

VERIFICATION & CERTIFICATION REPORT

For the GS-VER Project Activity

ERITREA COMMUNITY BOREHOLES (GS REF. No. GS 5125)

1st Monitoring Period
22/09/2016 to 29/02/2020 (including both the days)

REPORT No.
GS.18.VER.008 MP01

Date of this issue: 04/05/2020		KBS Ref. No.: GS.18.VER.008	
Project Title:		Eritrea Community Boreholes	
Organization:		KBS Certification Services Pvt. Ltd.	
Client:		CO2balance	
Monitoring Period:		22/09/2016 to 29/02/2020 (including both dates)	
Summary:			
KBS Certification Services Pvt. Ltd. has performed 1st periodic verification of the GS-VER project "Eritrea Community Boreholes" with Gold Standard Ref. Number GS 5125. The verification includes confirming the implementation of the monitoring plan of the registered PDD and the application of the monitoring methodology as per registered Gold Standard Methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" Version 2.0. A site visit was conducted to check the implementation of registered monitoring plan and verify the data submitted in the monitoring report. KBS confirms the following has been reviewed; (a) The registered PDD, Passport, monitoring plan and the corresponding validation opinion; (b) The validation report; (c) The applied monitoring methodology; (d) The monitoring report to verify that it is as per the standardized format; (e) Any other information and references relevant to the project activity's emission reductions (e.g. IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations); (f) VER calculations sheets and all supporting documents; KBS Certification Services Pvt. Ltd. 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 896,336 tCO₂e emission reductions during the monitoring period 22/09/2016 to 29/02/2020 (including both the days).			
Subject Group		Sectoral Scope(s):	
GS Verification		01 (Energy industries (renewable - / non-renewable sources)) and 03 Energy Demand	
Version of GS rules: GS Version 2.2		Methodology:	
		"Technologies and Practices to Displace Decentralized Thermal Energy Consumption" Version 2.0	
Verification Team:		Verification report:	
Team Leader, Technical Expert (1.1, 3.1) & Local Expert		First version 25/04/2020	
Verifier		Final version 04/05/2020	
Independent Technical Reviewer Team		Verification status:	
Date: 04/05/2020			
Technical Reviewer		Rohit Badaya	
TR Expert (1.1, 3.1)		Rohit Badaya	
		☐ Findings not closed.	
		☐ Draft verification opinion	
		☒ Final verification opinion	
Date: 05/05/2020			
Manager T&C		Rohit Badaya	
Authorized Signatory:			
Date: 05/05/2020			
Managing Director		Kaushal Goyal	
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Date		Rev. No.	
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		☐ Limited distribution	



28/04/2020	0	
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Abbreviations

CAR	Corrective Action Request
CL	Clarification Request
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
EB	Executive Board
ER	Emission Reduction
FT	Fuel Test
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
GS	Gold Standard
HH	Household
IPCC	Intergovernmental Panel on Climate Change
KPT	Kitchen Performance Test
MKS	Monitoring Kitchen Survey
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-governmental Organization
NRB	Non-renewable biomass
OSV	On-site visit
PDD	Project Design Document
PP	Project proponent
PTD	Project Technology Days
QA/QC	Quality Assurance/Quality Control
SD	Sustainable Development
UNFCCC	United Nations Framework Convention on Climate Change
VER	Voluntary Emission Reduction
VVB	Validation/Verification Body
VVS	Validation and Verification Standard for project activities

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1. INTRODUCTION

1.1 Objective

KBS has been commissioned by “CO2balance” to perform an independent verification of its registered GS-VER project “Eritrea Community Boreholes” (GS 5125) for the reported GHG emission reductions for the given monitoring period 22/09/2016 to 29/02/2020 (both dates included). The Gold Standard projects must undergo independent third party verification and certification of emission reductions as the basis for issuance of Gold Standard Voluntary Emission Reductions (GS 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 GS-PDD /05/ and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report /01//02/ 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.

1.2 Scope

The scope of the verification is the independent and objective review and ex post determination of the monitored reductions in GHG emission by the project activity. The verification is based on review of monitoring report, supporting information and

- (a) The registered PDD /05/, including the monitoring plan, GS Passport /05/ and the corresponding validation opinion(s);
- (b) Monitoring report /01//02/ for the monitoring period under verification including GS VER calculations sheets and all supporting documents;
- (c) The applied monitoring methodology/20/;
- (d) Relevant decisions, clarifications and guidance from the CMP and the Gold Standard Board;
- (e) All information and references relevant to the project activity's resulting in emission reductions

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

KBS has, based on the recommendations in the applicable version of Gold Standard Toolkit and 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.

1.3 Description of the Project Activity

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 /20/
Crediting period:	22/09/2016 – 21/09/2023
Project Participants:	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 120 boreholes as a part of multiple projects between the 21st September 2016 and 17th February 2018. 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 vast majority of pumps that were fixed are Afridev, U3 Modified and India Mark II pumps.

The individual project technology days for each borehole were totaled 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 22/09/2016 to 29/02/2020 (including both days) are 896,336 tCO₂e.

2. METHODOLOGY

KBS follows a rule based verification approach, wherein, as a first step, the contract review is undertaken as per latest version of CDM Accreditation Standard. Subsequently, after the contract is signed, the monitoring report of the project activity is made available at Gold Standard registry as per CDM procedures in accordance with Gold Standard rules. Since the Gold Standard prescribes the application of CDM rules and guidelines which are followed along with the Gold Standard rules.

A desk review of the project documentation is undertaken, which is followed by an onsite visit /19/ by the members of verification team in accordance with the latest version of CDM AS. 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 requirements viz., latest version of CDM Project Standard, registered/revised 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, if any. The verification protocol is an internal document, and is available on request. Following are the major milestones for the verification under consideration.

