

**Verification and certification report form
for Gold Standard project activities**

BASIC INFORMATION

Title of the project activity	Eritrea Community Boreholes										
GS ID of Project	GS5125										
Scale of the project activity	☒ Large-scale ☐ Small-scale										
GS Version applicable	GS4GG										
Version number of the verification and certification report	03										
Completion date of the verification and certification report	11/12/2024										
Monitoring period number and duration of this monitoring period	Monitoring period no: 4 Duration: 31/08/2022 - 21/09/2023 (Inclusive of both days)										
Version number of the GS monitoring report to which this report applies	05										
Crediting period of the project activity corresponding to this monitoring period	22/09/2016 – 21/09/2023 (First crediting period)										
Project Representative	CO2balance UK Ltd.										
Host Party	State of Eritrea										
Applied methodologies and standardized baselines	“Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 2.0										
Mandatory sectoral scopes	01 (Energy industries (renewable - / non-renewable sources)) 03 Energy Demand										
Conditional sectoral scopes, if applicable	-										
Estimated amount of annual average SDG impact (as per approved Transition annex)	<table border="1"> <thead> <tr> <th>SDGs</th><th>Values estimated in ex ante calculation of approved PDD for this monitoring period¹</th></tr> </thead> <tbody> <tr> <td>SDG 3 Good Health and Well-being</td><td>80% reduction in exposure to Household Air Pollution due to boiling water</td></tr> <tr> <td>SDG 5 Gender Equality</td><td>At least 0.5 hours per trip per household time saved</td></tr> <tr> <td>SDG 6 Clean Water and Sanitation</td><td>55,074</td></tr> <tr> <td>SDG 13 Climate Action</td><td>286,289 tCO₂e</td></tr> </tbody> </table>	SDGs	Values estimated in ex ante calculation of approved PDD for this monitoring period ¹	SDG 3 Good Health and Well-being	80% reduction in exposure to Household Air Pollution due to boiling water	SDG 5 Gender Equality	At least 0.5 hours per trip per household time saved	SDG 6 Clean Water and Sanitation	55,074	SDG 13 Climate Action	286,289 tCO ₂ e
SDGs	Values estimated in ex ante calculation of approved PDD for this monitoring period ¹										
SDG 3 Good Health and Well-being	80% reduction in exposure to Household Air Pollution due to boiling water										
SDG 5 Gender Equality	At least 0.5 hours per trip per household time saved										
SDG 6 Clean Water and Sanitation	55,074										
SDG 13 Climate Action	286,289 tCO ₂ e										

¹Ex antes values refer to the approved Transition Annex (GS4GG_GS5125_Transition_Annex_v2_CLEAN)

Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	SDG Actual values achieved during this monitoring period	
	SDG 3 Good Health and Well-being	95% reduction in exposure to Household Air Pollution due to boiling water
	SDG 5 Gender Equality	Time saved on collecting firewood has increased during this monitoring period by 1.18 hours
	SDG 6 Clean Water and Sanitation	Additional people with access to safe water: 50,055
	SDG 13 Climate Action	94,928 tCO ₂ e (89,531 tCO ₂ e per annum)
Name and UNFCCC reference number of the VVB	4K Earth Science Private. Limited UNFCCC Ref No. CDM-E-0069	
Name, position and signature of the approver of the verification and certification report	 Chandrakala R. Managing Director	

SECTION A. Executive summary

4K Earth Science Private Limited (4KES) has been commissioned by “Vita Eritrea” to perform an independent 4th verification of its registered GS VER project “Eritrea Community Boreholes”, GS Ref # GS5125 for the reported SDG impacts for the given 4th monitoring period 31/08/2022 - 21/09/2023 (both dates included). The GS VER projects must undergo independent third-party verification and certification of SDG impacts as the basis for issuance of Verified Emission Reductions (VERs)

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The project activity has been implemented and operated as per the registered PDD/Approved transition annex and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report and other supporting documents are complete;
- The actual monitoring systems & procedures and monitoring report conforms with the requirements of the approved monitoring plan and the approved monitoring methodology;
- The data is recorded and stored as per the monitoring methodology and approved monitoring plan.

Scope:

The scope of the verification is the independent and objective review and ex post determination of the SDG impacts by the project activity. The verification is based on review of monitoring report, supporting information and

- (a) The registered GS PDD, Approved transition annex
- (b) The approved methodology mentioned in the GS PDD
- (c) The registered monitoring plan
- (d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board
- (e) Applicable Gold Standard rules and regulations
- (f) CDM Validation and Verification Standard (VVS)
- (g) All information and references relevant to the project activity's resulting in emission reductions
- (h) Information related to monitoring of SD parameters

The project is assessed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related GS rules and guidance.

4KES has based on the recommendations in the latest version of CDM Validation and Verification Standard, employed a rule-based approach in the verification, focusing on the identification of significant reporting risks and the reliability of project monitoring.

Description of project:

Title of project activity:	Eritrea Community Boreholes
Gold Standard Id:	GS 5125
Applied methodology:	“Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 2.0 /33/
Crediting period:	22/09/2016 – 21/09/2023
Project Representative:	CO2balance
Location of the project activity:	The project is located in Zoba Maekel, Zoba Debub and Zoba Anseba Regions of Eritrea

The project activity “Eritrea Community Boreholes” registered with GS on 08/12/2017, aims to deliver clean and safe water by rehabilitation of existing boreholes in the State of Eritrea. The project is located in semi-rural districts in Eritrea in where people use wood fuel to purify their drinking, cleaning and washing water. This process results in the release of greenhouse gas emissions from the combustion of wood - this can be avoided if a technology that does not require fuel (wood or fossil) supplies clean water desired by households. CO2balance's project partner Vita has worked to identify broken down boreholes and rehabilitated 163 boreholes. By providing safe water, this project

ensures that households consume less firewood during the process of water purification and therefore reduce greenhouse gas emissions from the combustion process.

The project is implemented by CO2balance. The key partners of the project is Vita, an Irish Charity that works in Eritrea, which deliver multiple projects that renovate broken boreholes so that they deliver clean, safe water. The project is a large-scale project activity and the pumps that were fixed are India Mark II and India Mark III pumps.

The individual project technology days for each borehole were totalled by multiplying the number of days each borehole credited for in this monitoring period with by the number of people using the borehole for the current monitoring period. The date of rehabilitation was used as the start date of operation and crediting for each borehole; without considering the first day in counting for conservativeness.

By providing safe water this project ensures that households consume less firewood during the process of water purification and therefore reduce greenhouse gas emissions from the combustion process. The emission reductions achieved during the current monitoring period starting from 31/08/2022 - 21/09/2023 (including both days) are 94,928 tCO₂e.

Methodology:

4KES follows a rule-based verification approach, wherein, as a first step, the contract review is undertaken as per latest version of CDM Accreditation Standard/GS PRINCIPLES & REQUIREMENTS.

A desk review of the project documentation is undertaken, which is followed by interviews by the members of verification team in accordance with the latest version of CDM AS/ GS PRINCIPLES & REQUIREMENTS. The verification protocol is filled by the verification team that is based on standard auditing practices and latest version of CDM VVS, to capture the assessment of applicable CDM & GS requirements viz., latest version of CDM Project Standard, applicable GS4GG requirements, registered GS-PDD applied methodology/ies and/or tools and recent decisions. The verification protocol provides transparent means to record the observations and compliances by the verification team members and the nonconformities (CARs/CLs), if any. The verification protocol is an internal document, and is available on request. After successful closure of findings (CARs/CLs), the draft verification report is prepared which went through Independent technical review as per 4KES internal procedures and the TR comments were given for any gaps in audit findings. After closure of the TR comments, final verification report is prepared then followed by final approval for the decision made. The approved verification report is given to PP which shall be submitted for request for issuance.

Following are the major milestones for the verification under consideration.

Verification contract	10/01/2024
Interviews	24/07/2024 24/07/2024 to 27/07/2024
Draft Verification Report	25/09/2024
Final Verification Report	11/12/2024

4K Earth Science Private Limited confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements.

Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 94,928 tCO₂e (round down) emission reductions during period 31/08/2022 - 21/09/2023 (Including both the days).

SDG	Actual values achieved during this monitoring period
SDG 3 Good Health and Well-being	95% reduction in exposure to Household Air Pollution due to boiling water
SDG 5 Gender Equality	Time saved on collecting firewood has increased during this monitoring period by 1.18 hours
SDG 6 Clean Water and Sanitation	Additional people with access to safe water: 50,055



SDG 13 Climate Action 94,928 tCO₂e (89,531 tCO₂e per annum)

Vintage-wise Emission reductions

		Amount Achieved
Start Dates	End Dates	VERs
31/08/2022	31/12/2022	30,170 tCO ₂ e
01/01/2023	21/09/2023	64,758 tCO ₂ e

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of VVB or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader, Verifier and Technical Expert	IR	R	Narendra Kumar	Central	X		X	X
2.	Local Expert and Technical Expert	EI	Yemane	Mehreteab Michael	Central	X	X	X	

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of VVB or outsourced entity)
1.	Technical reviewer	IR	Puratchikkanal	Ma Paa	Central
2	Approver	IR	R.	Chandrakala	Central

SECTION C. Means of verification

C.1. Desk/document review

The verification is performed primarily as a desk review of the documents submitted at various stages of assessments. The review is performed by assessment team using verification protocols (checklists). The assessment team cross-checked the information provided in the MR and information from sources other than those used, if available, and also conducts independent background investigations. 4KES conducted a desk review, involving but not limited to,

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

The list of documents reviewed is included in the section 'Appendix 3' of this report.

C.2. On-site audit

Verification team has conducted the physical site visit interviews of the project beneficiaries by Technical Expert and Local Expert along with other remote interviews. This is inline with para 8.3.1.2 of the VALIDATION/VERIFICATION BODY REQUIREMENTS, Version 2.0 /39/ which specify that Team Leader is not mandatory to visit the site however Technical Expert should visit the site. Along with desk review, audit team has conducted interview (Microsoft Teams interviews and physical interview) as follows:

- A complete desk review of the MR, as well as all applicable country legal requirement and supportive evidences have been checked by the verification team.
- Verification team has performed interviews with PP representative/Water Resource Division Head/Borehole manager/Wash Member/Stakeholders/beneficiary households etc. in order to check implementation, project boundary, current situation, evaluation of data management, QA/QC system, monitoring equipment, monitoring procedures, calibration, Sustainable development, Grievance mechanism etc.
- Cross checks between information provided by interviewed personnel (i.e. by checking sources) to ensure that no relevant information has been omitted.
- Cross-check evaluation, for information received from interviews, under the scope of all information and references provided in MR and supporting documents.

Details of interviewees, topics covered and additional information presented in the below section “C.3 Interviews”.

C.3. Interviews

No.	Interviewee			Date	Subject	Team Member
	Last name	First name	Affiliation			
1.	Barton	Rebecca	Carbon Project Manager, CO2balance UK Ltd.	24/07/2024 Mr. Narendra Kumar R (Microsoft Teams interviews)	- General aspects of the project - Changes since validation/3rd verification - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management	Mr. Narendra Kumar R (Microsoft Teams interviews) and Mr. Mehreteab Michael Yemane (Physical site visit by Local Expert and Technical Expert)
2.	Martin	Chiara	Senior Project Manager, CO2balance UK Ltd.			
3.	Zekaryas	Tesfai	Project Officer, Vita Eritrea			
4.	Mosazghi	Bereket	WASH expert, Vita Eritrea			
5.			Water quality test expert, Water Resource Division			
6.	Woldeslassie	Ashebr	Water technician, Vita Eritrea	24/07/2024 to 27/07/2024 Mr. Mehreteab Michael Yemane (Physical site visit by	- QA/QC - Maintenance - Qualification - Carbon rights - Procedural aspects of the Monitoring - Maintenance - Data analysis	
7.	Mehari	Yohannes	Responsible for 5 minute testing dry season, Vita Eritrea			
8.	Tecle	Gherghish	Responsible for 5 minute			

			testing Wet season, Vita Eritrea	Local Expert and Technical Expert)	- ER Calculations - MR editorial issues - The impact of the project activity on the local community including households was discussed. - Grievance mechanism - SDGs	
9.			Water Resource Division Head, Zoba Debub			
10.			Guard, Adiawatot, ZD 246			
11.			Guard, Mefalso, ZD 216			
12.			Wash Member			
13.			Mefalso Women's Association Chairwoman			
14.			Borehole manager (Borehole ID: ZD182), Adi Debrebrhan, Sub Zoba Adi Quala			
15.			Wash Member, Adi Debrebrhan, Sub Zoba Adi Quala			
16.			Village Chair Woman for National Union Eritrean Women, Adi Debrebrhan, Sub Zoba Adi Quala			

Verification team has done the sampling to check households/borehole's during the audit to verify the implementation, baseline, monitoring etc.

The form used for the survey along with survey result is attached below.

