the CME decides to define the total ERs as per the 100% schools' results, this is 7,665 tCO2e.

Other elements of the monitoring plan

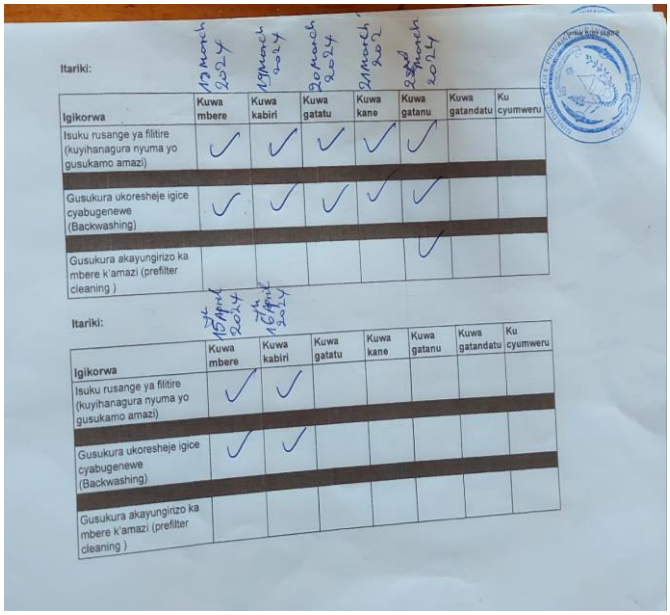
When the filters are installed, the best location is decided along with the headmaster to ensure accessibility, basically all the filters are installed in the classrooms where students and teachers can take water on a free-demand basis. In all the cases, the schools staff including the headmaster, teacher and supporting staff receive a training how to clean and maintain the filters (e.g. filling and backwash). In some cases, students are also involved in the training. The project delivers instructions material and posters as part of the hygiene campaign. The headmaster appoints teachers or supporting staff as responsible to report daily cleaning and usage, some schools also record how many times each filter is refilled. Some schools organized «The Water Club» which invites students to participate in the daily cleaning routine of the filters in the classroom and remind classmates about the importance of drinking safe water and hygiene habits. Those reminders take place during the morning ceremonies and during classes.
During the training, contact details of project staff (on-field and office) are provided to ensure they can deliver comments, feedback, or report troubles with the filters. The project staff is responsible for ensuring the proper function including solving issues and replacing components.

Below, there are pictures of the project operation.

Figure 4. Example of the barcode with the unique ID number of the filter

Figure 5. Typical location of the water filter in a classroom.

Figure 6. Example of a filter in use.



Itariki:

Igikorwa	Kuwa mbere	Kuwa kabiri	Kuwa gatatu	Kuwa kane	Kuwa gatanu	Kuwa gatandatu	Ku cyumweru
Isuku rusange ya filitire (kuyihanagura nyuma yo gusukamo amazi)	✓	✓	✓	✓	✓		
Gusukura ukoresheje igice cyabugenewe (Backwashing)	✓	✓	✓	✓	✓		
Gusukura akayungirizo ka mbere k'amazi (prefilter cleaning)					✓		

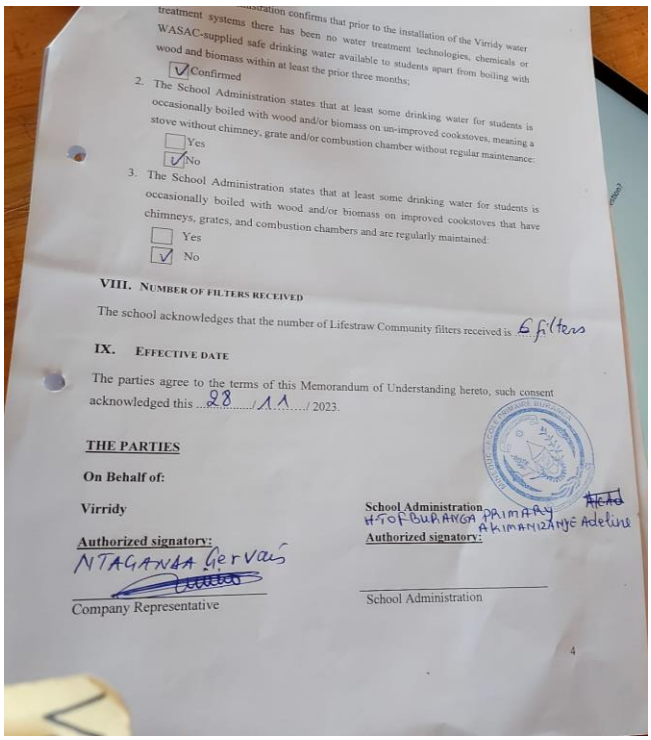
Itariki:

Igikorwa	Kuwa mbere	Kuwa kabiri	Kuwa gatatu	Kuwa kane	Kuwa gatanu	Kuwa gatandatu	Ku cyumweru
Isuku rusange ya filitire (kuyihanagura nyuma yo gusukamo amazi)	✓	✓					
Gusukura ukoresheje igice cyabugenewe (Backwashing)	✓	✓					
Gusukura akayungirizo ka mbere k'amazi (prefilter cleaning)							

Figure 7. Sample of the daily report including general cleaning, pre filter cleaning, and backwash.

Figure 8. Example of a filter instructions next to 2023-2024 School calendar in the headmaster's office.

Figure 9. Sample of the daily report including general cleaning, pre filter cleaning, and backwash.



treatment systems there has been no water treatment technologies, chemicals or WASAC-supplied safe drinking water available to students apart from boiling with wood and biomass within at least the prior three months:

☑ Confirmed

2. The School Administration states that at least some drinking water for students is occasionally boiled with wood and/or biomass on un-improved cookstoves, meaning a stove without chimney, grate and/or combustion chamber without regular maintenance:

☐ Yes
☑ No

3. The School Administration states that at least some drinking water for students is occasionally boiled with wood and/or biomass on improved cookstoves that have chimneys, grates, and combustion chambers and are regularly maintained:

☐ Yes
☑ No

VIII. NUMBER OF FILTERS RECEIVED

The school acknowledges that the number of Lifestraw Community filters received is 6 filters

IX. EFFECTIVE DATE

The parties agree to the terms of this Memorandum of Understanding hereto, such consent acknowledged this 28/11/2023.

THE PARTIES

On Behalf of:

Virridy

Authorized signatory:

NTAGANDA Gervais

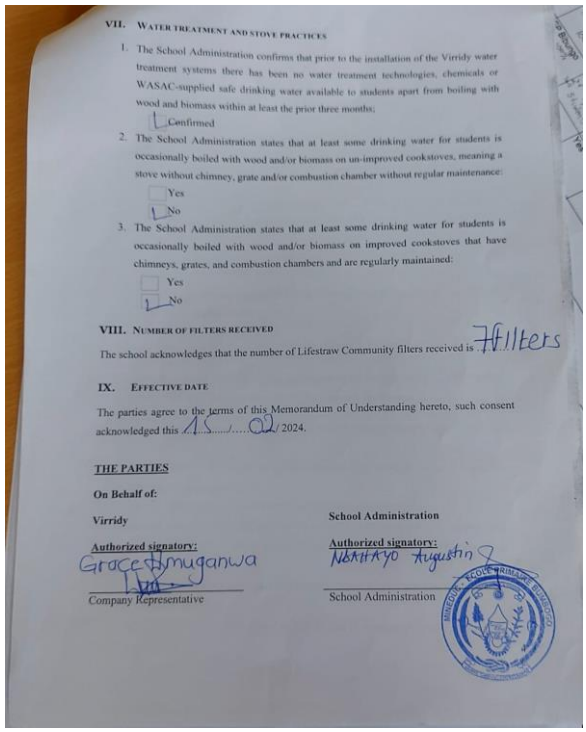
Company Representative

School Administration

HITOPBURANGA PRIMARY
NIYIMANIZANYE Adeline

Authorized signatory:

School Administration



VII. WATER TREATMENT AND STOVE PRACTICES

1. The School Administration confirms that prior to the installation of the Virridy water treatment systems there has been no water treatment technologies, chemicals or WASAC-supplied safe drinking water available to students apart from boiling with wood and biomass within at least the prior three months:

☑ Confirmed

2. The School Administration states that at least some drinking water for students is occasionally boiled with wood and/or biomass on un-improved cookstoves, meaning a stove without chimney, grate and/or combustion chamber without regular maintenance:

☐ Yes
☑ No

3. The School Administration states that at least some drinking water for students is occasionally boiled with wood and/or biomass on improved cookstoves that have chimneys, grates, and combustion chambers and are regularly maintained:

☐ Yes
☑ No

VIII. NUMBER OF FILTERS RECEIVED

The school acknowledges that the number of Lifestraw Community filters received is 7filters

IX. EFFECTIVE DATE

The parties agree to the terms of this Memorandum of Understanding hereto, such consent acknowledged this 15/02/2024.

THE PARTIES

On Behalf of:

Virridy

Authorized signatory:

Grace Nyuganwa

Company Representative

School Administration

Authorized signatory:

NKAKAYO Augustin

School Administration

Figure 10. Samples of the MoU signed by the schools indicating the number of filters installed and the date of installation.

SECTION E. CALCULATION OF SDG IMPACTS

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

>>

The detailed ex-ante Emission Reduction Calculation Spreadsheet is submitted in a separate excel file. The essential calculations are explained below.

Calculation of SDG 13

Baseline emission calculation

The baseline emissions is calculated as follows:

$$BEy = EFb \times (1 - Cb - Xcleanboil\ ,y\ ) \times Qy \times Mq,y$$

Where:

BEy	=	7,665.45	Emission factor for the use of fuel to obtain safe water in the baseline (tCO_2e/L)
EFb	=	0.0003770	Baseline emissions from the use of fuel to obtain safe water in the baseline (tCO_2e)
Cb	=	0	Proportion of project end-users who in the baseline were already using a safe water supply that did not require boiling (%)
$Xcleanboil\ ,y$	=	0	Proportion of project end-users that boil safe water in the project year y (%)
Qy	=	20,825,430.71	Quantity of safe drinking water provided by the project in year y (L)
Mq,y	=	0.98	Modifier for the water quality in year y

The baseline emission factor is calculated as follows:

$$EFb = SEw,b,y * \sum_{f}(xf * (EFb,f,CO_2 * fNRB,f,y + EFb,f,nonCO_2))\ f \div 10^9$$

Where

EFb	=	0.0003770	Emission factor for the use of fuel to obtain safe water in the baseline (tCO_2e/L)
SEw,b,y	=	3,608.30	Specific energy required to boil water (kJ/L), to be calculated as per the paragraph below

xf	=	1	Proportion of fuel f used in the baseline (fraction determined based on an energy basis)
$EFb,f,CO2$	=	112	CO_2 emission factor from use of fuel f (tCO_2/TJ)
$EFb,f,non\ CO_2$	=	9.46	Non-CO_2 emission factor arising from use of fuel f, when the baseline fuel f is biomass or charcoal (tCO_2e/TJ). This parameter is omitted when f is a fossil fuel.
$fNRB,f,y$	=	84.85%	Fractional non-renewability status of woody biomass fuel during year y (fraction). For biomass, it is the fraction of woody biomass that can be established as non-renewable. This parameter is omitted when f is a fossil fuel.
f	=	100% wood	Index for baseline fuel types

The specific energy required to boil water using the baseline technology (SEw,b,y) is determined as follows, by calculating the energy input required to obtain 1 L of boiling water, including boiling and vaporization losses, taking into account default or measured stove efficiency.

$SEw,b,y = 360.83/\eta wb$

SEw,b,y	=	3,608.30	
Where:			
360.83	=	360.83	Default amount of energy required to obtain 1 L of water after 5 minutes of boiling from a first principles approach kJ/l
ηwb	=	0.1	Efficiency of the stoves for baseline water boiling (%). Weighted average of baseline stove types.

The quantity of safe drinking water provided by the project is calculated using one of two methods. Method 1 applies to CWT and CWS, and Method 2 applies to HWT and IWT.