Duration of verification

<i>Verification Contract</i>	11/12/2018
<i>On site verification</i>	09/03/2020 to 12/03/2020
<i>Draft Verification Report</i>	28/04/2020
<i>Final Verification Report</i>	04/05/2020

2.1 Review of Documentation

A desk review is undertaken, 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;
- 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 'References'

2.2 Site Visits

A site visit is undertaken by members of verification team, involving but not limited to,

- An assessment of the implementation and operation of the proposed GS project activity as per the registered PDD, GS Passport and other supporting documentation;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the approved monitoring plan;
- A cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources;
- A check of the monitoring equipment, including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;

- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Topics discussed during on-site visit and the interviewed have been summarized in the below table.

Location:	Zoba Debub, State of Eritrea	
Dates:	09/03/2020 to 12/03/2020	
Key points discussed:	Name of person, interviewed*	Designation, Organization
• Project design, start date, project implementation & execution, LSC, organizational structure, monitoring, quality check & control. • Training, construction, maintenance, data collection and processing. • The impact of the project activity on the local community was discussed. • The impact of the project activity on local community including Households was discussed	Wenghelawit Asrut	Project Manager, Vita
	Iyassu Ghabreruferele	Country Director Vita
	kibrom misgnina Wakeresovra	Director of dept., Debub Region
	Bilena Ghivuay	Project officer, Vita

Verification team has done the sampling to check households/borehole's during the on-site visit 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 on-site visit 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?	Result: The Boreholes were found in use during the on-site visit.
Q2. Do you get monitored by the project developer for the use of borehole?	Result: The response was yes with the year of monitoring.
Q3. How frequently is the borehole used? For what purpose is the water from borehole used?	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

* (Indicative list, more users interviewed)

	<i>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 on-site 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. 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 Quantity of safe water boiled in the project scenario p during the year y using the zero or low emissions clean water supply technology The raw or unsafe water that is still boiled after installation of the water treatment technology	<i>Result: The results were found comparable as given under MR, ER sheet and other documents. Result: 0 Result: 0</i>
Q12. Time spent for collecting the wood per household Reduction in household air pollution	<i>Result: Yes, reduction</i>
Result of DOE survey	<i>Result: Accepted.</i>
Name of the DOE Auditors	<i>Result: Chetan Swaroop Sharma</i>

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

S. No.	Household Name	Borehole ID
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1.	Semhar Teclai (Housewife)	ZD027
2.	Azieb Fissechaye (Housewife)	ZD035
3.	Mohammad Ali	ZD010
4.	Mihrat Debassay (Housewife)	ZD007
5.	Senait Goitom (Housewife)	ZD002
6.	Atta Seid (Housewife)	ZD016
7.	Tsegheseda Negusse (Housewife)	ZD100
8.	Selom Tadesse (Housewife)	ZD090
9.	Ghebresilasia Menghisteb	ZD088
10.	Amleret Kidone (Housewife)	ZD095
11.	Saron kahsay (Housewife)	ZD086
12.	Asmeet Menghisteb (Housewife)	ZD015
13.	Hawa Omer (Housewife)	ZD083
14.	Mahmud Mohammednur (Guard)	ZD079
15.	Jimea Mahmud	ZD069
16.	Akberet Gherenkiel	ZD073
17.	Fatna Mohamedomer (Housewife)	ZD058
18.	Rawda Afedish (Housewife)	ZD065
19.	Zeineb Salih (Housewife)	ZD063

2.3 Reporting of Findings

During the course of verification, the findings may be raised as under;

CAR is raised if one of the following occurs:

- Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- Issues identified in a FAR during validation to be verified during verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

FAR is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

The verification report contains (section 7) all CARs, CLs and FARs raised during this verification in transparent manner and provides clear information of the issues raised, response received and its resolutions, including the changes in the documents.

2.4 Verification Assessment

Based on the desk review and site visit the team leader follows the verification protocol to identify and record the findings in the context of the project activity. The findings are communicated to the client in the findings document (section 7 of report). The project documentation, including responses to the findings is reviewed by the team leader in consultation with team members, wherever appropriate. The team leader prepares the draft verification report subject to closure or non-closure of the findings.

2.5 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 KBS are duly followed and the verification report/opinion is reached in an objective manner and complies with the applicable CDM requirements.

The independent technical reviewer may approve or reject the draft verification report. The findings may be identified even at this stage, which needs to be satisfactorily resolved, before the request for issuance is submitted to Gold Standard. The final decision is taken by the Manager Technical and Certification. The technical reviewer and Manager T&C can be same person.

The final decision is authorized by Managing Director, KBS once the report is approved by the Manager T&C.

3. VERIFICATION FINDINGS

3.1 Remaining Issues (FARs from Previous Validation or Verification)

Discussion:

This is the 1st periodic verification of the project activity. There were no FARs raised during the registration review process.

Findings:

No findings raised.

3.2 Compliance of project implementation with registered PDD

Discussion:

Project Participants:	CO2balance, Vita Eritrea
Project Parties:	United Kingdom, 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 /20/
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 Verification team confirms that the project activity is a large scale project activity as per the design change review /05/ approved on the 10th December 2019.
Location of the project activity:	Project areas: three districts (Zoba Debub, Zoba Anseba and Zoba Maekel) of Eritrea As verified during the onsite visit conducted from 09/03/2020-12/03/2020, 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:	22/09/2016 – 29/02/2020 (including both dates) The monitoring period verified is within the crediting period which is accepted to the verification team.

As part of the 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/.

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/ i.e. rehabilitation of existing boreholes in the State of Eritrea. In total 120 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/, /07/ and /18/, Verification team confirms that the rehabilitated boreholes are as per the registered PDD /05/.

Verification team has checked the technical description of the India Mark-II and India Mark III submitted by the PP /06/ 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 /18/ 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 /07/ are verified from Repair Confirmation Form /18/ 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 896,336 tCO₂e. The borehole ID and its date of rehabilitation were verified during the site visit by the verification team and from Repair Confirmation Form /18/.

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) /23/. 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. 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 onsite visit by the verification team and also through document review /02/, /05/, /09/ and /17/.