Questionnaire for survey

Project Title: Eritrea Community Boreholes Date: Name: Designation: Location: Phone number: Serial number/ GPS Co-ordinate of the Borehole: Date of installation/rehabilitation of Borehole: Condition of the Borehole:	Result: The information recorder during the audit was verified from the project information available in the MR, ER sheet and other docs and found consistent.
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Q1. Is the borehole in use?	<i>Result: The Boreholes were found in use during the visit.</i>
Q2. Do you get monitored by the project developer for the use of borehole?	<i>Result: The response was yes with the year of monitoring.</i>
Q3. How frequently is the borehole used? For what purpose is the water from borehole used?	<i>Result: The frequency of using the borehole was checked along with water carrying each time to have a fair idea of the quantity of water used per day and found consistent with the MR and ER sheet. Also the purpose of water from borehole was for cooking, drinking and personal hygiene which was found acceptable and in compliance with the registered PDD.</i>
Q4. Type of pump used for the Water extraction. ?	<i>Result: India mark II and III were used in the project activity as verified during visit.</i>
Q5. Is there any other source of water? If yes, how frequently is it used?	<i>Result: There was other source of water but they were used for other purposes i.e. bathing, washing clothes etc.</i>
Q6. What is the method used for water Purification? What type of fuel is used for the same?	<i>Result: There is no water purification happening in the households since the water from project activity is safe to drink.</i>
Q7. What was the method used for water Purification in baseline? What type of fuel was used for the same? What was the boundary for collecting the wood in baseline for water boiling.	<i>Result: Boiling, wood was used for boiling the water.</i> <i>Nearby the household.</i>
Q8. How do you perceive the quality of water from the borehole? (With respect to drinking, cooking etc.).	<i>Result: The interview results shows that the household found the quality of water good. Further no incident of getting sick was identified during the interview.</i>
Q9. Distance of the household from borehole?	<i>Result: The distance was checked and found within 1 KM.</i>
Q10. 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.	<i>Result: No</i>
Q11. Quantity of safe water supplied in the project scenario p during the year y, using the 'zero or low' emissions water supply technology	<i>Result: The results were found comparable as given under MR, ER sheet and other documents.</i>
Quantity of safe water boiled in the project scenario p during the year y using the zero or low emissions clean water supply technology	<i>Result: 0</i>
The raw or unsafe water that is still boiled after installation of the water treatment technology	<i>Result: 0</i>
Q12. Reduction in Time spent for collecting the water per household.	<i>Result: Yes, reduction</i>
Q13. Reduction in household air pollution.	<i>Result: Yes, reduction</i>
Q14. Reduction in Time spent for collecting the wood per household and how much in percentage?	<i>Result: Yes, reduction</i>
Q15. Using a safe water supply in baseline. ?	<i>Result: No</i>
Q16. What was the baseline stove used. ?	<i>Result: Traditional stove</i>
Result of VVB survey	<i>Result: Accepted.</i>

The details of Households interviewed & surveyed near the Boreholes by the Verification team are as given below.

S. No.	Last name	First Name	Borehole ID	Details
1.			ZD232	24/07/2024 to 27/07/2024

2.			ZD182	Mr. Mehreteab Michael Yemane (Physical site visit by Local Expert and Technical Expert)
3.			ZD025	
4.			ZD046	
5.			ZD218	
6.			ZD217	
7.			ZD071	
8.			ZD071	
9.			ZD005	
10.			ZD212	
11.			ZD246	
12.			ZD231	
13.			ZD216	
14.			ZD013	
15.			ZD013	

C.4. Sampling approach

During the on-site verification, a random sampling approach has been used by the verification team to verify the reported values of the monitored parameters as listed in the MR which are determined through sampling by PP.

Sampling approach during verification audit is conducted in accordance with “Guidelines for Sampling and Surveys for CDM Project Activities and Programme Activities, Version 04.0” and the “Standard for Sampling and Surveys for CDM Project Activities and Programme Activities, Version 09.0” /28/.

The verification team followed the “Standard for Sampling and Surveys for CDM Project Activities and Programme Activities” version 09, para 29 and 33, esp. for taking samples out of the PP’s sample. Verification has adopted the acceptance sampling approach in order to verify the sampling result of the PP for the applied verification period.

The Sampling and surveys for CDM project activities and programmes of activities (Version 9.0) /28/ states under paragraph 28 that “When the project participants or the coordinating/managing entity have applied a sampling approach, the VVB may apply acceptance sampling as described in the steps indicated in paragraphs 29–38 below as part of validation/verification activities”.

As per para 39 of the sampling standard version 9.0 /28/, “A VVB may select a different sample size than the one indicated in paragraph 32 above either by choosing a different value for the consumer risk and producer risk (e.g., 20 per cent for the consumer risk) when applying acceptance sampling or by using another approach, if any of the following conditions apply:

- The estimated volume of annual GHG emission reductions of the project activity or the PoA being verified is equal to or less than 100,000 tCO₂e.
- The security conditions in the project region prevents inspection of many samples (eg. conflict zones); or
- The project activity or the PoA is located in a least developed country or a host party with 10 or fewer registered CDM project activities at the end of the monitoring period being verified.”

The project activity is located in Eritrea which is an LDC. (<https://unfccc.int/topics/resilience/workstreams/national-adaptation-programmes-of-action/ldc-country-information>).

For the determination of VVB’s acceptance sample size in the checklist, verification team assumed the following factors:

1. Acceptable quality level (AQL) - 0.5%
2. Unacceptable Quality Level (UQL) – 15%
3. Producer risk- 10%
4. Consumer risk- 10%

Verification team has determined acceptance sample size based on the “Table. Sample size and acceptance number based on AQL, UQL, and producer and consumer risks” of standard “Sampling and surveys for CDM project activities and programme of activities” version 09.0. From the above assumed factors, the verification team determined the minimum sample size (n) as 15 minimum samples for households under the project and acceptance number (c) as Zero. The verification team shared the samples with the PP during on-site visit.

The actual number of sample size where the acceptance survey was done given below:

Parameters	Total Population	PP’s sample size	Acceptance sample size (n)	Acceptance Number (z)	Sampling method used
Monitoring parameters as per the MR	163 boreholes in district Zoba Debub	40 Households for Water Consumption Field Test. + 150 Usage Survey year 2022 + 139 Usage Survey year 2023 + 150 Project survey	15 boreholes/Households	0	Acceptance sampling using Random sample

During site visit, Verification team visited sample households/boreholes applying the random selection technique to cross check the data reported by PP. Verification team has checked the PP samples result with the on-site interview and result details, monitoring forms, households data base as per the ER sheet /04/ and found consistent. The result of the survey is given below:

Parameters	VVB Sample size (n)	No of PP’s record beyond unacceptable level (C)	Accepted Samples By VVB	Accepted/ Rejected

Monitoring parameters as per the MR	15	0	15	Accepted
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All the visited samples were showing similar result as reported by PP in its monitoring records. Onsite audit results/observation is found to be in line with PP surveys and results. Further, all the primary monitoring records on-site were reviewed to assess the consistency of information in MR and ER calculation spreadsheet and found the monitoring data to be correctly transcribed. Based on that, verification team concludes that sampling results and values presented by PP in the MR and spread sheet and results of survey are consistent with the onsite observation and interview with the end users.

Hence, verification team confirms that PP's survey/sampling records to be acceptable in line with the requirements of the Sampling Standard and Guidance /28/.

C.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

02 CL, 02 CAR and 00 FAR raised during this verification and successfully closed. Refer Appendix 4 of this report for more details.

SECTION D. Verification findings

D.1. Compliance of the monitoring report with the monitoring report form

Means of verification	PP used GS monitoring report template, version 1.1. Verification team checked the GS monitoring report /02/ with "GS template" /31/ and found OK. All the sections of the form were filled as per the GS4GG guidelines and provide all the relevant details.
Findings	No finding raised.
Conclusion	GS Monitoring report /02/ was found to be completed and using the valid version i.e. version 1.1 of the GS MR /31/, hence the monitoring report is complying with the monitoring report form.

D.2. Remaining forward action requests from validation and/or previous verifications

This is the 4th periodic verification of the project activity. No FAR was raised during the 3rd periodic verification of the project activity.

D.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	Project Representative:	CO2balance
	Project Parties:	State of Eritrea (host)
	Title of project activity:	Eritrea Community Boreholes
	GS registration No:	GS 5125
	Baseline and monitoring methodology:	Gold Standard Voluntary Methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" Version 2.0 /33/
	Project Type:	The project activity involves rehabilitating nonfunctional boreholes, which will reduce the amount of firewood used in purifying water from unsafe sources for the community.
	Project Scale:	Large scale
	Location of the project activity:	Verification team confirms that the project activity is a large-scale project activity. Project areas: three districts (Zoba Debub, Zoba Anseba and Zoba Maekel) of Eritrea

	As verified during the interviews and site visit, verification team confirms that the rehabilitated boreholes are located in the three districts (Zoba Debub, Zoba Anseba and Zoba Maekel of Eritrea) as given above and hence within the project boundary.
Project's crediting period:	22/09/2016 – 21/09/2023
Total Duration of the project:	21 years. The first crediting period will last 7 years with 2 renewal periods.
Period verified in this verification:	31/08/2022 - 21/09/2023 (including both dates)
	The monitoring period verified is within the crediting period which is accepted to the verification team.
As part of the interviews and physical site visit, the verification team was able to confirm that the project implementation is in accordance with the project description contained in the registered GS PDD /05/ and approved transition annex /32/. The project activity "Eritrea Community Boreholes" aims to identify broken down boreholes, renovate them and supply a maintenance programme to ensure that clean, safe water is delivered as a result of this project. By providing safe water, thereby removing the need to boil water, the project will ensure that households consume less firewood during the process of water purification leading to reduction in greenhouse gases. Apart from this, the project offers co-benefits to users by providing relief from high fuel cost, reduced time for fuel collection and/or improved health due to less indoor pollution during the cooking process. The project activity is implemented in line with the registered PDD /05/ and the approved transition annex /32/ i.e. rehabilitation of existing boreholes in the State of Eritrea. In total 163 boreholes have been rehabilitated in Zoba Debub by the end of this monitoring period and accordingly used for the emission reduction calculations. Based on the document review /02/, /04/, /08/ and /19/, Verification team confirms that the rehabilitated boreholes are as per the registered PDD /05/ and the approved transition annex /32/. Verification team has checked the technical description of the India Mark-II and India Mark III submitted by the PP /07/ which was accurately verified at the project location during the on-site visit /19/. The India Mark II and III pumps are considered to be medium pumps, accessing water at a maximum of 50m and 30m, respectively. The start date of the project activity has been considered as 21/09/2016 i.e. First Repair Confirmation form which is a part of Signed transfer of carbon rights. Verification team has checked the Repair Confirmation Form /19/ and found the start date to be consistent. The total number of boreholes rehabilitated till the end of this monitoring period, mentioned in the Borehole Project Database /08/ are verified from Repair Confirmation Form /19/ which was signed by the mechanic carrying out the repair along with a village administrator from the local community and found to be correct. The GHG offset during this monitoring period is 94,928 tCO₂e. The borehole ID and its date of rehabilitation were verified on sample basis during the site visit and from Repair Confirmation Form /19/. During this monitoring period, the fraction of NRB has been considered based on the default NRB value (0.97) country wise available on the UNFCCC website (CDM Default values- https://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf) /27/. As per the applied methodology, the NRB assessment will remain fixed until the end	

of the crediting period, using the CDM default value for the State of Eritrea, Verification team confirmed that NRB assessment is based on publicly available and verifiable data. Further the fNRB value (0.97) is in line with the value as per the registered PDD /05/. Hence the value of fNRB considered as 0.97 is correct for this monitoring period.

These boreholes are rehabilitated to ensure that clean, safe water is delivered to the households. The areas targeted are largely rural districts in which many local people typically use wood fuel on inefficient three-stone fires to purify their drinking, cooking and personal hygiene water. By providing safe water this project ensures that households consume less firewood during the process of water purification and therefore reduce greenhouse gas emissions from the combustion process, which has been confirmed during the site visit and also through document review /02/, /05/, /10/ and /18/.

During on site visit, 15 randomly selected boreholes which were found to be in line with the description provided in registered PDD /05/, approved transition annex /32/ and Repair confirmation Form /19/ provided by the PP.

Monitoring procedure of GHG data is found sufficient and in accordance with the procedures stipulated under the registered monitoring plan of the GS PDD /05/ and approved transition annex /32/.