Method 2 – HWT and IWT technologies

In the case of HWT and IWT, the quantity of safe drinking water provided by the project Qy is determined as follows:

$Qy = \Sigma\, Np,y \times Up,y \times QPW,p,y \times DPp,y$

Qy = 20,825,430.71

Where:

Np,y	=	154 Total 150 Full time schools 4 Boarding schools	Number of premises type p with at least one project technology in year y
Up,y	=	98%	Usage rate of the project technology by premises type p during year y (%)
QPW,p,y	=	4 Full time schools 4 Boarding schools	Volume of drinking water per premises p per day in year y (L)
DPp,y	=	77.14	Days the project technology is present for end-users in the premises p in year y. MINEDUC 2021-2022 and 2022-2023 School Calendar: https://www.mineduc.gov.rw/index.php?eID=dumpFile&t=f&f=26973&token=25e04b17718bfdf251599175b5922b44e68478a6

The volume of drinking water per premises per day is determined by considering whether the capacity of the project device is sufficient to provide at least the default amount of drinking water, as follows:

QPW,p,y = min (($qi \times tp,y \times DNp,y$), ($QPWp \times HNp,y$))

QPW,p,y = 532,624

Where:

qi	=	27.2	Capacity of the HWT or IWT individual project technology (L/h)

tp,y	=	8	Usage time of the project technology by premises type p in year y (h/day)
DNp,y	=	8.21	Average number of individual project technologies in each project premises type p in year y
HNp,y	=	862.21	Average Number of individuals per premises type p (e.g., household, school) in year y.
$QPWp$	=	4 Full time schools 4 Boarding schools	Volume of drinking water per person per day for premises type p (L). Apply the default value or monitored value through water consumption field tests in the project scenario, capped at 5.5 L per person per day.

Parameter	Description	Units	Traditional cookstoves -Wood	Source/Equations used
SEw,b,y	Specific energy required to boil water	KJ/L	3,608.30	SEw,b,y = 360.83/ηw
ηwb	Efficiency of the stoves for baseline water boiling (%). Weighted average of baseline stove types.	%	Type of stove / Proportion of stoves used / Default efficiency 3-stone / 27.1% / 0.1 Imbabura / 5.1% / 0.1 Muvero (carbon project) / 35.6% / 0.1 Muvero (non-carbon project) / 8.5% / 0.1 Rondereza / 23.7% / 0.1	Data from the baseline survey, calculated as per the methodology equation.
xf	Proportion of fuel f used in the baseline (fraction determined based on an energy basis)	%	100%	Baseline Survey
$fNRB,f,y$	Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass	Fraction	0.8485	Calculated following the CDM Tool30.
EFp,i,CO2	CO2 emission factor of the fuel that is substituted or reduced	tCO_2/TJ	112	Methodology default
EFp,i,non-CO2	Non-CO2 emission factor of the fuel that is reduced	tCO_2/TJ	9.46	Methodology default

EFb	Emission factor for the use of fuel to obtain safe water in the baseline	tCO_2e/L	0.0003770	$EFb = SEw,b,y * \Sigma(xf * (EFb,f,CO2 * fNRB,f,y + EFb,f,nonCO2)) f \div 10^9$
QPW,p,y	Volume of drinking water per premises p per day in year y (L)	L/p/day	1,787.43	Calculated
QPWp	Volume of drinking water per person per day for premises type p (L)	L	Full-time school: 4 Boarding school: 4	Default
HNp,y	Average Number of individuals per premises type p in year y		862.21	Project Survey
qi	Capacity of the IWT individual project technology	L/h	27.2	Manufacturer's specifications
Up,y	Cumulative usage rate for technologies in project scenario p in year y	%	98%	Assumption/To be monitored
DNp,y	Number of premises type p with at least one project technology in year y	-	Total 154 150 Full time schools 4 Boarding schools	Distribution database
DPp,y	Days the project technology is present for end-users in the premises p in year y	-	77.14	Ministry of Education Rwanda, Distribution database
Qy	Quantity of safe drinking water provided by the project in year y	L	20,825,430.71	CALCULATED $Qy = \Sigma\ Np,y \times Up,y \times QPW,p,y \times DPp,y$
Cb	Proportion of project end-users who in the baseline were already using a safe water supply that did not require boiling	%	0	Baseline survey Assume this is zero because all schools have at least one contaminated water source and won't continue boiling after filter installation
Xcleanboil, y	Proportion of project end-users that boil safe water in the project year y	%	0	Project Survey