During on site visit, Verification team has checked 19 randomly selected boreholes which were found to be in line with the description provided in registered PDD /05/ and Repair confirmation Form /18/ provided by the PP.

Monitoring procedure of GHG data is found sufficient and in accordance with the procedures stipulated under the registered monitoring plan.

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.
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		Applying the new BWBT /15/ score as mentioned in section B.2.2. above in the current monitoring period resulted in the emission reductions exceeding the aggregate energy savings cap for small scale projects which is equivalent to 60 GWh per year or 180 GWh thermal per year in fuel input. It was therefore necessary to increase the scale of the project to a large-scale project in order to accommodate the additional emission savings. In addition, this project will be transitioning to GS4GG during this Performance Review.
Any Changes in the monitoring Plan	☐ Yes ☒ No	NA
Any changes in the sustainable development monitoring plan?	☐ Yes ☒ No	NA

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

Milestone of the project activity	Timeline	Assessment by the verification team
Crediting period: 22/09/2016 – 21/09/2023		
1 st monitoring period	22/09/2016 – 29/02/2020	Verification team has verified the same from the monitoring report /P02/. Also, the monitoring period is within the first crediting period.

The project activity was implemented and 120 boreholes were rehabilitated in Zoba Debub as described in the registered PDD /05/. On the basis of site visit, interview and the reviewed project documentation along with documentary evidences, it can be confirmed that the project implementation is in accordance with registered PDD /05/. The monitoring and sustainable development indicators parameters are also monitored as per the PDD and GS guideline and found to be appropriate.

Assessment of actual emission reductions with the estimate emission reductions in PDD:

Estimated Emission Reduction as per Registered PDD:	978,154 tCO ₂ e.
Actual Emission Reduction for the Monitoring Period	896,336 tCO ₂ e.
Is any increase of CER's occurred?	No
Reason for Increase of CER's	NA

In summary, verification team found that the actual emission reductions are lower than the estimate of the registered project for the current monitoring period.

Verification team considers the project description in the project activity contained in the Monitoring report to be in line with the registered PDD /05/ and complete and accurate. The Monitoring report complies with the relevant methodology, tools, forms and guidance applied in the registered PDD /05/.

Sampling Plan:

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 08.0".

The verification team followed the “Standard for Sampling and Surveys for CDM Project Activities and Programme Activities” version 08, 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.

For the determination of VVB’s acceptance sample size in the checklist /32/, 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- 5%

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 08.0. From the above assumed factors, the verification team determined the minimum sample size (n) as 19 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	120 boreholes in district Zoba Debub	46 Households for Water Consumption Field Test. + 105 Usage Survey + 106 Project survey	19 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 beyond level (C)	PP’s record unacceptable	Accepted Samples By VVB	Accepted/ Rejected
Monitoring parameters as per the MR	19	0		19	Accepted

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 /24/.

Findings:

CL 05 was raised and successfully closed. Refer to Section 7 for further details.

Opinion:

- a) 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/.
- b) The actual emission reductions for the current monitoring period are 896,336 tCO₂e which are lower than the estimated ERs (978,154 tCO₂e) for the comparable period.
- c) The verification team on the basis of objective evidence collections, data generation and recording analysis also considered the views obtained in the interviews while arriving at Verification Opinion.

3.3 Compliance of monitoring plan with the monitoring methodology including applicable tool(s)

Discussion:

The DOE verification team is able to confirm that the monitoring plan contained in the registered PDD /05/ is in accordance with the approved methodology applied by the project activity “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 2.0 /20/.

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/.

During the verification all relevant monitoring parameters (as listed in the PDD /05/) 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 finding has been raised.

Opinion:

The monitoring plan mentioned in the registered PDD is in line with the applied methodology i.e. “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 2.0 /20/. The monitoring mechanism is in line with the methodology and is effective and reliable.

3.4 Post registration changes, if any

A design change review /05/ was approved on the 10th December 2019 which involved applying the new BWBT (Baseline Water Boiling Test) result /15/ i.e. 0.8892 kg instead of the previously registered 0.3kg for parameters Wb,y and Wp,y , to the project for Boreholes in the Zoba Debub Region only. The value was replaced after conducting a test on 40 households representative of the baseline project scenario in Zoba Debub in August 2018.

Due to the application of the new BWBT value /15/ as mentioned above in the current monitoring period resulted in the emission reductions exceeding the aggregate energy savings cap for small scale projects which is equivalent to 60 GWh per year or 180 GWh thermal per year in fuel input.

Therefore, the design change review /05/ which was approved on the 10th December 2019 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.

3.5 Compliance of monitoring activities with registered monitoring plan

Discussion:

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

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 /07/ and the data regarding on-going monitoring studies /09/,/10/, /11/, /14/, /15/ is maintained.

The verification team reviewed the actual monitoring during the site visit, which was again verified during the document review and compared against the requirements of the monitoring plan in the PDD /05/ 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 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 /07/ 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 /04/ supplied by the community group and or district water officer responsible for that borehole while conducting the site visit.

Data recording, maintenance and archival was assessed and verified during the site visit by the verification team. 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 /07/ 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 /18/, lists /04/ supplied by the community group and also verified during OSV.

During OSV, random Borehole ID in Project Database are cross checked with Repair confirmation Form /18/ as hard copies and found to be correct. Further GPS coordinates of boreholes were also verified during the on-site visit 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.

Data Management

The Borehole Project Database /07/ and results of all Water consumption field test (WCFT) /14/, Usage Surveys /09/, Project Survey /10/ and Quality of the treated water /17/ 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 physically verified and discussed at the time of site visit and found correct.

Description of staff conducting monitoring activities

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 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 staff conducting the monitoring activities were interviewed at the time of site visit, and found to be well versed with proper knowledge of conducting the monitoring activities. The field staff conducted the survey were trained time to time as verified by the interview and the supportive documents /30/.

Water Consumption Field Test (WCFT):

As per the Gold Standard Methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption V.2.0' /20/ 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.