Any Project Design Change been sought and approved by GS Secretariat for the project?	☒ Yes ☐ No	A design change review /05/ was approved on the 10th December 2019 which involved increasing the project size from a small-scale to a large-scale project and in doing so, expanding the project area beyond Zoba Debub to cover regions Zoba Maekel and Zoba Anseba, Eritrea for all subsequent monitoring periods.
Any Changes in the monitoring Plan	☒ Yes ☐ No	The Wp,y value has changed for this monitoring period and will remain as a permanent change. Previous monitoring periods used a measured baseline value obtained from the Baseline Water Boiling Test. However, as per GS SWS Grievance Review, the recent update to the parameters means a cap has now been introduced which has been applied to this project for this monitoring period considering the firewood required to boil 1 litre of water for 10 minutes using a three stone fire (0.4 kg/L). Updates have been made to parameter EF (Non-CO2 (CH4 and N2O emission factor arising from use of wood fuel in baseline scenario) with previous AR4 values applied to 2020 vintage, but as new rule update came into force on 01/01/2021, 2021 vintage have been calculated with the updated AR5 value in the corresponding parameter box.
Any changes in the sustainable development monitoring plan?	☐ Yes ☒ No	NA

The timeline of the project's implementation is as follow:

Crediting period: 22/09/2016 – 21/09/2023		
Milestone of the project activity	Monitoring period	Assessment by the verification team
3 rd monitoring period	01/03/2021 - 30/08/2022	Already verified

	4 th monitoring period	31/08/2022 - 21/09/2023	This is the 4 th monitoring period being verified. Verification team has verified the same from the monitoring report /02/. Also, the monitoring period is within the first crediting period.
	The project activity was implemented and 163 boreholes were rehabilitated in Zoba Debub. On the basis of site visit, interviews and the reviewed project documentation along with documentary evidences, it can be confirmed that the project implementation is in accordance with registered PDD /05/ and approved transition annex /32/. The monitoring and SDG parameters are also monitored as per the PDD, approved transition annex /32/ and GS guideline and found to be appropriate. Verification team considers the project description in the project activity contained in the Monitoring report to be in line with the registered PDD /05/, approved transition annex /32/ and complete and accurate. The Monitoring report complies with the relevant methodology, tools, forms and guidance applied in the registered PDD /05/ and approved transition annex /32/. VVB confirm that project is not registered in other eligible carbon registries as confirmed from the weblinks /40/, /41/, /42/, /43/.		
	Findings	No finding raised.	
	Conclusion	In the opinion of assessment team, the implementation and operation of the project activity is in compliance with the description in the registered PDD /05/ and approved transition annex /32/.	

D.4. Post-Design Certification changes

D.4.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

N/A

D.4.2. Corrections

N/A

D.4.3. Changes to start date of the crediting period

N/A

D.4.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

The Wp,y value has changed in the second monitoring period and will remain as a permanent change. Previous monitoring periods used a measured baseline value obtained from the Baseline Water Boiling Test. However, as per GS SWS Grievance Review, the recent update to the parameters means a cap has now been introduced which has been applied to this project for this monitoring period- considering the firewood required to boil 1 litre of water for 10 minutes using a three stone fire (0.4 kg/L).

Updates have been made to parameter EF (Non-CO2 (CH4 and N2O emission factor arising from use of wood fuel in baseline scenario) with previous AR4 values applied to 2020 vintage, but as new

rule update came into force on 01/01/2021, 2021 vintage have been calculated with the updated AR5 value in the corresponding parameter box which is found OK.

D.4.5. Changes to project design of approved project

N/A

D.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents

Means of verification	The VVB verification team is able to confirm that the monitoring plan contained in the registered PDD /05/ and approved transition annex /32/ is in accordance with the approved methodology applied by the project activity “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 2.0 /33/. The monitoring plan along with sampling & survey of the boreholes for baseline as well as the project case is described in the registered PDD /05/ and approved transition annex /32/. During the verification all relevant monitoring parameters (as listed in the PDD /05/ and approved transition annex /32/) have been verified with regard to the appropriateness of the applied measurement / determination method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures.
Findings	No findings raised.
Conclusion	The monitoring plan mentioned in the registered PDD /05/ and approved transition annex /32/ is in line with the applied methodology i.e. “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 2.0 /33/. The monitoring mechanism is in line with the methodology and is effective and reliable.

D.6. Compliance of monitoring activities with the registered monitoring plan

D.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	The verification team has checked the ex-ante parameters and data stated in Section D.1 of MR /02/ and compared with GS PDD /05/ and section A.3 of the approved transition annex /32/ whether all parameters fixed ex-ante for the crediting period have been applied correctly.	
	1. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation)
	Data/parameter:	C _j
	Unit	Percentage
	Description	Portion of users of project safe water supply who were already in baseline using a non-boiling safe water supply.
	Source of data	Baseline study.

	Value(s) applied)	Zoba Debub: 0 Zoba Maekel: 0 Zoba Anseba: 0 The verification team has checked Baseline Project survey /09/ and confirms that the values applied are appropriate. This has also been re-confirmed during the site visit interaction with the households. The Value is as per the registered PDD /05/ and approved transition annex /32/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team
	Choice of data or measurement methods and procedures	The portion of safe water users is determined through the baseline project survey and refers to the number of users that already use safe water from water sources such as boreholes. Deemed valid by Methodology.
	Purpose of data/Parameter	Calculation of emission reductions
	Additional comments	The baseline project survey revealed that all households boil water.
	2. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
	Data/parameter:	EF _{b,co2}
	Unit	tCO ₂ /TJ
	Description	CO ₂ emission factor arising from use of fuels in baseline scenario
	Source of data	IPCC default value
	Value(s) applied)	112 Verification team has confirmed the IPCC default value /27/ which was found to be in line with the applied methodology /33/. Also, the Value is as per the registered PDD /05/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team.
	Choice of data or measurement methods and procedures	Deemed valid by Methodology.
	Purpose of data/parameter	Calculation of baseline emissions.
	Additional comments	-
	3. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
	Data/parameter:	EF _{b,non co2}

Unit	tCO ₂ e/TJ																								
Description	Non-CO ₂ (CH ₄ and N ₂ O) emission factor arising from use of wood fuel in baseline scenario																								
Source of data	Default emissions factor: https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_2_Non-CO2_Stationary_Combustion.pdf https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf Global Warming Potential: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14																								
Value(s) applied)	9.46 Verification team has confirmed the IPCC default value /27/ which was found to be in line with the applied methodology /33/. Also, the Value is as per the registered PDD /05/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team																								
Choice of data or measurement methods and procedures	Deemed valid by Methodology <table><tr><th>Ga s</th><th>Default Emissions factor (kg_gas/TJ_{NCV})</th><th>GWP of gas</th><th>Default Emissions factor (kg_CO₂e/TJ_{NCV})</th><th>Default Emissions factor (t_CO₂e/TJ_{NCV})</th></tr><tr><td>CH 4</td><td>300</td><td>28</td><td>8,400</td><td>8.4000</td></tr><tr><td>N₂ O</td><td>4</td><td>265</td><td>1,060</td><td>1.060</td></tr><tr><td></td><td></td><td></td><td>Total</td><td>9.46</td></tr></table>					Ga s	Default Emissions factor (kg_gas/TJ _{NCV})	GWP of gas	Default Emissions factor (kg_CO ₂ e/TJ _{NCV})	Default Emissions factor (t_CO ₂ e/TJ _{NCV})	CH 4	300	28	8,400	8.4000	N ₂ O	4	265	1,060	1.060				Total	9.46
Ga s	Default Emissions factor (kg_gas/TJ _{NCV})	GWP of gas	Default Emissions factor (kg_CO ₂ e/TJ _{NCV})	Default Emissions factor (t_CO ₂ e/TJ _{NCV})																					
CH 4	300	28	8,400	8.4000																					
N ₂ O	4	265	1,060	1.060																					
			Total	9.46																					
Purpose of data/parameter	Calculation of emission reductions.																								
Additional comments	This value corresponds with updated AR5 GWP value which will be applied from 01/01/2021. AR5 - https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf																								

4. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	EF _{p,co2}
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor arising from use of fuels in the project scenario
Source of data	Volume 2: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2, Table 2.5

	Value(s) applied)	112 Verification team has confirmed the IPCC default value /27/ which was found to be in line with the applied methodology /33/. Also, the Value is as per the registered PDD /05/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team.																							
	Choice of data or measurement methods and procedures	Deemed valid by Methodology.																							
	Purpose of data/parameter	Calculation of emission reductions.																							
	Additional comments	-																							
	5. Data/Parameter																								
	Monitoring Parameter Requirement	Assessment/Observation by the VVB																							
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action)																							
	Data/parameter:	EF _{p,non co2}																							
	Unit	tCO ₂ e/TJ																							
	Description	Non-CO ₂ (CH ₄ and N ₂ O) emission factor arising from use of wood fuel in project scenario																							
	Source of data	Default emissions factor: https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_2_Non-CO2_Stationary_Combustion.pdf https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf Global Warming Potential: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14																							
	Value(s) applied)	9.46 Verification team has confirmed the IPCC default value /27/ which was found to be in line with the applied methodology /33/. Also, the Value is as per the registered PDD /05/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team.																							
	Choice of data or measurement methods and procedures	Deemed valid by Methodology <table><tr><td>Gas</td><td>Default Emissions factor (kg_{gas}/TJ_{NCV})</td><td>GWP of gas</td><td>Default Emissions factor (kg_{CO₂e}/TJ_{NCV})</td><td>Default Emissions factor (t_{CO₂e}/TJ_{NCV})</td></tr><tr><td>CH₄</td><td>300</td><td>28</td><td>8,400</td><td>8.4000</td></tr><tr><td>N₂O</td><td>4</td><td>265</td><td>1,060</td><td>1.060</td></tr><tr><td></td><td></td><td></td><td>Total</td><td>9.46</td></tr></table>				Gas	Default Emissions factor (kg _{gas} /TJ _{NCV})	GWP of gas	Default Emissions factor (kg _{CO₂e} /TJ _{NCV})	Default Emissions factor (t _{CO₂e} /TJ _{NCV})	CH ₄	300	28	8,400	8.4000	N ₂ O	4	265	1,060	1.060				Total	9.46
Gas	Default Emissions factor (kg _{gas} /TJ _{NCV})	GWP of gas	Default Emissions factor (kg _{CO₂e} /TJ _{NCV})	Default Emissions factor (t _{CO₂e} /TJ _{NCV})																					
CH ₄	300	28	8,400	8.4000																					
N ₂ O	4	265	1,060	1.060																					
			Total	9.46																					

	Purpose of data/parameter	Calculation of emission reductions.
	Additional comments	This value corresponds with updated AR5 GWP value which will be applied from 01/01/2021. AR5 - https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf
	6. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
	Data/parameter:	NCV _b
	Unit	TJ/ton
	Description	Net calorific value of the wood fuel used in the baseline
	Source of data	IPCC Default emissions factor
	Value(s) applied)	0.0156 Verification team has confirmed the IPCC default value /27/ which was found to be in line with the applied methodology /33/. Also, the Value is as per the registered PDD /05/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team.
	Choice of data or measurement methods and procedures	Deemed valid by Methodology.
	Purpose of data/parameter	Calculation of emission reductions.
	Additional comments	-
	7. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
	Data/parameter:	NCV _p
	Unit	TJ/ton
	Description	Net calorific value of the wood fuel used in the project
	Source of data	IPCC Default emissions factor
	Value(s) applied)	0.0156 Verification team has confirmed the IPCC default value /27/ which was found to be in line with the applied methodology /33/. Also, the Value is as per the registered PDD /05/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team.
	Choice of data or measurement methods and procedures	Deemed valid by Methodology.

	Purpose of data/parameter	Calculation of emission reductions.
	Additional comments	-
	8. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
	Data/parameter:	fNRB _{i,y}
	Unit	Fractional non-renewability
	Description	Non-renewability status of woody biomass fuel in scenario i during year y
	Source of data	CDM Default stated in following document: https://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf
	Value(s) applied)	0.97 Verification team confirmed that NRB assessment is based on publicly available and verifiable data /27/. Further the fNRB value (0.97) is in line with the value as per the registered PDD /05/. Hence the value of fNRB considered as 0.97 is correct for this monitoring period.
	Choice of data or measurement methods and procedures	Default values of fraction of non-renewable biomass as outlined by the UNFCCC CDM.
	Purpose of data/parameter	Calculation of emission reductions.
	Additional comments	Ratified by the DNA Source: CDM – Executive Board, EB 67 Report, Annex 22, Page 4 https://cdm.unfccc.int/Reference/Notes/meth/meth_note12.pdf
	9. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Clean Water and Sanitation), SDG 3.9.1 (Good Health and Well Being)
	Data/parameter:	W _{b,y}
	Unit	T/litre
	Description	Quantity of wood fuel that is used to treat 1 litre of water in the baseline scenario b during year y
	Source of data	Baseline Water Boiling Test
	Value(s) applied)	Zoba Debub: 0.000889 Zoba Maekele: 0.000883 Zoba Anseba: 0.000577 The verification team has checked Baseline Water Boiling Test Reports /16/ and confirms that the values applied are appropriate. The Value is as per the registered PDD /05/. The same value is applied in the ER calculation sheet /04/ and hence, acceptable to the verification team.
	Choice of data	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is

	or measurement methods and procedures	gathered according to: <i>Technologies and Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1 and 2, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
	Purpose of data/parameter	Calculation of emission reductions.
	Additional comments	A value of 0.0004 is now applied under the BAMG changes, see table below.
10. Data/Parameter		
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Clean Water and Sanitation), SDG 3.9.1 (Good Health and Well Being)
	Data/parameter:	$W_{p,y}$
	Unit	T/litre
	Description	Quantity of wood fuel that is used to treat 1 litre of water in the project scenario p during year y
	Source of data	Baseline Water Boiling Test
	Value(s) applied)	Zoba Debub: 0.0004 Zoba Maekel: 0.0004 Zoba Anseba: 0.0004 Value is capped which is found OK to the verification team.
	Choice of data or measurement methods and procedures	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: <i>Technologies and Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1 and 2, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
	Purpose of data/parameter	Calculation of emission reductions.
	Additional comments	Capped in line with GS BAMG report.
11. Data/Parameter		
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
	Data/parameter:	Xboil Non-Suppressed Demand
	Unit	Percentage
	Description	Percentage of premises that in the absence of the project activity would have used non-GHG emitting technologies like chlorine treatment techniques (if available) in the project boundary.
	Source of data	Baseline study. Credible literature, studies, survey, reports, relevant to the project target area