Mq,y	Modifier for the water quality in year y	Fraction	0.98	Project Survey
ER	Emission reductions, for 154 schools	tCO_2/yr	7,665	Calculated

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

>>

The water filtration technology does not require any fossil fuel or power consumption for water treatment hence the project emission due to the water filter would be zero

PEy = Project Emissions in year y (tCO2/year) = 0 (zero)

E.3. Calculation of leakage

>>

The leakages have been assessed related to non-renewable biomass as follows (other leakages have been excluded for simplification according the methodology):

a) Since the non-renewable biomass is available in abundance in the project geographical area (as evident from fNRB), it was highly unlikely that the use of non-renewable biomass increased among the members of the population who did not participate in the project, and were previously using lower emitting energy sources.

b) The purpose of the project was reducing the use of NRB that was being used in cookstoves for boiling water and is after project implementation, water purifiers are being used which do not require any NRB or any other fuel for its operations. The project helped in relatively increasing the NRB fraction in that area. Therefore, the condition that the project involves reducing the NRB fraction within an area where other GHG mitigation project activities account for NRB fraction in their baseline scenario is not applicable, hence no leakage emissions.

c) The project population is in the area where the annual average temperature is above 20°C. Hence there was no requirement to compensate for loss of the space heating effect of water boiling by adopting some other form of space heating or by retaining some baseline wood fuel-burning practices.

Therefore, leakage emissions have been considered nil and ignored for the project activity.

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

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
SDG 13	Emission Reductions	7,665	-	7,665
SDG 6	Proportion of population using safely managed drinking water services	-	100%	100%
SDG 7	Number of beneficiaries: Individuals	-	133,156	133,156
SDG 8	Total number of jobs created (during Distribution and monitoring, and Evaluation)	-	11	11

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

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values[31] achieved during this monitoring period
13	7,308 tCO2e	7,665 tCO2e
6	100%	100%
7	31,850 People	133,156 People
8	14 Permanent Jobs	11 Permanent Jobs

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

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

>>

The difference of 5% against the ERs in the PDD is not considered material and can be explained because slightly differences is the assumption used in the ex-ante calculations, specifically, the parameter 'Number of individuals per premises type p in year y' as shown in the table below:

Number of individuals per premises type p in year y	PDD Ex-ante	Monitoring Period
$HN_{p,y}$ (Full-time school)	867	716
$HN_{p,y}$ (Boarding school)	619	869

The ex-ante calculations used values obtained from the baseline survey. For this specific parameter the number of schools included in the baseline survey was 52, whereas the number of schools surveyed in the monitoring period was 154. It explains the difference.

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

>>

The only value that reports a considerable difference is the SDG 6 Proportion of population using safely managed drinking water services. The difference can be explained because the ex-ante value was based on the lower average of students & staff considered and a lower number of schools.

SECTION F. SAFEGUARDS REPORTING

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No mitigation measure defined for the safeguarding principles.

The project has been implemented as pe the design defined. There are no changes, neither updates, nor improvements that require adding mitigation measures.

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.

>>

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)	Virridy Carbon LLC (CEM) and Virridy Rwanda LTD have been managed comments/feedback/support/concerns as part of the Continuous Inputs and Grievance Mechanisms. A list of the comments received is provided to the VVB. The inputs and grievance process book is located at KK 15 Road Silverback Mall, Third Floor, Unit Number SB1-313. Kigali, Rwanda.
GS Contact (mandatory)	help@goldstandard.org
Other	Jean Ntazinda jean.ntazinda@virridy.com

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

>>

N/A

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

>>

No legal contest has arisen with the VPA during the current monitoring period.

Revision History

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