The Water Consumption Field Test has been carried out by randomly selecting 46 households from the borehole project database, which is in compliance with the minimum sampling requirement of 30 households in the methodology /20/. Verification team has checked the process of selecting samples as given under section D.3 of the Monitoring report /02/ and found acceptable.

The test was carried out by a trained staff for over four days (1-day for preparation and 3 days for measurement) following a similar method as the Kitchen Performance Test as confirmed during the OSV. 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.

The results showed that on average 11.74 litres of non-boiled clean water used only for drinking, hand washing and food preparation (capped at 7 l) 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 /14/ with applied methodology /20/ and the registered PDD /05/ and also confirmed the details during the onsite visit interview.

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 /31/ 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.

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. The first usage surveys in this monitoring period were carried out between the 25/09/2019 - 06/10/2019, as confirmed from the Usage survey results /09/.

The usage survey has been carried out by randomly selecting 105 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 in the methodology /20/. Verification team has checked the process of selecting samples as given under section D.3 of the Monitoring report and found acceptable.

The results confirmed that 100% of the respondents and their family members use the boreholes that were rehabilitated by Vita, as verified from the User survey results /09/.

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 on-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 106 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 /20/. Verification team has checked the process of selecting samples as given under section D.3 of the Monitoring report and found acceptable.

Verification team has reviewed the Project survey results /10/ conducted between 25/09/2019 – 06/10/2019, 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 /30/ and Project survey results /09/ have been checked to confirm that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /P10/

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 /20/ and baseline emissions are not calculated separately.

Emissions reductions were calculated using the results of the Borehole project database /07/, WCFT /14/, Usage Surveys /09/ and Project surveys /10/, 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 /P05/.

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 parameter listed in the monitoring plan and used for calculation of emission reductions.

The monitored parameters of the project are in line with the registered PDD /05/ and the applied GS methodology /20/. Brief descriptions of the monitored parameters are listed below:

Ex-Post Parameters:

3.5.1. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter		Np,y
Unit		Project Technology Days
Description		Number of persons consuming water supplied by project scenario p through year y
Measured/calculated/default		Calculated
Source of data		Borehole Project Database
Value(s) of monitored parameter		78,672,008 The verification team has checked the borehole project database /07/ and confirms that the values reported are accurate.
Monitoring equipment		Project Database
Measuring/reading/recording frequency		Continuous
Calculation (if applicable)	method	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 /20/.
QA/QC procedures		N/A
Purpose of data/parameter		Calculation of emission reductions
Additional comments		-

3.5.2. Data/Parameter

Monitoring Requirement	Parameter	Assessment/ Observation by the DOE
Data/Parameter		Up,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% Verification team has checked the Usage survey results and calculation /09/ and found OK. The Usage survey records /09/ were also cross checked during the on-site visit by randomly visiting the household and found correct.
Monitoring equipment		Usage Survey
Measuring/reading/recording frequency		Annual

Calculation (if applicable)	method	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. 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.
QA/QC procedures		NA
Purpose of data/parameter		Calculation of usage of project technology
Additional comments		The latest usage survey carried out in the monitoring period was between 25/09/2019 - 06/10/2019. Previous usage surveys were carried out between 04/09/2018 – 23/09/2018 and 25/09/2017 – 23/10/2017 maintaining annual monitoring frequency.

3.5.3. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter		Qp,y
Unit		Litres per person per day
Description		Quantity of safe water supplied in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default		Default
Source of data		Water Consumption Field Test (WCFT)
Value(s) of monitored parameter		7 The WCFT Test reports /14/ have been checked by the verification team and show that on average 11.74 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 on-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 (if applicable)	method	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.
QA/QC procedures		N/A
Purpose of data/parameter		Calculation of emission reductions.

Additional comments	The latest WCFT carried out in the monitoring period was between 05/09/2018 – 21/09/2018. The previous WCFT was conducted between 26/09/2017 – 20/10/2017 maintaining biennial monitoring frequency.
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3.5.4. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	Qp,cleanboil,y	
Unit		Litres per person per day
Description		Quantity of safe water boiled in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default		Measured
Source of data		Water Consumption Field Test (WCFT)
Value(s) of monitored parameter		0 The WCFT Test reports /14/ 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 on-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 (if applicable)	method	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. Last survey took place between 05/09/2018 – 21/09/2018.
QA/QC procedures		N/A
Purpose of data/parameter		Calculation of emission reductions.
Additional comments		The latest WCFT carried out in the monitoring period was between 05/09/2018 – 21/09/2018. The previous WCFT was conducted between 26/09/2017 – 20/10/2017 maintaining biennial monitoring frequency.

3.5.5. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	Qp,rawboil,y	
Unit		Litres per person per day
Description		The raw or 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 /14/ 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 on-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 (if applicable) method	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. Last survey took place between 05/09/2018 – 21/09/2018
QA/QC procedures	N/A
Purpose of data/parameter	Calculation of emission reductions.
Additional comments	The latest WCFT carried out in the monitoring period was between 05/09/2018 – 21/09/2018. The previous WCFT was conducted between 26/09/2017 – 20/10/2017 maintaining biennial monitoring frequency.

3.5.6. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
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 /17/ 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 /25/. 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/reading/recording frequency	Quarterly according to TPDDTEC v2, sampling requirements employ 90/10 precision. All boreholes are tested at least once per year. 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/17/.
Calculation (if applicable) method	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	N/A
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	-

3.5.7. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	LEp,y	
Unit	tCO2e 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 /08/ and monitoring survey results /09/ /10/ /11/ /14/ /15/ and confirms that the value of leakage has been accurately reflected.	
Monitoring equipment	Desk based research	
Measuring/reading/recording frequency	Biennial	
Calculation (if applicable) method	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.	
QA/QC procedures	N/A	
Purpose of data/parameter	Calculation of leakage.	
Additional comments	-	

3.5.8. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
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 /11/ 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 in 2018 and 2019 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.
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.
Calculation (if applicable)	method	N/A
QA/QC procedures		Report produced audited by DOE
Purpose of data/parameter		In accordance with TPDDTEC v2 methodology.
Additional comments		Annual monitoring frequency has been maintained during the current monitoring period.