	Value(s) applied)	Zoba Debub: 0% Zoba Maekel: 4% Zoba Anseba: 2% The verification team has checked Baseline Survey /09/, project survey /11/ and confirms that the values applied are appropriate. the Value is as per the registered PDD /05/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team.
	Choice of data or measurement methods and procedures	Suppressed demand will be determined through a set of questions in the project survey that establish the method households use to purify their water, if any, and how they would choose to purify if they were not subject to monetary and access barriers. This is in line with the Gold Standard principles of suppressed demand outline in annex 2. A fixed suppressed demand baseline has been opted for, however, in the event the project surveys show a substantial change in fuel use characteristics, a new baseline shall be conducted.
	Purpose of data/parameter	Calculation of emission reductions.
	Additional comments	-
	12. Data/Parameter	
	Monitoring Parameter Requirement	Assessment/Observation by the VVB
	Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Clean Water and Sanitation)
	Data/parameter:	Tb,y
	Unit	Hours
	Description	Baseline time spent collecting firewood per household per day
	Source of data	Baseline project survey
	Value(s) applied)	1.74 The verification team has checked Baseline Survey /09/ and confirms that the values applied are appropriate. The Value is as per the approved transition annex /32/ and the same value is applied in the ER calculation sheet /04/. Hence, acceptable to the verification team.
	Choice of data or measurement methods and procedures	Established through questions in the baseline on a representative sample of the end users
	Purpose of data/parameter	To measure the decrease in hours spent collecting firewood, a responsibility falling disproportionately on women, as an indicator of reduced time poverty of women.
	Additional comments	-
Findings	No findings raised.	
Conclusion	The default values applied were found to be consistent with GS PDD /05/ and the approved transition annex /32/, applied methodology and other relevant sources of data. All the values fixed at the time of validation were from IPCC report and CDM Default values /27/.	

D.6.2. Data and parameters monitored

Mean s of verifi	Discussion: The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and approved transition annex /32/.
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catio n	During the course of verification, all relevant monitoring parameters have been verified with regard to the appropriateness of the applied measurement/determination method and applied QA/QC procedures. It is confirmed that the monitoring parameters have been measured / determined without material misstatements. According to the methodology, Borehole Project Database /08/ and the data regarding on-going monitoring studies /10/, /11/, /12/, /15/, /16/ is maintained. The verification team reviewed the actual monitoring during the interviews and site visit, which was again verified during the document review and compared against the requirements of the monitoring plan in the PDD /05/ and approved transition annex /32/ and found in line with the registered monitoring plan. The sampling plan implemented by the PP in Zoba Debub of the State of Eritrea is in accordance with the applied approved monitoring methodology /33/ and PDD /05/. According to the registered PDD, the verification team summarize the findings of the monitoring approach applied. Borehole Project Database: Verification team has reviewed the Borehole Project Database /08/ which accurately includes the information of the borehole ID, Date of rehabilitation, Quantity of Boreholes rehabilitated, No. of people accessing water from each borehole and distance from the borehole to the household. Randomly selected boreholes/household have been crosschecked to ensure that they were accurately reflected in the electronic records and further total number of households using each borehole has been confirmed through the lists /08/ supplied by the community group and or district water officer responsible for that borehole. Data recording, maintenance and archival was assessed and verified during the interviews and site visit. Continuous data entry and recording is maintained by retaining relevant information of the boreholes rehabilitated and households accessing water from each borehole. The accuracy of maintaining Borehole Project Database /08/ is found to be adequate by the verification team. PP has an effective system to maintain the records of every particular borehole rehabilitated in the project activity in electronic forms. The boreholes have an individual unique ID, details of rehabilitation and individual list of people accessing water from each borehole, which avoids any chance of double counting in the entire crediting period which was verified with Repair Confirmation Form /19/, lists /04/ supplied by the community group and also verified during site visit. During site visit, random Borehole ID in Project Database are cross checked with Repair confirmation Form /19/ as hard copies and found to be correct. Further GPS coordinates of boreholes were also verified and found consistent with the database. Based on above, verification team can confirm that the boreholes assessed during the site visit were all found to have a unique ID. Therefore, it is concluded that the project is not a double-counting emission reductions. <u>Data Management</u> The Borehole Project Database /08/ and results of all Water consumption field test (WCFT) /15/, Usage Surveys /10/, Project Survey /11/ and Quality of the treated water /18/ are collated in excel spreadsheet and stored on a central server in an electronic format. The documentation procedure ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in the Eritrean office and are available scanned upon request of the UK team. The data management was verified during the interview and at the time of site visit and found correct. <u>Description of staff conducting monitoring activities</u> Vita has technicians who do the installation, maintenance and monitoring of the boreholes along with Vita senior staff. All surveys are administered by trained staff of Vita that is local to the area and conversant in the local dialects to ensure that responses were consistent and not biased by
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any regional language barriers. Each participant is provided with a briefing on the purpose of the survey and is assured that no individual names are used in the analysis. The same is verified during the interviews and the site visit. The field staff conducted the survey were trained time to time as verified by the interview and the supportive documents /24/.

Water Consumption Field Test (WCFT):

As per the Gold Standard Methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption V.2.0' /33/ and the registered PDD /05/, the WCFT should be completed prior to first verification and then biennially after first verification. This has been accurately followed by the PP as WCFT was conducted before the first verification i.e. from 05/09/2018 - 21/09/2018 and later on biennially. WCFT was conducted from 28/11/2022 – 03/12/2022 during this 4th Monitoring period /15/.

The Water Consumption Field Test has been carried out by randomly selecting 40 households from the borehole project database, a total of 8 households selected from each of the 5 age groups which is in compliance with the minimum sampling requirement of 30 households in the methodology /33/.

The test was carried out by a trained staff for over four days (1-day for preparation and 3 days for measurement). The test was conducted in accordance with the registered PDD and total litres of water consumed each day was measured, divided by the number of people consuming water in that day – this measurement was repeated over 3 consecutive days and an overall average per household was calculated.

After removing 3 outliers, the results showed that on average 7.76 litres of non-boiled clean water used only for drinking, hand washing and food preparation (capped at 7l) and 0 litres of boiled clean water is consumed per person per day. The total amount of water credited for in this monitoring period is equal to the average amount of clean non-boiled water consumed per person per day (7l), minus the average amount of boiled clean water consumed per person per day (0). Verification team assessed the WCFT Test reports /15/ with applied methodology /33/ and the registered PDD /05/ and also confirmed the details during the interviews.

Quality of the treated water:

The quality of the treated water has been assessed to ensure that it is fit for human consumption. The parameters used to assess the water quality were in line with WHO standards /30/ for potable water and all parameters were within levels considered acceptable for domestic human consumption as confirmed from the Water Quality Tests (WQTs) reports certified by The Water Resource Department from the Ministry of Land, Water & Environment /18/.

The tests were conducted quarterly with 90/10 precision according to the methodology. Verification team confirms that all boreholes are tested at least once per year.

Usage Survey:

The usage survey establishes the proportion of beneficiaries that use the boreholes. This is a key parameter for the emission reduction calculations. Usage survey from 21/11/2022 – 25/11/2022 conducted during the 4th Monitoring period.

The usage survey (from 21/11/2022 – 25/11/2022) has been carried out by randomly selecting 150 households from the borehole project database, which is in compliance with the minimum sampling requirement of 100 households and at least 30 samples for project technologies of each age (5 age groups) in the methodology /33/. To do this the age group of each borehole is determined and the boreholes are split into age groups. Surveys are conducted through a Random Sample Group (RSG). Boreholes has been randomly selected for monitoring in accordance with the 90/30 confidence/precision as set out in the monitoring plan. The individual participants are selected at random from the household database. A random number generator ranked the unique serial numbers of the stoves in the project, generating a RSG.

An additional usage survey with 139 households was carried out between 29/05/2023 - 01/06/2023. There were 35 households from each of the 4 age groups included in the random sample, however for one age group only 34 surveys were collected. This is still above the minimum sample size of 30 per age group, complying with the methodology requirements /33/. The households that

participated in the survey were randomly selected from the borehole user lists. The same was confirmed from the Usage survey results /10/.

The results confirmed that 100% (capped at 95%) of the respondents and their family members use the boreholes that were rehabilitated by Vita, as verified from the User survey results /10/.

The VVB confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and as required by the applied methodology. During the site verification, all interviews were conducted face-to-face in the respondents' home and found OK.

Project Survey Analysis:

The Project survey has been carried out by randomly selecting 150 households across the homogenous boreholes in Zoba Debub to explore changes in the project scenario (demographics, water use and purification practices etc) over time, which is in compliance with the sampling requirement of the methodology /33/.

Verification team has reviewed the Project survey results /11/ conducted between 21/11/2022 – 25/11/2022, which accurately includes the General information (Name, address, telephone number etc), Household socio-demographic information, Water use and purification characteristics, Sources and availability of fuel and SDG Project Indicators.

Hygiene Campaign:

A hygiene campaign is conducted annually in the format of Water, Sanitation and Hygiene (WASH) training to promote the practice of well-functioning Water Resource Committees at each borehole to ensure good hygienic tendencies are adopted by the communities at the Sub-Zoba level. WASH practices are also monitored through a series of questions in the annually conducted Project Survey to determine the effectiveness of the trainings and to monitor the health status of the villages with regards to avoiding the spread of water borne diseases.

The training records /12/ and Project survey results /11/ have been checked to confirm that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/.

5 Minute Stroke Test:

As per the deviation request, Dev_242, approved on 13/06/2022 /37/, PP introduced a 5 Minute Stroke Test for this monitoring period. The test and method were created by UPGro Hidden Crisis Research Project and approved by GS. The Deviation request and field methodology have been checked by the verification team.

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

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

The key indicators used to determine if a 400 user cap can be applied to each borehole are:

- A minimum of 50 litres of water is collected in the five-minute duration of the test.
- A flow rate of 10 litres per minute or more is achieved throughout the test.

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

As per the Deviation request and using CDM sampling, the test is required to be conducted for each season. This test was done during the rainy season on the dates 06/09/2023 – 09/09/2023 and during the dry season on the dates 06/03/2023- 11/03/2023. The total sample size was 65, with 15 in the rainy season and 50 in the dry season. There were four outliers in the dry season bringing the sample size down to 61.

	Average				
	L/day	L/hour	L/5 mins	Flow rate L/min	Users
Rainy Season	6167.7	771.0	64.2	12.8	411.2
Dry Season	5379.6	672.4	56.0	11.0	351.1
Both seasons	5717.3	721.7	60.1	11.9	381.6

The results showed an average of 64.2 litres of water is collected per five minutes for the rainy season and an average of 56.0 litres per five minutes for the dry season. This satisfies the key indicator that a minimum of 50 litres of water is collected during the five-minute duration of the test. All test results showed more than 50 litres of water collected per 5 minutes.

The second key indicator requires a flow rate of a minimum of 10 litres per minute. Results show that this requirement has been met with an average flow rate of 12.8 litres per minute for the rainy season and an average of 11.0 litres per minute for the dry season. These results therefore satisfy the requirements of the deviation, and a maximum cap of 381 users per borehole has been applied. Where test results showed a lower flow rate for specific boreholes, a lower cap is applied for conservativeness. Verification team has checked the 5 minutes stroke test and procedure /38/ and found acceptable. Also the employees conducted the test were interviewed to confirm the procedure followed and found in compliance.

Calculation of Emissions Reductions:

As the baseline fuel and the project fuel are the same and the baseline emission factor and project emission factor are considered the same, the overall GHG reductions achieved by the project activity is calculated using equation 1 of the methodology /33/ and baseline emissions are not calculated separately.

Emissions reductions were calculated using the results of the Borehole project database /08/, WCFT /15/, Usage Surveys /10/ and Project surveys /11/, taking into consideration values for NRB and leakage.

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/.

The verification team assessed the monitoring techniques and each monitoring value in the monitoring report; and provided a short summary on the verification of every SDG parameter listed in the monitoring plan and used for calculation of SDG impacts.