The ER calculations have been checked by the Verification team and it was verified that all the above ex-post parameters were accurately used in the ER calculations.

Findings:

CAR 01 & CAR 02 were raised and successfully closed. Refer to Section 7 for further details.

Opinion:

In summary, the verification team confirms that all the ex-post parameters are monitored in accordance with the approved monitoring plan /P05/ and applied methodology /20/.

For Contributions to Sustainable Development

The verification team checked the sustainable development indicator parameters during the site visit and interview. The additional parameters that are monitored are in accordance with the monitoring plan for sustainability indicators as referred in the Gold Standard monitoring report.

As per the sustainability monitoring plan in the GS MR, verification team evaluated all the sustainable development indicators as followed table:

Parameter: 01

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Relevant indicator:		Air quality
Data/Parameter		Total suspended particulate matter (TSPM) – measured indirectly by wood consumption.
Current situation of parameter		As determine by research and field staff, traditional cooking methods produce large amounts of TSPM. It is not justifiable to measure this quantitatively but it will be measured qualitatively as described below.
Estimation of baseline situation of parameter		Qualitatively, the baseline situation is one which smoke is emitted by fires used to boil water
Future target for parameter		The project aims to eliminate the use of wood fuel to purify water for drinking.
Source of data		Project surveys, Usage surveys
Value(s) of monitored parameter		Since this parameter was not monitored quantitatively, hence no value has been reported by the PP as confirmed by the verification team.
Monitoring equipment		Survey
Measuring/reading/recording frequency		Annually The verification team has checked that the surveys were conducted annually in line with the registered GS Passport /05/.
QA/QC procedures		Survey is conducted by Expert surveying team
Verified Score		+ (Positive) As checked from the Usage survey results /09/ and The WCFT Test reports /14/ which show that 0 litres of boiled clean water is consumed per person per day. Hence, no smoke is emitted by the fires for boiling water, which was also confirmed during the OSV by the verification team. Hence, this sustainable parameter scores positive.

Parameter: 02

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Relevant indicator:		Water quality and quantity
Data/Parameter		Water quality
Current situation of parameter		Unsafe water source
Estimation of baseline situation of parameter		More than 1 CFU of E.Coli/100ml
Future target for parameter		0 CFU of E.Coli/100ml
Source of data		Bacterial water quality test
Value(s) of monitored parameter		-

Monitoring equipment	Bacterial water quality test
Measuring/reading/recording frequency	Quarterly After the review of WQT results /17/, the verification team confirms that for the parameter "Quality of Treated Water", the monitoring requirements have been accurately followed as the test were conducted quarterly, with at least one test conducted during the rainy season, and all the test were conducted through a government accredited lab "The Ministry of Land, Water and Environment - Water Resource Department". Also, the first test was conducted within 6 months of rehabilitation (i.e. 21/09/2016) as confirmed by the WQT result dated 20/04/2017 which was conducted for feb/march 2017.
QA/QC procedures	At least once biennially by accredited laboratory All the tests were conducted through a government accredited lab "The Ministry of Land, Water and Environment - Water Resource Department", as confirmed from the WQT results /17/.
Verified Score	+ (Positive) Water Quality Tests are conducted on a quarterly basis using 90/10 confidence/precision for random sampling. All water quality tests conducted since 2016 have passed the target of 0 CFU of E.Coli/100ml, hence the PP score this indicator positively.

Parameter: 3.1

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Relevant indicator:		Livelihood of the poor
Data/Parameter		Time and effort spent purifying and collecting water. Boreholes are usually located in a central place, so the rehabilitation of them should mean that, overall, the time and effort spent collecting water is reduced for the community.
Current situation of parameter		The time and effort spent collecting water is significant within the project boundary. This is a physical and laborious task that often has health implications
Estimation of baseline situation of parameter		We estimate that at least 2 hours is devoted to collecting water.
Future target for parameter		Time and effort spent collecting water is reduced by 20%.
Measured/calculated/default		
Source of data		Project surveys, Usage surveys
Value(s) of monitored parameter		The average time spent collecting water was not measured in the baseline and project surveys but during the project survey 99% of respondents reported the project saved them on average just over an hours' time per day to spend on income generating activities; religious activities; social and leisure activities. Project survey results /10/ have been checked by the verification team. It was also confirmed during the OSV.

Monitoring equipment	Survey
Measuring/reading/recording frequency	Annually The verification team has checked that the surveys were conducted annually in line with the registered GS Passport /05/.
QA/QC procedures	Survey is conducted by Expert surveying team
Verified Score	+ (Positive) During the OSV it was confirmed that 100% of participants now collect their water from a rehabilitated borehole, no longer requiring them to boil water for purification which can be assumed to result in a time saving for participants. Therefore, PP score this indicator positively.

Parameter: 3.2

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Relevant indicator:		Livelihood of the poor
Data/Parameter		Time and effort spent collecting firewood. This project will supply pure water and for those that previously had to purify water, it will mean that less time and effort is spent collecting fuel for this purpose and also for the act of purifying itself.
Current situation of parameter		The time and effort spent collecting wood fuel is significant within the project boundary. This is a physical and laborious task that often has health implications
Estimation of baseline situation of parameter		We estimate that at least 3 hours per day is spent collecting wood, although this is partly for cooking use.
Future target for parameter		Time and effort spent collecting firewood is reduced by 20%.
Measured/calculated/default		baseline survey: 1.61 baseline survey: 1.74
Source of data		Project surveys, Usage surveys
Value(s) of monitored parameter		
Monitoring equipment		Survey
Measuring/reading/recording frequency		Annually The verification team has checked that the surveys were conducted annually in line with the registered GS Passport /05/.
QA/QC procedures		Survey is conducted by Expert surveying team
Verified Score		- (Negative) The baseline survey /08/ shows that on average, people spend 1.74 hours on any day to collect woodfuel for household purposes. In the project, the time spent collecting woodfuel is 1.61 hours, which has reduced but not significantly. It may have not met the target of a reduction in time of 20% due to participants recording in the project survey travelling further to collect wood due to local deforestation and wood resource depletion. Therefore PP score this indicator negatively.

Parameter: 04

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Relevant indicator:		Access to affordable and clean energy services
Data/Parameter		Change in volume of traditional fuel consumption
Current situation of parameter		Total fuel consumption (wood) is known to be high amongst the project area population
Estimation of baseline situation of parameter		Wood consumption to boil water is estimated to around 0.8 kg in order to boil 1 liter of water
Future target for parameter		Reduce wood use to boil water by at least 50%
Measured/calculated/default		-
Source of data		Project surveys, Usage surveys
Value(s) of monitored parameter		
Monitoring equipment		Survey
Measuring/reading/recording frequency		Annually The verification team has checked that the surveys were conducted annually in line with the registered GS Passport /05/.
QA/QC procedures		Survey is conducted by Expert surveying team
Verified Score		+ (Positive) Project survey results /10/ have been checked by the verification team. During the OSV it was confirmed that 100% of participants now collect their water from a rehabilitated borehole, no longer requiring them to boil water for purification, resulting in no consumption of fuel wood for boiling. Therefore, PP score this indicator positively as the target of reduction in 50% fuel wood consumption has been met.

In summary, verification team confirms that all monitored sustainable development indicators are in accordance to the approved GS PDD and score provided is reasonable.

Findings:

CL 03 was raised and successfully closed. Refer to Section 7 for further details.

Opinion:

The adequacy and compliance of the monitoring plan in the Monitoring report was found as per the requirements laid by the monitoring methodology and the PDD. 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 and revised PDD.

3.6 Compliance with the calibration frequency requirements for measuring instruments

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 and monitoring of social and environmental indicators 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 OSV. 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.

3.7 Data not monitored (ex-ante or external parameters)

3.7.1. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	Cj	
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/08/ and confirms that the values applied are appropriate. This has also been re-confirmed during the on-site interaction with the households. The Value is as per the registered PDD /P10/ 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
---------------------	---

3.7.2. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	fNRB,i,y	
Unit		Fractional non-renewability
Description		Non-renewability status of woody biomass fuel in scenario i during year y
Measured/calculated/default		Default/calculated
Source of data		CDM Default stated in following document: https://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf
Value(s) of monitored parameter		0.97 Verification team confirmed that NRB assessment is based on publicly available and verifiable data /23/. Further the fNRB value (0.97) is in line with the value as per the registered PDD. 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

3.7.3. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	EFb,co2	
Unit		tCO2/TJ
Description		co2 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 /23/ which was found to be in line with the applied methodology /20/. Also, the Value is as per the registered PDD /P10/ 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		-

3.7.4. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the DOE				
Data/Parameter	EFp,non co2				
Unit	tCO2e/TJ				
Description	Non-CO2 (CH4 and N2O) emission factor arising from use of wood fuel in project scenario				
Source of data	IPCC Default emissions factor				
Value(s) applied	8.692 Verification team has confirmed the IPCC default value /23/ which was found to be in line with the applied methodology /20/. Also, the Value is as per the registered PDD /P10/ 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				
	Gas	Default Emissions factor (kg_gas/TJNCV)	GWP of gas	Default Emissions factor (kg_CO2e/TJNCV)	Default Emissions factor (t_CO2e/TJNCV)
	CH4	300	25	7,500	7.5000
	N2O	4	298	1,192	1.1920
				Total	8.692
Purpose of data/parameter	Calculation of emission reductions				
Additional comments	-				

3.7.5. Data/Parameter

Monitoring Parameter Requirement	Assessment/Observation by the DOE
Data/Parameter	NCVb
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 /23/ which was found to be in line with the applied methodology /20/. Also, the Value is as per the registered PDD /P10/ 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	NA

3.7.6. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	NCVp	
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 /23/ which was found to be in line with the applied methodology /20/. Also, the Value is as per the registered PDD /P10/ 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	NA	

3.7.7. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	Wb,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 Maekel: 0.000883 Zoba Anseba: 0.000577	The verification team has checked Baseline Water Boiling Test Reports /15/ and confirms that the values applied are appropriate. The Value is as per the design change review /05/ was approved on the 10th December 2019 and the registered PDD /P10/. The same value is applied in the ER calculation sheet /04/ and hence, acceptable 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: Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1 and 2, Draft General Guidelines On Sampling And Surveys; EB37 Annex 27; and Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities (Version 02); EB65 Annex 2	
Purpose of data/parameter	Calculation of emission reductions.	
Additional comments	-	

3.7.8. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
Data/Parameter	Wp,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 Dehub: 0.000889 Zoba Maekel: 0.000883 Zoba Anseba: 0.000577 The verification team has checked Baseline Water Boiling Test Reports /15/ and confirms that the values applied are appropriate. The Value is as per the design change review /05/ was approved on the 10th December 2019 and the registered PDD /P10/. The same value is applied in the ER calculation sheet /04/ and hence, acceptable 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: Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1 and 2, Draft General Guidelines On Sampling And Surveys; EB37 Annex 27; and Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities (Version 02); EB65 Annex 2
Purpose of data/parameter		Calculation of emission reductions.
Additional comments		-

3.7.9. Data/Parameter

Monitoring Requirement	Parameter	Assessment/Observation by the DOE
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 Dehub: 0% Zoba Maekel: 4% Zoba Anseba: 2% The verification team has checked Baseline Survey /08/, project survey /10/ and confirms that the values applied are appropriate. the Value is as per the registered PDD /P10/ 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	-

Findings:

CL 04 was raised and successfully closed. Refer to Section 7 for further details.