The monitored parameters of the project are in line with the registered PDD /05/ and the applied GS methodology /33/. Brief descriptions of the monitored parameters are listed below:

Ex-Post Parameters:

1. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 3.9.1 (Good Health and Well-Being)
Data/parameter:	HAPR,y
Unit	Percentage
Description	Total reduction in Household Air Pollution for project activity in year y (%)
Measured/calculated/default	Calculated
Source of data	Project survey, baseline survey, BWBT and WCFT

Value(s) of monitored parameter	95%
	Verification team has checked the calculation of the parameter from the Excel sheet /04/ and found correct.
Monitoring equipment	Assessed every year using Project Survey, baseline survey, BWBT and WCFT
Measuring/reading/recording frequency	Annual
	The verification team has checked that the surveys were conducted annually in line with the GS PDD /05/ and approved transition annex /32/.
Calculation method (if applicable)	Review the number of people using the borehole according to the household lists and multiply by the usage rate to calculate the number of people now using a safe water source in order to calculate the amount of biomass that would have been burnt to purify the water in the baseline scenario. Deduct from this any individuals that still boil water in the project scenario.
QA/QC procedures	All data is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
Purpose of data/parameter	Calculation of SDG 3.9.1 contribution
Additional comments	

2. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 5.4.1 (Gender Equality)
Data/parameter:	TR,y
Unit	Hours
Description	Total reduction in time spent collecting firewood for project activity in year y (hours)
Measured/calculated/default	Calculated
Source of data	Project Survey and baseline survey
Value(s) of monitored parameter	1.18
	VVB has checked the project survey /11/ and baseline survey /09/ and found the reported values under the ER sheet /04/ to be correct. This was also confirmed during the site visit.
Monitoring equipment	Assessed every year using Project Survey and baseline survey. Calculate the average amount of time spent collecting firewood in the project scenario and compare to the pre-project scenario.
Measuring/reading/recording frequency	Annual
	The verification team has checked that the surveys were conducted annually in line with the GS PDD /05/ and approved transition annex /32/.
Calculation method (if applicable)	Assessed every year using Project Survey. Calculate the average amount of time spent collecting firewood in the project scenario and compare to the pre-project scenario
QA/QC procedures	All data is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd

Purpose of data/parameter	To quantify whether the project has contributed to a reduction in the amount of time spent collecting firewood compared to the pre-project scenario towards SDG 5 target.
Additional comments	-

3. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 5.4.1 (Gender Equality)
Data/parameter:	TP,y
Unit	Hours
Description	Project time spent collecting firewood per household per day (hours)
Measured/calculated/default	Calculated
Source of data	Project Survey
Value(s) of monitored parameter	0.56 VVB has checked the project survey /11/ and found the reported values under the ER sheet /04/ to be correct. This was also confirmed during the site visit.
Monitoring equipment	Assessed every year using Project Survey questionnaire.
Measuring/reading/recording frequency	Annual The verification team has checked that the survey was conducted annually in line with the GS PDD /05/ and approved transition annex /32/.
Calculation method (if applicable)	Assessed every year using Project Survey
QA/QC procedures	All data is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd
Purpose of data/parameter	To quantify whether the project has contributed to a reduction in the amount of time spent collecting firewood for SDG 5.4.1 contribution.
Additional comments	-

4. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 6.1.1 (Clean Water and Sanitation)
Data/parameter:	P _{access}
Unit	Number of people
Description	Number of additional persons having access to safe water in the project activity compared to the baseline scenario
Measured/calculated/default	Calculated
Source of data	Project Survey and baseline survey

Value(s) of monitored parameter	50,055 VVB has checked the calculation under the Excel sheet /04/ and found correct.
Monitoring equipment	Assessed every year using Project Survey, Usage Survey and Household list. Review the number of people using the borehole according to the household list and multiply by the usage rate to calculate the number of people now using a safe water source.
Measuring/reading/recording frequency	Annual The verification team has checked that the survey was conducted annually in line with the GS PDD /05 and approved transition annex /32/.
Calculation method (if applicable)	Assessed every year using Project Survey, Usage Survey and Household list. Review the number of people using the borehole according to the household lists for each VPA and multiply by the usage rate to calculate the number of people now using a safe water source.
QA/QC procedures	The user lists are obtained through the local administration and transferred to an excel by the partner. These are then checked by CO2balance UK Ltd, and any households further than 1km away from the boreholes are removed. Duplicate checks are also run, and duplicate households are removed.
Purpose of data/parameter	Calculation of SDG 6.1.1 contribution
Additional comments	-

5. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 6.1.1 (Clean Water and Sanitation)
Data/parameter:	Py
Unit	Number of people
Description	Number of persons having access to safe water in the project activity
Measured/calculated/default	Measured annually using household list and usage and project survey
Source of data	Project Survey, Household list and Usage survey
Value(s) of monitored parameter	52,689 VVB has checked the User database under the Excel sheet /04/ and found OK.
Monitoring equipment	Project Survey, Usage Survey and Household list
Measuring/reading/recording frequency	Annual The verification team has checked that the surveys were conducted annually in line with the GS PDD /05 and approved transition annex /32/.
Calculation method (if applicable)	Assessed every year using Project Survey, Usage Survey and Household list

QA/QC procedures	The user lists are obtained through the local administration and transferred to an excel by the partner. These are then checked by CO2balance UK Ltd, and any households further than 1km away from the boreholes are removed. Duplicate checks are also run, and duplicate households are removed.
Purpose of data/parameter	Calculation of SDG 6.1.1 contribution
Additional comments	-

6. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB					
Relevant SDG Indicator/Safeguarding Principle	SDG 13.B.1 (Climate Action)					
Data/parameter	N _{p,y}					
Unit	Project Technology Days					
Description	Number of persons consuming water supplied by project scenario p through year y					
Measured/calculated/default	Calculated					
Source of data	Borehole Project Database					
Value(s) of monitored parameter	19,371,111					
	The verification team has checked the borehole project database /08/ and confirms that the values reported are accurate.					
	Pump ID	Down Days				
		Total Down Days (Monitoring Period)	Total Down Days 2022	Total Down Days 2023	% Downdays	
		ZD001	0	0	0	0.00%
		ZD002	0	0	0	0.00%
		ZD003	0	0	0	0.00%
		ZD004	0	0	0	0.00%
		ZD005	0	0	0	0.00%
		ZD006	0	0	0	0.00%
		ZD007	0	0	0	0.00%
		ZD008	0	0	0	0.00%
		ZD009	0	0	0	0.00%
		ZD010	0	0	0	0.00%
		ZD011	0	0	0	0.00%
		ZD012	0	0	4	1.03%
		ZD013	0	0	0	0.00%
		ZD014	0	0	0	0.00%
		ZD015	0	0	0	0.00%
		ZD016	0	0	0	0.00%
ZD017	0	0	0	0.00%		

		ZD018	0	0	0	0.00%
		ZD019	0	0	0	0.00%
		ZD020	3	0	3	0.78%
		ZD021	4	0	4	1.03%
		ZD023	0	0	0	0.00%
		ZD024	0	0	0	0.00%
		ZD025	3	0	3	0.78%
		ZD026	0	0	0	0.00%
		ZD027	0	0	0	0.00%
		ZD028	0	0	0	0.00%
		ZD029	3	0	3	0.78%
		ZD030	0	0	0	0.00%
		ZD031	0	0	0	0.00%
		ZD032	0	0	0	0.00%
		ZD033	0	0	0	0.00%
		ZD034	0	0	0	0.00%
		ZD035	0	0	0	0.00%
		ZD036	0	0	0	0.00%
		ZD053	0	0	0	0.00%
		ZD054	0	0	0	0.00%
		ZD055	0	0	0	0.00%
		ZD056	0	0	0	0.00%
		ZD058	0	0	0	0.00%
		ZD059	0	0	0	0.00%
		ZD060	0	0	0	0.00%
		ZD062	0	0	0	0.00%
		ZD063	0	0	0	0.00%
		ZD064	0	0	0	0.00%
		ZD065	0	0	0	0.00%
		ZD066	0	0	0	0.00%
		ZD067	0	0	0	0.00%
		ZD068	0	0	0	0.00%
		ZD069	0	0	0	0.00%
		ZD070	0	0	0	0.00%
		ZD071	0	0	0	0.00%
		ZD072	0	0	0	0.00%
		ZD073	0	0	0	0.00%
		ZD074	0	0	0	0.00%
		ZD075	0	0	0	0.00%
		ZD076	0	0	0	0.00%
		ZD077	0	0	0	0.00%
		ZD078	0	0	0	0.00%
		ZD079	0	0	0	0.00%
		ZD080	0	0	0	0.00%

		ZD081	5	0	5	1.29%
		ZD082	0	0	0	0.00%
		ZD083	5	0	5	1.29%
		ZD084	0	0	0	0.00%
		ZD085	0	0	0	0.00%
		ZD086	0	0	0	0.00%
		ZD087	0	0	0	0.00%
		ZD088	0	0	0	0.00%
		ZD089	0	0	0	0.00%
		ZD090	0	0	0	0.00%
		ZD091	0	0	0	0.00%
		ZD092	0	0	0	0.00%
		ZD093	0	0	0	0.00%
		ZD094	0	0	0	0.00%
		ZD095	0	0	0	0.00%
		ZD096	0	0	0	0.00%
		ZD097	0	0	0	0.00%
		ZD098	0	0	0	0.00%
		ZD099	0	0	0	0.00%
		ZD100	4	0	4	1.03%
		ZD153	0	0	0	0.00%
		ZD154	0	0	0	0.00%
		ZD155	0	0	0	0.00%
		ZD156	0	0	0	0.00%
		ZD159	0	0	0	0.00%
		ZD160	0	0	0	0.00%
		ZD161	0	0	0	0.00%
		ZD163	0	0	0	0.00%
		ZD166	0	0	0	0.00%
		ZD168	0	0	0	0.00%
		ZD169	0	0	0	0.00%
		ZD170	3	0	3	0.78%
		ZD171	0	0	0	0.00%
		ZD172	0	0	0	0.00%
		ZD173	0	0	0	0.00%
		ZD174	0	0	0	0.00%
		ZD175	0	0	0	0.00%
		ZD177	0	0	0	0.00%
		ZD179	0	0	0	0.00%
		ZD181	8	0	8	2.07%
		ZD182	0	0	0	0.00%
		ZD184	0	0	0	0.00%
		ZD185	0	0	0	0.00%
		ZD186	0	0	0	0.00%

		ZD187	4	0	4	1.03%
		ZD188	0	0	0	0.00%
		ZD193	0	0	0	0.00%
		ZD194	0	0	0	0.00%
		ZD195	0	0	0	0.00%
		ZD196	0	0	0	0.00%
		ZD197	0	0	0	0.00%
		ZD198	0	0	0	0.00%
		ZD200	0	0	0	0.00%
		ZD202	0	0	0	0.00%
		ZD203	4	0	4	1.03%
		ZD205	0	0	0	0.00%
		ZD206	0	0	0	0.00%
		ZD208	0	0	0	0.00%
		ZD209	0	0	0	0.00%
		ZD227	0	0	0	0.00%
		ZD228	0	0	0	0.00%
		ZD229	0	0	0	0.00%
		ZD230	0	0	0	0.00%
		ZD231	0	0	0	0.00%
		ZD232	0	0	0	0.00%
		ZD233	0	0	0	0.00%
		ZD234	0	0	0	0.00%
		ZD235	0	0	0	0.00%
		ZD236	0	0	0	0.00%
		ZD237	0	0	0	0.00%
		ZD238	0	0	0	0.00%
		ZD239	0	0	0	0.00%
		ZD240	0	0	0	0.00%
		ZD241	0	0	0	0.00%
		ZD242	0	0	0	0.00%
		ZD243	0	0	0	0.00%
		ZD244	0	0	0	0.00%
		ZD245	0	0	0	0.00%
		ZD246	0	0	0	0.00%
		ZD247	0	0	0	0.00%
		ZD248	0	0	0	0.00%
		ZD249	4	0	4	1.03%
		ZD250	0	0	0	0.00%
		ZD251	0	0	0	0.00%
		ZD252	0	0	0	0.00%
		ZD253	0	0	0	0.00%
		ZD254	3	0	3	0.78%
		ZD255	0	0	0	0.00%

		<table><tr><td>ZD212</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD213</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD214</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD216</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD217</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD218</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD219</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD220</td><td>3</td><td>0</td><td>3</td><td>0.78%</td></tr><tr><td>ZD221</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD222</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD223</td><td>4</td><td>0</td><td>4</td><td>1.03%</td></tr><tr><td>ZD224</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td>ZD225</td><td>3</td><td>3</td><td>0</td><td>0.78%</td></tr><tr><td>ZD226</td><td>0</td><td>0</td><td>0</td><td>0.00%</td></tr><tr><td></td><td>67</td><td>3</td><td>64</td><td>0.11%</td></tr></table>	ZD212	0	0	0	0.00%	ZD213	0	0	0	0.00%	ZD214	0	0	0	0.00%	ZD216	0	0	0	0.00%	ZD217	0	0	0	0.00%	ZD218	0	0	0	0.00%	ZD219	0	0	0	0.00%	ZD220	3	0	3	0.78%	ZD221	0	0	0	0.00%	ZD222	0	0	0	0.00%	ZD223	4	0	4	1.03%	ZD224	0	0	0	0.00%	ZD225	3	3	0	0.78%	ZD226	0	0	0	0.00%		67	3	64	0.11%
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		67	3	64	0.11%																																																																								
		This table can also be found in the ERs Calculation document which accompanies this MR. The Non- functional period Dates have been checked from the maintenance records /20/ and found consistent.																																																																											
Monitoring equipment	Project Database																																																																												
Measuring/reading/recording frequency	Continuous																																																																												
Calculation method (if applicable)	Sum of the total number of people using each borehole in the project multiplied by the number of days crediting each borehole earns in a given monitoring period. The formula for calculating the project technology days was also found to be in line with the registered PDD /05/ and the methodology /33/. 95% functionality cap is implemented on all BHs claiming functionality above this figure to be conservative. Where below 95% functionality is present, the true value is used to calculate the Project Technology Days. PTDs are also further capped as a result of a max 381 users cap per borehole.																																																																												
QA/QC procedures	If a borehole does not pass the water quality tests, the borehole is discounted from the project numbers. During this monitoring period there was no incident of this.																																																																												
Purpose of data/parameter	Calculation of emission reductions.																																																																												
Additional comments	-																																																																												
7. Data/Parameter																																																																													
Monitoring Parameter Requirement	Assessment/Observation by the VVB																																																																												
Relevant SDG Indicator/Safeguarding Principle	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation), SDG 3.9.1 (Good Health and Well-Being)																																																																												

Data/parameter	$U_{p,y}$
Unit	Percentage
Description	Usage rate in project scenario p through year y
Measured/calculated/default	Calculated
Source of data	Usage Survey
Value(s) of monitored parameter	100% (capped at 95%) Verification team has checked the Usage survey results and calculation /10/ and found OK. The Usage survey records /10/ were also cross checked during the site visit by randomly visiting the household and found correct.
Monitoring equipment	Usage Survey
Measuring/reading/recording frequency	Annual
Calculation method (if applicable)	The usage survey has been carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd. The usage rate is 100%, this is capped at 95%. The VVB confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and as required by the applied methodology /33/.
QA/QC procedures	All data is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd
Purpose of data/parameter	Calculation of usage of project technology
Additional comments	The latest usage survey carried out in the monitoring period was between 29/05/2023 and 01/06/2023. There was another usage survey carried out in 2022 from 21/11/2022 to 25/11/2022 maintaining annual monitoring frequency. CO2balance usage rate cap of 95%.

8. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation)
Data/parameter	$Q_{p,y}$
Unit	Litres per person per day
Description	Quantity of safe water supplied in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	Default
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	7 (7.76) The WCFT Test reports /15/ have been checked by the verification team and show that on average 7.76 litres of non-boiled clean water used only for drinking, hand washing and food preparation (capped at 7l). WCFT Test results have also been

	cross-checked during the site visit by randomly visiting the household and found acceptable.
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency	Biennial The VVB confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and as required by the applied methodology.
Calculation method (if applicable)	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. Volume is capped at 7 litres per person per day as per the methodology. The WCFT is carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
QA/QC procedures	All data is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd
Purpose of data/parameter	Calculation of emission reductions.
Additional comments	The latest WCFT was conducted 28/11/2022 – 03/12/2022, maintaining biennial monitoring frequency.

9. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation)
Data/parameter	$Q_{p, \text{cleanboil}, y}$
Unit	Litres per person per day
Description	Quantity of safe water boiled in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	Measured
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	0 The WCFT Test reports /15/ have been checked by the verification team and show that 0 litres of boiled clean water is consumed per person per day. WCFT Test results have also been cross-checked during the site visit by randomly visiting the household and found acceptable
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency	Biennial The VVB confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and as required by the applied methodology.
Calculation method (if applicable)	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
QA/QC procedures	All data is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd

Purpose of data/parameter	Calculation of emission reductions.
Additional comments	The latest WCFT was conducted 28/11/2022 – 03/12/2022, maintaining biennial monitoring frequency.

10. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation)
Data/parameter	$Q_{p,rawboil,y}$
Unit	Litres per person per day
Description	The raw of unsafe water that is still boiled after installation of the water treatment technology
Measured/calculated/default	Measured
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	0 The WCFT Test reports /15/ have been checked by the verification team and show that 0 litres of raw/unsafe water is boiled for consumption per person per day. WCFT Test results have also been cross-checked during the site visit by randomly visiting the household and found acceptable
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency	Biennial The VVB confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and as required by the applied methodology.
Calculation method (if applicable)	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
QA/QC procedures	All data is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd
Purpose of data/parameter	Calculation of emission reductions.
Additional comments	The latest WCFT was conducted 28/11/2022 – 03/12/2022, maintaining biennial monitoring frequency.

11. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Safe Water and Sanitation)
Data/parameter	Quality of Treated Water
Unit	Parameters as per national standards

Description	Performance of the treatment technology
Measured/calculated/default	Measured
Source of data	Laboratory Tests The Water Quality Tests (WQTs) reports /18/ certified by The Water Resource Department from the Ministry of Land, Water & Environment, have been checked by the verification team and show that all parameters were within levels considered acceptable for domestic human consumption /29/. It has also been confirmed from the households during the on-site visit and found acceptable
Value(s) of monitored parameter	Pass
Monitoring equipment	Laboratory equipment
Measuring/recording frequency	A sample (sampling requirements employ 90/10 precision) of boreholes is tested each quarter. All boreholes are tested at least once per year. The dates of the Water Quality Test reports for this monitoring period are September 2022, December 2022, March 2023, June 2023 and September 2023. The tests were conducted quarterly with 90/10 precision according to the methodology. Verification team confirms that all boreholes are tested at least once per year as confirmed from the Water Quality Tests (WQTs) reports /18/.
Calculation method (if applicable)	The Water Resource Department from the Ministry of Land, Water & Environment has certified each water supply as in line with national standards.
QA/QC procedures	The tests results are approved by the Water Resource Department from the Ministry of Land, Water & Environment. The results are checked against the national standards. (Water quality Standards - Eritrea 2004)
Purpose of data/parameter	To test water quality for safety of human consumption according to WHO Guidelines - https://apps.who.int/iris/bitstream/handle/10665/44584/9789241548151_eng.pdf;jsessionid=936A8C46CE81D193F89C70536B4EF350?sequence=1
Additional comments	-

12. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 13.B.1 (Climate Action)
Data/parameter	LE _{p,y}
Unit	tCO ₂ e per year
Description	Leakage in project scenario p during year y
Measured/calculated/default	Calculated
Source of data	Baseline and Monitoring surveys
Value(s) of monitored parameter	0 The verification team has checked the Baseline /09/ and monitoring survey results /10/ /11/ /15/ /16/ and confirms that the value of leakage has been accurately reflected.

Monitoring equipment	Desk based research
Measuring/reading/recording frequency	Biennial
Calculation method (if applicable)	Assessed every two years using baseline and monitoring survey. The VVB confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and as required by the applied methodology /33/.
QA/QC procedures	CO2balance reviews the leakage assessment, please refer to section E.3 in MR.
Purpose of data/parameter	Calculation of leakage.
Additional comments	-

13. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the VVB
Relevant SDG Indicator/Safeguarding Principle	SDG 6.1.1 (Safe Water and Sanitation)
Data/parameter	Hygiene campaigns
Unit	Outcome of WASH meetings
Description	Hygiene campaigns carried out among project technology users
Measured/calculated/default	Measured
Source of data	Annual hygiene campaign results The Annual hygiene campaign results /12/ of the WASH trainings conducted at sub-zoba level have been checked by the verification team and found ok.
Value(s) of monitored parameter	Positive – WASH trainings were delivered by the Water Resource Department to the WASH Committees at sub-zoba level. All sub-zobas received initial training in 2016/2017 to set up water resource committees and outline the roles and responsibilities of members representing their communities. Subsequent annual meetings followed up with water resource committees to ensure proper operation on sanitation and hygiene, servicing and the long-term sustainable management of the boreholes for the respective communities. The annual meetings for MP4 were conducted in the month of December of 2022 as confirmed from the records /12/.
Monitoring equipment	WASH Trainings
Measuring/reading/recording frequency	Annual The VVB confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /05/ and as required by the applied methodology /33/.
Calculation method (if applicable)	N/A
QA/QC procedures	Report produced audited by VVB
Purpose of data/parameter	In accordance with TPDDTEC v2 methodology.
Additional comments	Annual monitoring frequency has been maintained during the current monitoring period.

	In summary, the verification team confirms that all the ex-post parameters for SDGs are monitored in accordance with the approved monitoring plan under GS PDD /05/ and approved transition annex /32/.
Findings	CL-01 and CAR-02 raised in this respect and successfully closed. Refer appendix 4 of this report for more details.
Conclusion	The adequacy and compliance of the monitoring plan in the Monitoring report was found as per the requirements laid by the monitoring methodology, GS PDD /05/ and approved transition annex /32/. The information flow (from data generation, aggregation, to recording, calculation and reporting) is already included under respective parameter above. The verification team has verified all the data and collected evidence as per the required monitoring frequency and found to be correct and appropriate meeting the requirements of the applied methodology, GS PDD /05/ and approved transition annex /32/.

D.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	As per the registered PDD, neither the registered monitoring plan nor applied GS monitoring methodology for this particular project technology, describes the requirement of calibration of monitoring equipment's. Verification team confirms that the monitoring tasks, such as Usage Surveys, Water Consumption Field Tests, Water Quality Tests, Annual hygiene campaign results and assessment of leakage usage surveys etc. are carried out by Project team of Vita. Project team of Vita were trained in household energy studies and surveying. This has been confirmed during the interview. Hence, verification team confirms the creditability/competency of the project team. This also confirms the credibility and authenticity/accuracy of test/survey done by the project team
Findings	No findings raised.
Conclusion	Hence, verification team confirms the creditability/competency of the project team. This also confirms the credibility and authenticity/accuracy of test/survey done by the project team.

D.8. Calculation of SDG outcomes

D.8.1. Calculation of baseline/project/leakage value or estimation of baseline/project/leakage situation of each SDG Impact

Means of verification	SDG 3 – Good Health & Wellbeing: Calculations are as follows: $HAPR_y = ((P_{b,y} - P_{p,y}) / P_{b,y}) * U_{p,y}$ Where: HAPR_y Total reduction in Household Air Pollution for project activity in year y (%) P_{b,y} Quantity of fuel that is consumed in the baseline scenario b during year y (kg/household-day) P_{p,y} Quantity of fuel that is consumed in the project scenario p during year y (kg/household-day) U_{p,y} Usage rate in project scenario p during year y Baseline estimate: 0% reduction in exposure to Household Air Pollution due to boiling water. Project estimate: 95% reduction in exposure to Household Air Pollution due to no longer boiling water $P_{b,y} = W_{b,y} * Q_{p,y}$
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Where:

$W_{b,y}$ Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representative of baseline scenario b during year y
 $Q_{p,y}$ Quantity of safe water supplied in the project scenario p during year y, using the “zero or low” emissions’ clean water supply technology

and

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

$W_{b,y}$ Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representative of baseline scenario b during year y
 $Q_{p, \text{cleanboil}, y}$ Quantity of safe water boiled in the project scenario p during year y, after installation of the project technology

$W_{b,y}$ is a fixed parameter as justified under section D.6.1 of this report and $Q_{p,y}$, $Q_{p, \text{cleanboil}, y}$ and $U_{p,y}$ are the ex-post parameters as justified under section D.6.2 of this report. VVB has checked the calculation of the SDG from the submitted excel sheet /04/ and found OK.

SDG 5 – Gender Equality:

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

Where:

TR_y Total reduction time spent collecting firewood for project activity in year y (hours)
 $T_{b,y}$ Baseline time spent collecting firewood per household per day (hours)
 $T_{p,y}$ Project time spent collecting firewood per household per day (hours)

Baseline estimate: 1.74 hours spent collecting firewood per household per day

Project estimate: 0.56 hours spent collecting firewood per household per day

$T_{b,y}$ and $T_{p,y}$ are the ex-post parameters as justified under section D.6.2 of this report. VVB has checked the calculation of the SDG from the submitted excel sheet /04/ and found OK.

SDG 6 – Safe Water & Sanitation:

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

Where:

P_{access} Number of additional persons having access to safe water in the project activity compared to the baseline scenario.
 P_y Number of persons having access to safe water in the project activity.
 C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.
 $U_{p,y}$ Usage rate in project scenario p during year y

Baseline estimate: 0 people with access to safe water

Project estimate: People with access to safe water 50,055

P_y , C_j and $U_{p,y}$ are the ex-post parameters as justified under section D.6.2 of this report. VVB has checked the calculation of the SDG from the submitted excel sheet /04/ and found OK.

SDG 13 Climate Action:

The project proponent submitted all the relevant data and parameters required to be monitored to the verification team along with the monitoring report. All the parameters required to be monitored as per the registered PDD /05/ and approved transition annex /32/ have been monitored and reported in the monitoring report. Verification team has reviewed the calculation worksheet /04/ for the emission reduction calculation for the monitoring period 31/08/2022 - 21/09/2023 (including both the days). Verification team confirms that the formulas, conversions, aggregations and factors are consistent with the monitoring plan in the PDD /05/ and approved transition annex /32/. The reported data was checked as follows:

- All the necessary data and all the parameters required to be monitored in the registered PDD /05/ and approved transition annex /32/ were reviewed to ensure accuracy;
- The Borehole Project Database kept electronically /08/ was reviewed along with an interview with the person responsible for data entry and data review, to confirm the number of boreholes rehabilitated by the end of this monitoring period. Repair Confirmation Forms /19/ were also assessed for further check.

The overall GHG reductions achieved by the project activity in year y are calculated using the equation below:

$$ER_y = \Sigma BE_{b,y} - \Sigma PE_{p,y} - \Sigma LE_{p,y}$$

Where:

ER_y = Emission reduction for total project activity in year y (tCO₂e/yr)

$BE_{b,y}$ = Emissions for baseline scenario b during the year y in tCO₂e

$\Sigma PE_{p,y}$ = Emissions for project scenario p during the year y in tCO₂e

$LE_{p,y}$ = Leakage for project scenario p during the year y in tCO₂e

Hence PP has used the equation (7) available in the methodology, which combines the calculation of baseline, project and leakage into one equation and consolidated emission reductions calculated which has been checked by the verification team and is in line with applied methodology /33/.