Opinion:

The default values applied were found to be consistent with the registered PDD /05/, 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 /23/.

3.8 Assessment of Data & calculation of GHG Emission Reductions

Discussion:

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 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 22/09/2016 to 29/02/2020 (including both the days). Verification team confirms that the formulas, conversions, aggregations and factors are consistent with the monitoring plan in the PDD. The reported data was checked as follows:

- All the necessary data and all the parameters required to be monitored in the registered PDD /05/ were reviewed to ensure accuracy;
- The Borehole Project Database kept electronically /07/ 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 /18/ were also assessed for further check.

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

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

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

$PE_{b,y}$ = 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 /20/.

Total emission reductions achieved in the current monitoring period (22/09/2016 to 29/02/2020), were calculated to be 896,336 tCO₂e. The calculation for the same has been checked and found OK.

Baseline emission:

Baseline emission calculations are conducted as follows:

Baseline Emissions:

$$BE_b = B_b * ((fNRBy * EF_{b,2}) + EF_{b,fuel,nonco2}) * NCV_{b,fuel}$$

Where:

$$B_b = (1 - C_j) * N_j * W_b * (Q_p + Q_{p,l,y})$$

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

$B_{b,y}$ = 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 /20/ and baseline emissions are not calculated separately.

Project emission calculations are conducted as follows:

Project Emissions:

$$PE_p = B_p * ((fNRBy * EF_{p,2}) + EF_{p,fuel,nonco2}) * NCV_{p,fuel}$$

Where:

$$B_p = (1 - C_j) * N_j * W_p * (Q_p + Q_{p,l,y})$$

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.

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 /20/.

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.

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

There is no evidence to suggest significant (if any) use of renewable energy for purifying water in the project region as found in the Baseline Water Surveys /08/. 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.

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.*

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. Also, there are currently no other CDM or VER projects in the project area. Hence there is no leakage from this source.

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.*

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 emission reductions as per the above equation are as follows:

	2016	2017	2018	2019	2020	Total in Monitoring Period
BE _{b,y} (tCO ₂ /y)	33,501	244,420	285,076	286,280	47,061	896,336
PE _{p,y} (tCO ₂ /y)	0	0	0	0	0	0
Up _y (Fraction)	1	1	1	1	1	1
LE _{p,y} (tCO ₂ /y)	0	0	0	0	0	0
ER _y (tCO ₂ /y)	33,501	244,419	285,076	286,280	47,061	896,336

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 /20/ and PDD /05/.

Hence total verified emission reduction during the reported monitoring period (i.e. 22/09/2016 to 29/02/2020) are 896,336 tCO₂e.

Findings:

CL 05 was raised and successfully closed. Refer to Section 7 for further details.

Opinion:

The verification team confirms that

- a) The complete data set for the monitoring parameters was available as mentioned in the monitoring plan in the registered PDD for the duration of 22/09/2016 to 29/02/2020 (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 of the registered PDD;
- c) Appropriate methods and formulae for calculating baseline emission, project emissions and leakage have been followed;
- d) The claimed emission reductions are free from material errors, omissions or misstatements, with a reasonable level of assurance.

3.9 Quality of Evidence to Determine Emission Reductions

The evidences (documents/interview/site visit) referred for verification of individual monitoring parameter and fixed parameters are defined section 3.5 and section 3.7 respectively. It can be 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 Section 6 of this report.

3.10 Management System and Quality Assurance

Verification team evaluated the management systems in place to implement the monitoring of the project activity. This included the organizational structure, roles and responsibilities, data collection, transfer and aggregation procedures, training of personnel, data storage and archiving and emergency procedures for the monitoring system. On the basis of onsite interview, with the employees of CO₂balance and Vita, involved in the project monitoring and data collection, inspection of data storage and document review. All surveys are administered by trained staff or casuals, local to the area and conversant in the local dialects to ensure that responses were consistent and not biased by any regional language barriers. Field staffs were provided with an English version of the questionnaire to provide for the greatest possible standardisation of responses. Verification team can confirm that the responsibilities and authorities for monitoring and reporting are appropriate and effective for the project type and hence in accordance with monitoring plant of the registered PDD /05/ and applied monitoring methodology /20/.

3.11 Status of implementation of continuous input/ Grievance mechanism & feedback received

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 /29/ has been placed in Vita offices in the State of Eritrea to facilitate such activities.

During the OSV, the location of the placement of Grievance Expression Process Book /29/ 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.

4. RECOMMEDATIONS / FORWARD ACTION REQUEST

No FAR has been raised during this monitoring period.

5. VERIFICATION & CERTIFICATION STATEMENT

KBS Certification Services Pvt. Ltd. has been contracted by “CO2balance” to undertake independent verification and certification for the greenhouse gas (GHG) emission reductions reported from the Eritrea Community Boreholes, GS ID: GS 5125 for the monitoring period 22/09/2016 to 29/02/2020 in the Monitoring Report Version 01 (first version) dated 24/02/2020 /01/.

The verification is based on the registered PDD, Passport, and the Monitoring report for this project. Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the Gold Standard Board.

The management of the CO2balance is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Final Monitoring Report Version 04 dated 23/04/2020 /02/. The calculation and determination of GHG emission reductions from the project is the responsibility of the management of the CO2balance. The development and maintenance of records and reporting procedures are in accordance with the Final Monitoring Report Version 04 dated 23/04/2020 /02/.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the monitoring period 22/09/2016 to 29/02/2020 based on the reported emission reductions in the Final Monitoring Report Version 04 dated 23/04/2020 /02/ for the same period.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, KBS planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

KBS confirms the following;

Reporting period: From 22/09/2016 to 29/02/2020

Verified and certified emission in the above reporting period:

Gold Standard Voluntary Emission Reductions (GS VERs): 896,336 t CO₂e

Year	Gold Standard Voluntary Emission Reductions (GS VERs) t CO ₂ e
2016	33,501
2017	244,419
2018	285,076
2019	286,280
2020	47,060
Total for Monitoring period (From 22/09/2016 to 29/02/2020)	896,336

Location: Faridabad

Date: 05/05/2020

A handwritten signature in black ink, appearing to read 'Kaushal', is enclosed within a rectangular border.