Total emission reductions achieved in the current monitoring period (31/08/2022 - 21/09/2023), were calculated to be 94,928 tCO₂e. The calculation for the same has been checked and found OK.

Baseline emission:

Baseline emission calculations are conducted as follows:

Baseline Emissions:

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

Where:

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

Where:

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

C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it. Premises with a piped water supply can be excluded from the C_j factor when it can be clearly demonstrated that the piped water supply is not a clean water source. Prior to registration, the water quality of the piped water supply

should be established as unsafe by carrying out water quality testing over a representative period of time or by referring to relevant third party studies for the target area. Premises with a piped water supply that boil water or would have boiled water (suppressed demand situation) in the baseline situation are in such cases eligible and can be included in the calculation of baseline emissions from boiling water. PP shall carry out baseline surveys to demonstrate that premises do actually boil water or would indeed have boiled water to make it safe for use.

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

$Q_{p,y}$ Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day

$Q_{p,rawboil,y}$ Quantity of raw water boiled in the project scenario p per person per day

$W_{b,y}$ Quantity of fuel in tons required to treat 1 litre of water using technologies representative of baseline scenario b during the project year y, as per Baseline Water Boiling Test

Project emission:

As the baseline fuel and the project fuel are the same and the baseline emission factor and project emission factor are considered the same, the overall GHG reductions achieved by the project activity is calculated using equation 1 of the methodology /33/ and baseline emissions are not calculated separately.

Project emission calculations are conducted as follows:

Project Emissions:

$$PE_{p,y} = B_{p,y} * ((f_{NRBy} * EF_{p,fuel,co2}) + EF_{p,fuel,nonco2}) * NCV_{p,fuel}$$

Where:

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

Where:

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

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

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

$Q_{p,y}$ = Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day

$Q_{p,rawboil,y}$ = Quantity of raw water boiled in the project scenario p per person per day

$W_{p,y}$ = Quantity of fuel in tons required to treat 1 litre of water using technologies representative of project scenario p during the project year y.

Baseline estimate: 94,928 tCO₂e

Project estimate: 0 tCO₂e

VVB has checked the calculation of the SDG from the submitted excel sheet /04/ and found OK.

Leakage assessment: The potential sources of leakage listed in the methodology are investigated, and addressed below:

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

	In all cases the traditional stoves replaced are three stones fires; these have no market value and are not a product as such. There is nothing limiting the use of three stone cooking across the country (technology is lowest, price is zero), which is why this cooking method is so widespread. In any case the primary purpose of these three rocks is for cooking so they will not be replaced/displaced in their entirety as a result of this project - which means they will not be reused outside the project boundary. This leakage source can therefore be discounted as was confirmed during the site visit. Hence there is no leakage from this source. <i>b) The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.</i> There is no evidence to suggest significant (if any) use of renewable energy for purifying water in the project region as found in the Baseline Water Surveys /09/. As solar purification devices are not used, renewable energy used for purifying water would likely be animal dung or crop residues which will be used due to ease of availability/proximity to the home rather than due to a shortage of wood fuel, therefore it is an independent factor. This leakage source can therefore be discounted. This was confirmed from interviewing the local households and other stakeholders and found OK. Hence there is no leakage from this source. <i>c) The project significantly impacts the NRB fraction within an area where other CDM or VER projects activities account for NRB fraction in their baseline scenario.</i> The CDM default NRB fraction of 0.97 was used; this was valid for dates covering the monitoring period. The majority of participants collect wood from within the project boundary and therefore the NRB is not expected to be affected in other areas, which was confirmed during the site visit. Hence there is no leakage from this source. <i>e) By virtue of promotion and marketing of a 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.</i> This project is not marketing efficient technology; it is eliminating the need for a fuel-based technology to deliver pure water. Lower emission technology substitution within households is therefore not possible as confirmed during the site visit and this leakage source can therefore be discounted. Hence there is no leakage from this source. Verification team has checked the assessment for all these potential sources of leakage in the monitoring report and verified that there are no leakage emissions. The equation used to calculate emission reductions does not provide a value for baseline or project emissions, rather it uses a value for fuel savings that is then multiplied by relevant emission factors to give emission reductions. The above consolidated equation used for estimation of emission reduction is in line with methodology /33/ and PDD /05/. Hence total verified emission reduction during the reported monitoring period (i.e. 31/08/2022 - 21/09/2023) are 94,928 tCO₂e.
Findings	CL-02 raised in this respect and successfully closed. Refer appendix 4 of this report for more details.
Conclusion	The verification team confirms that a) The complete data set for the monitoring parameters was available for the duration of 31/08/2022 - 21/09/2023 (including both the days). b) The cross checks were undertaken for all the parameters indicated in the respective sections and were found complying with the requirements of the monitoring plan; c) Appropriate methods and formulae for calculating baseline emission, project emissions and leakage have been followed; d) The claimed SDGs are free from material errors, omissions or misstatements, with a reasonable level of assurance.

D.8.2. Calculation of net benefits as difference of baseline and project values or direct calculation for each SDG Impact

Means of verification	Section E.4 of MR /02/ demonstrate the summary of net benefits for each SDG impact for the monitoring period.				
	PP has submitted the calculation in the excel sheet /04/. The calculation for each SDG impact is checked whether the calculation is in accordance with the formula given in the registered PDD /05/, approved transition annex /32/ and the selected methodology /33/.				
	SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
	SDG 3 Good Health and Well-being	Variation in household smoke	0% reduction in exposure to Household Air Pollution due to boiling water	95% reduction in exposure to Household Air Pollution due to no longer boiling water	95% additional reduction in exposure to Household Air Pollution due to no longer boiling water
	SDG 5 Gender Equality	Variation of time spent on firewood collection	1.74 hours spent collecting firewood per household per day	0.56 hour spent collecting firewood per household per day	1.18 hours saved on collecting firewood per household per day
	SDG 6 Clean Water and Sanitation	People gain access to safe water	0 people with access to safe water	People with access to safe water: 52,689	Additional people with access to safe water: 50,055
	SDG 13 Climate Action	Emissions Reductions (tCO ₂ e)	99,927 tCO ₂ e	0 tCO ₂ e	94,928 tCO ₂ e reduced emissions
Findings	No findings raised.				
Conclusion	The verification team confirms the following: Each SDG impact is calculated as per the registered PDD /05/, approved transition annex /32/ and the selected methodology /33/.				

D.8.3. Comparison of actual SDGs Impacts with estimates in approved PDD

Means of verification	The verification team has checked whether the MR includes a comparison of actual values of the monitoring period with the estimations in the registered PDD /05/, approved transition annex /32/.		
	Section E.5 of the MR /02/ includes a comparison of each SDG actual with the ex-ante calculated values in the registered PDD /05/ and approved transition annex /32/.		
	SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period²	Actual values³ achieved during this monitoring period
	SDG 3 Good Health	80% reduction in exposure to Household Air	95% reduction in exposure to Household

²Ex antes values refer to the approved Transition Annex (GS4GG_GS5125_Transition_Annex_v2_CLEAN)

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.

	and Well-being	Pollution due to boiling water	Air Pollution due to boiling water
	SDG 5 Gender Equality	At least 0.5 hours per trip per household time saved	Time saved on collecting firewood has increased during this monitoring period by 1.18 hours
	SDG 6 Clean Water and Sanitation	55,074	Additional people with access to safe water: 50,055
	SDG 13 Climate Action	286,289 tCO2e	94,928 tCO2e
Findings	No findings raised.		
Conclusion	SDG impacts as per PDD and the actual SDGs achieved for the monitoring period are correctly reported in the section E.5 of MR /02/.		
	The justification for decrease in the emission reduction is provided in the section E.6 of the MR and the reasons provided are verified and found to be valid.		

D.9. SAFEGUARDS REPORTING

As per the Safeguarding Principle Assessment in the GS transition document /32/, there are no safeguarding principles which are to be included in the monitoring plan or hold any relevance to the project activity. Also, there is no impact (positive/negative/slightly) for any mitigation measures, being applicable to any of the safeguarding principles. Hence, this section is not relevant.

D.10. Stakeholder Inputs & Legal Disputes

Means of verification	There is a continuous input/grievance mechanism in place for beneficiaries to be able to give feedback on the project. In this regard Grievance Expression Process Book /23/ has been placed in Vita offices in the State of Eritrea to facilitate such activities. During the interview, the location of the placement of Grievance Expression Process Book /23/ was found to be appropriate as it is central to the project areas and easily accessible. Field staffs Vita field staff have not received any feedback during this monitoring period from the borehole users on damage or breaking of boreholes therefore it can be assumed that the project is running as planned. It was confirmed that no feedback was received during the monitoring period.
Findings	No findings raised.
Conclusion	The verification team confirms the following: - No major grievances received during the current or previous monitoring period. - No legal consent or dispute raised during the monitoring period.

SECTION E. Internal quality control

The draft verification report prepared by team leader is reviewed by an independent technical reviewer (having competence of relevant technical area himself/herself or through an independent technical area expert) to confirm the internal procedures established by 4KES are duly followed and the verification report/opinion is reached in an objective manner and complies with the applicable Gold Standard & CDM requirements.

The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the verification team. The independent technical reviewer(s) may approve or reject the draft verification

report. The findings may be identified even at this stage, which needs to be satisfactorily resolved, before submit final report to Client/Gold Standard. The final approval decision is taken by the Head of the VVB/Director.

The final decision is authorized by the Director, 4KES, once the report is finalized by the Head of the VVB/VVB Manager.

SECTION F. Verification opinion

The verification team confirms that the evidence is of sufficient quantity, appropriate quality and reliable. The reported values, notation, units and sources in the monitoring report for all the monitoring parameters have been cross checked with the emission reduction sheet and monitoring report. During the course of verification and interviews, the data submitted by PP was cross verified with the values mentioned in the emission reduction sheet /04/ and monitoring report /02/. The procedure for data monitoring, recording, transfer and compilation was also verified and found in compliance with the monitoring plan as mentioned in the approved PDD /05/ and approved transition annex /32/.

Evidences (Documents/interviews) referred for verification of individual monitoring parameter and fixed parameters are defined in section E.6 above. It is confirmed by the assessment team that the reported emission reductions have been conservatively calculated. A list of referred documents for verification is also included in Appendix 3 of this report.

Based on the information seen and evaluated we confirm that the implementation of the project has resulted in SDGs during period from 31/08/2022 - 21/09/2023 (Including both the days) as follows.

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
SDG 3 Good Health and Well-being	Variation in household smoke	0% reduction in exposure to Household Air Pollution due to boiling water	95% reduction in exposure to Household Air Pollution due to no longer boiling water	95% additional reduction in exposure to Household Air Pollution due to no longer boiling water
SDG 5 Gender Equality	Variation of time spent on firewood collection	1.74 hours spent collecting firewood per household per day	0.56 hour spent collecting firewood per household per day	1.18 hours saved on collecting firewood per household per day
SDG 6 Clean Water and Sanitation	People gain access to safe water	0 people with access to safe water	People with access to safe water: 52,689	Additional people with access to safe water: 50,055
SDG 13 Climate Action	Emissions Reductions (tCO ₂ e)	99,927 tCO ₂ e	0 tCO ₂ e	99,927 tCO ₂ e reduced emissions

Vintage-wise Emission reductions

		Amount Achieved
Start Dates	End Dates	VERs
31/08/2022	31/12/2022	30,170 tCO ₂ e
01/01/2023	21/09/2023	64,758 tCO ₂ e

SECTION G. Certification statement

4K Earth Science Pvt. Ltd. has been contracted by 'Vita Eritrea' to undertake independent verification and certification for the SDGs reported from the GS Project activity "Eritrea Community Boreholes", GS Reference Number GS 5125 for the monitoring period 31/08/2022 - 21/09/2023 (including both dates) in the Monitoring Report Version 1 (first version) dated 06/06/2024.

The verification is based on the GS approved PDD, approved transition annex and the monitoring report for this project. Our verification approach was based on the requirements as defined under the Gold Standard requirements, Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive Board.

The management of the 'Vita Eritrea' is responsible for the preparation of the GHG emissions data and the reported SDGs on the basis set out within the project Final Monitoring Report Version 5 dated 29/11/2024. The calculation and determination of GHG emission reductions from the project is the responsibility of the management of the 'CO2balance UK Ltd.'. The development and maintenance of records and reporting procedures are in accordance with the Monitoring Report Version 5 dated 29/11/2024.

In our opinion the GHG emissions reductions reported for the project activity are fairly stated in the Monitoring Report (final) Version 5 dated 29/11/2024. 4KES based on outcome of verification activities, certifies in writing that, during the monitoring period 31/08/2022 - 21/09/2023 (including both days), the registered GS PA "Eritrea Community Boreholes" achieved the verified amount of 94,928 tCO₂e reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the PA.

The Verified and certified SDGs impacts during the monitoring period 31/08/2022 - 21/09/2023 (Including both dates) is stated below:

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
SDG 3 Good Health and Well-being	Variation in household smoke	0% reduction in exposure to Household Air Pollution due to boiling water	95% reduction in exposure to Household Air Pollution due to no longer boiling water	95% additional reduction in exposure to Household Air Pollution due to no longer boiling water
SDG 5 Gender Equality	Variation of time spent on firewood collection	1.74 hours spent collecting firewood per household per day	0.56 hour spent collecting firewood per household per day	1.18 hours saved on collecting firewood per household per day
SDG 6 Clean Water and Sanitation	People gain access to safe water	0 people with access to safe water	People with access to safe water: 52,689	Additional people with access to safe water: 50,055
SDG 13 Climate Action	Emissions Reductions (tCO ₂ e)	99,927 tCO ₂ e	0 tCO ₂ e	94,928 tCO ₂ e reduced emissions

Vintage-wise Emission reductions

		Amount Achieved
Start Dates	End Dates	VERs
31/08/2022	31/12/2022	30,170 tCO ₂ e
01/01/2023	21/09/2023	64,758 tCO ₂ e

Appendix 1. Abbreviations

Abbreviations	Full texts
4KES	4K Earth Science Pvt. Ltd
BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CH ₄	Methane
CL	Clarification Request
CO ₂ e	Carbon dioxide equivalent
EF	Emission Factor
ERs	Emission Reductions
FAR	Forward Action Request
FT	Fuel Test
GHGs	Greenhouse Gas(es)
GS	Gold Standard
GWP	Global Warming Potential
HH	Household
ISO	International Organization of Standardization
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
KPT	Kitchen Performance Test
LE	Leakage Emissions
MKS	Monitoring Kitchen Survey
MR	Monitoring Report
MP	Monitoring Plan
NCV	Net Calorific Value
NGO	Non-Governmental Organisation
NRB	Non-renewable biomass
PE	Project Emissions
PDD	Project Design Document
PP	Project proponent
PS	Project Standard
PCP	Project Cycle Procedure
PTD	Project Technology Days
SD	Sustainable Development
SDG	Sustainable Development Goal
QA/QC	Quality Assurance/Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified Emission Reduction
VVB	Validation and Verification Body
VVS	Validation & Verification Standard
WBT	Water Boiling Test

Appendix 2. Competence of team members and technical reviewers

<u>Certificate of Competence</u>							
Name	☒ Mr. ☐ Ms.	Narendra Kumar. R					
Qualification Procedure	Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GCC/GHG Projects.						
Appointed to work as:							
	Validator/ Verifier	Team Leader	Trainee	Technical Expert	Technical Reviewer	Financial Expert	Approver
Appointed	Yes	Yes	No	Yes	Yes	Yes	No
Appointed Date	15-07-2023						
Authorized to work as Technical Expert for:							
Authorized Technical Area	Sectoral Scope		TA Code		Technical Area within the scope		
	Energy industries (renewable - / non-renewable sources)		1.1		Thermal energy generation		
	Energy industries (renewable - / non-renewable sources)		1.2		Renewables		
	Energy demand		3.1		Energy demand		
	Waste handling and disposal		13.1		Solid waste and wastewater		
	Waste handling and disposal		13.2		Manure		
Authorized to work as Local Expert for:							
Country/Countries	India						
Compliance check by:				Anand S. R.			

<u>Certificate of Competence</u>							
Name	☒ Mr. ☐ Ms.	Mehreteab Michael Yemane					
Qualification Procedure	Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GCC/GHG Projects.						
Appointed to work as:							
	Validator/ Verifier	Team Leader	Trainee	Technical Expert	Technical Reviewer	Financial Expert	Approver
Appointed	No	No	No	Yes	No	No	No
Appointed Date	15-07-2024						
Authorized to work as Technical Expert for:							
Authorized Technical Area	Sectoral Scope		TA Code		Technical Area within the scope		
	Energy Demand		3.1		Energy Demand		
Authorized to work as Local Expert for:							
Country/Countries	Eretria						
Compliance check by:				Anand S R			

<u>Certificate of Competence</u>							
Name	☒ Mr. ☐ Ms.	Ma Paa Puratchikkanal					
Qualification Procedure	Fulfil the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GCC/GHG Projects.						
Appointed to work as:							
	Validator/ Verifier	Team Leader	Trainee	Technical Expert	Technical Reviewer	Financial Expert	Approver
Appointed	Yes	Yes	No	Yes	Yes	Yes	Yes
Appointed Date	15-07-2023						
Authorized to work as Technical Expert for:							
Authorized Technical Area	Sectoral Scope		TA Code		Technical Area within the scope		
	Energy industries (renewable - / non-renewable sources)		1.1		Thermal energy generation		
	Energy industries (renewable - / non-renewable sources)		1.2		Renewables		
	Energy demand		3.1		Energy demand		
	Construction		6.1		Construction		
	Waste handling and disposal		13.1		Solid waste and wastewater		
	Waste handling and disposal		13.2		Manure		
	Agriculture		15.1		Agriculture		
Authorized to work as Local Expert for:							
Country/Countries	India and Sri Lanka						
<u>Compliance check by:</u>				Anand S. R.			

Appendix 3. Documents reviewed or referenced

Ref no.	Reference Document
1.	Draft Monitoring Report version 1, dated 06/06/2024
2.	Final Monitoring Report version 5, dated 29/11/2024
3.	Emission reduction calculation sheet corresponding to draft MR
4.	Emission reduction calculation sheet corresponding to final MR
5.	Final GS PDD
6.	3 rd periodic verification Monitoring report, Final Verification report and GS review closure
7.	Technical description of the project technology (India Mark-II Deep well Handpump) along with installation and maintenance Manual
8.	- Borehole Project Database - HH list - along with distance from the boreholes.
9.	Baseline Survey
10.	Filled forms Random sample selection Excel sheet: Usage survey during the period 21/11/2022 – 25/11/2022 Excel sheet: Usage survey during the period 29/05/2023 – 01/06/2023
11.	Excel sheet: Project survey in year 2022 during the period 21/11/2022 – 25/11/2022 Random sample selection Filled forms
12.	Annual Refresher WASH and minor Maintenance Community Training in 27/12/2022 Training photos Training attendance sheet
13.	Transfer of carbon rights from borehole owners to Vita.
14.	List of hand pumps repaired under project activity
15.	Excel sheet: Water consumption field test WCFT during the period 28/11/2022 – 03/12/2022 Filled forms
16.	Baseline Water Boiling Test reports
17.	Supportive for suppressed demand
18.	Laboratory Test reports for Quality of Treated Water: Q4 2022, Q1 2023, Q2 2023, Q3 2023 Chlorine receipt 20/10/2022 & 13/12/2022 Random sample selection
19.	Repair Confirmation Form of sampled borehole
20.	Maintenance record of boreholes during the monitoring period
21.	Organization structure for the project activity
22.	Supportive documents for the sustainable parameters
23.	Supportive document for grievance mechanism
24.	Staff training record & attendance list 18/11/2022 & 26/05/2023
25.	Agreement signed between the Zoba Debub Department of Agriculture and Land and VITA Eritrea 18/10/2019
26.	1. CDM validation and verification standard for project activities, version 03.0 2. CDM project standard for project activities, version 03.0 3. CDM project cycle procedure for project activities, version 03.0
27.	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html IPCC Default emissions factor EFDB Emission Factor Database. https://www.ipcc-nggip.iges.or.jp/EFDB/main.php

	Default emissions factor: https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_2_Non-CO2_Stationary_Combustion.pdf https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf Global Warming Potential: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14 CDM Default values: https://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf
28.	Standard: Sampling and surveys for CDM project activities and programmes of activities, version 09.0 Guideline: Sampling and surveys for CDM project activities and programmes of activities, version 04.0
29.	National standard on water quality testing: Ministry of Land, Water and Environment Water Resources Department
30.	WHO Standards
31.	Gold standard for the Global Goals: Template for Monitoring report version 1.1 https://globalgoals.goldstandard.org/t-perfcert-monitoring-report/
32.	GS4GG Transition Annex GS4GG Transition Annex GS review closure
33.	Applied baseline and monitoring Gold Standard Voluntary Methodology, “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” version 2.0
34.	GS4GG specific rule/guidelines
35.	GS4GG PRINCIPLES & REQUIREMENTS, Version 1.2
36.	Annual report 11/12/2023
37.	Dev_242, that was approved by GS on 13/06/2022
38.	5 minutes Stroke Test Dry_LS_V1 5MST_August 23_Rainy_LS v1 How to conduct the test
39.	VALIDATION/VERIFICATION BODY REQUIREMENTS, Version 3.0
40.	CDM webpage https://cdm.unfccc.int/Projects/projsearch.html
41.	Verra Registry https://registry.verra.org/app/search/VCS/All%20Projects
42.	International REC Standard (I-REC) https://www.irecstandard.org/registries/
43.	GCC Website https://www.globalcarboncouncil.com/
44.	Declaration of non-double counting dated 14/08/2023 by Water Resources Department (WRD) of the Anseba and Debub regions

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verifications

This is the 4th periodic verification of the project activity. No FAR was raised during the last verification.

FAR ID	xx	Section no.	Date: DD/MM/YYYY
Description of FAR			
Project participant response			Date: DD/MM/YYYY
Documentation provided by project participant			
VVB assessment			Date: DD/MM/YYYY

Table 2. CL from this verification

CL ID	01	Section no.	D.6.2	Date: 16/08/2024
Description of CL				
For the monitoring parameters “Qp,y”, “Qp, cleanboil,y” and “Qp, rawboil,y” (Under section D.2 of the MR), Measuring/reading/recording frequency is Biennial. PP need to clarify whether the same is maintained during this monitoring period.				
Project participant response				Date: 22/08/2024
The monitoring parameters “Qp,y”, “Qp, cleanboil,y” and “Qp, rawboil,y” are found from the WCFT which is conducted biennially. The last WCFT was conducted between 28/11/2022 – 03/12/2022. LS WCFT_BHs_22 V1 has previously been shared. The previous WCFT was conducted 12/10/2020 – 28/10/2020.				
Documentation provided by project participant				
LS WCFT_BHs_22 V1				
VVB assessment				Date: 25/09/2024
Clarification has been provided by PP and found OK. Verification team has checked the WCFT records /15/ to confirm the WCFT dates and found consistent with the PP response. Hence this CL is closed.				

CL ID	02	Section no.	D.8.1	Date: 16/08/2024
Description of CAR				
Under the ER excel sheet: 1. Under column J i.e. Capped People (Under Tab “PTDs”), formula is applied for capped people however some of the values are typed. PP need to clarify the same.				
Project participant response				Date: 22/08/2024
Dev_242 allowed PP to implement a cap of up to 400 users per borehole. Analysis of the 5 Minute Stroke Tests for the rainy and dry season showed an average of 381 users per borehole. This was the cap applied to most of the borehole user numbers, as seen in the formula for Capped People in the ER excel. However, where test results for some boreholes showed a lower flow rate, a lower user number cap was applied for conservativeness, and therefore the formula was not applied in these cases.				
Documentation provided by project participant				
-				
VVB assessment				Date: 25/09/2024
Clarification has been provided by PP and found OK. Verification team has checked approved deviation /37/ and 5-minute stroke test /38/ to confirm the same. The approach followed by PP is found conservative and hence accepted to the verification team. Hence this CL is closed.				

Table 3. CAR from this verification

CAR ID	01	Section no.	D.4.4	Date: 16/08/2024
Description of CAR				
In section B.2.4. of MR, PP has mentioned that “The Wp,y value had changed for the previous monitoring period and will remain as a permanent change”. However, the Wp,y value has been changed in the second monitoring period itself. Hence, PP is requested to correct the statement or provide clarity on the same.				
Project participant response				Date: 22/08/2024
PP has corrected statement.				

Documentation provided by project participant	
-	
VVB assessment	Date: 25/09/2024
Correction has been done in the revised MR /02/ and found OK. Hence this CAR is closed.	

CAR ID	02	Section no.	D.6.2	Date: 16/08/2024
Description of CAR				
For the monitoring parameter, "Quality of Treated Water" (under section D.2 of the MR), it has been mentioned that all boreholes are tested at least once per year. However, in section c, it is mentioned that Water Quality Tests (WQTs) will be conducted quarterly with a sample size using the 90/10 precision rule. PP need to clarify how this requirement is fulfilled during this monitoring period.				
Project participant response				Date: 22/08/2024
PP follows a 90/10 WQT sampling approach in line with the methodology to conduct a sample of boreholes to be tested every quarter- ensuring each borehole is tested at least once annually. From the Methodology: "Water quality standard: The 90/10 precision rule must be followed in calculating the sample size required for testing water quality". PP confirms that the WQT's are tested annually and on a sampling basis each quarter, using 90/10 confidence precision: each quarter a minimum of 49 BHs are tested. Therefore, each borehole is tested at least once per year, and some are tested more than once. The WQTs for this MP were carried out in December 2022, March 2023, June 2023, and September 2023. See 'WQT LS MP4_checked-merged' pdf.				
Documentation provided by project participant				
WQT_LS_MP4_checked-merged				
VVB assessment				Date: 25/09/2024
Clarification has been provided by PP and found OK. Verification team has confirmed the same from the borehole database /08/ and WCFT records /15/. Hence this CAR is closed.				

Table 4. FAR from this verification

No FAR raised during this verification.

FAR ID	xx	Section No.		Date: DD/MM/YYYY
Description of FAR				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
VVB assessment				Date: DD/MM/YYYY