Kaushal Goyal

Managing Director

KBS Certification Services Pvt. Ltd.

6. REFERENCES

Ref no.	Reference Document																																																																	
/01/	Draft Monitoring Report version 1.0, dated 24/02/2020																																																																	
/02/	Final Monitoring Report version 4.0, dated 23/04/2020																																																																	
/03/	Emission reduction calculation sheet corresponding to /P01/																																																																	
/04/	Emission reduction calculation sheet corresponding to /P02/																																																																	
/05/	Final GS PDD, Passport and GS review closure																																																																	
/06/	Technical description of the project technology (India Mark-II Deep well Handpump) along with installation and maintenance Manual																																																																	
/07/	- Borehole Project Database - HH list- along with distance from the borehole.																																																																	
/08/	Baseline Survey																																																																	
/09/	Annual Usage survey 3rd survey during the period 25/09/2019-06/10/2019 2nd survey during the period 04/09/2018-23/09/2018 1st survey during the period 25/09/2017-23/10/2017																																																																	
/10/	Project survey in year 2017, 2018 and 2019																																																																	
/11/	Annual hygiene campaign results (WASH trainings conducted at sub-zoba level) in 2016-17 (first), 2018 and 2019																																																																	
/12/	Transfer of carbon rights from borehole owners to Vita.																																																																	
/13/	List of hand pumps repaired under project activity																																																																	
/14/	Water consumption field test WCFT - During the period 05/09/2018 – 21/09/2018 - During the period 26/09/2017 – 20/10/2017																																																																	
/15/	Baseline Water Boiling Test reports																																																																	
/16/	Supportive for suppressed demand																																																																	
/17/	Laboratory Test reports for Quality of Treated Water <table><tr><th>Quarter</th><th>Year</th><th>Month</th><th>Season</th><th>Notes</th></tr><tr><td>Quarter 1</td><td>2017</td><td>Apr</td><td>Rainy</td><td></td></tr><tr><td>Quarter 2</td><td>2017</td><td>Jul</td><td>Rainy</td><td></td></tr><tr><td>Quarter 3</td><td>2017</td><td>Sep</td><td>Rainy</td><td></td></tr><tr><td>Quarter 4</td><td>2017</td><td>Dec</td><td>Dry</td><td></td></tr><tr><td>Quarter 1/2</td><td>2018</td><td>Apr</td><td>Dry/Rainy</td><td>WQT was conducted late due to delay with Water Resource Department laboratory conducting the test. Subsequent tests follow every 3 months or less.</td></tr><tr><td>Quarter 3</td><td>2018</td><td>Jun</td><td>Dry</td><td></td></tr><tr><td>Quarter 4</td><td>2018</td><td>Oct</td><td>Dry/Rainy</td><td></td></tr><tr><td>Quarter 1</td><td>2019</td><td>Feb</td><td>Dry</td><td></td></tr><tr><td>Quarter 2</td><td>2019</td><td>May</td><td>Dry/Rainy</td><td></td></tr><tr><td>Quarter 3</td><td>2019</td><td>Sep</td><td>Rainy</td><td></td></tr><tr><td>Quarter 4</td><td>2019</td><td>Nov</td><td>Dry</td><td></td></tr><tr><td>Quarter 1</td><td>2020</td><td>Mar</td><td>Dry</td><td>WQT was conducted late due to delay with Water Resource Department laboratory conducting the test. Sample was submitted in January 2020.</td></tr></table>	Quarter	Year	Month	Season	Notes	Quarter 1	2017	Apr	Rainy		Quarter 2	2017	Jul	Rainy		Quarter 3	2017	Sep	Rainy		Quarter 4	2017	Dec	Dry		Quarter 1/2	2018	Apr	Dry/Rainy	WQT was conducted late due to delay with Water Resource Department laboratory conducting the test. Subsequent tests follow every 3 months or less.	Quarter 3	2018	Jun	Dry		Quarter 4	2018	Oct	Dry/Rainy		Quarter 1	2019	Feb	Dry		Quarter 2	2019	May	Dry/Rainy		Quarter 3	2019	Sep	Rainy		Quarter 4	2019	Nov	Dry		Quarter 1	2020	Mar	Dry	WQT was conducted late due to delay with Water Resource Department laboratory conducting the test. Sample was submitted in January 2020.
Quarter	Year	Month	Season	Notes																																																														
Quarter 1	2017	Apr	Rainy																																																															
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Quarter 4	2019	Nov	Dry																																																															
Quarter 1	2020	Mar	Dry	WQT was conducted late due to delay with Water Resource Department laboratory conducting the test. Sample was submitted in January 2020.																																																														

					Subsequent tests will follow every 3 months or less.
/18/	Repair Confirmation Form of sampled borehole				
/19/	Verification site visit records				
/20/	Applied baseline and monitoring Gold Standard Voluntary Methodology, "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" version 2.0				
/21/	Gold Standard specific rule/guidelines/standard for GS v2.2				
/22/	1. CDM validation and verification standard for project activities, version 02.0 2. CDM project standard for project activities, version 02.0 3. CDM project cycle procedure for project activities, version 02.0				
/23/	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html CDM Default values: https://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf				
/24/	Standard: Sampling and surveys for CDM project activities and programmes of activities, version 08.0 Guideline: Sampling and surveys for CDM project activities and programmes of activities, version 04.0				
/25/	National standard on water quality testing: Ministry of Land, Water and Environment Water Resources Department				
/26/	Maintenance record of boreholes during the monitoring period				
/27/	Organization structure for the project activity				
/28/	Supportive documents for the sustainable parameters				
/29/	Supportive document for grievance mechanism				
/30/	Trainings records 2018, 2019				
/31/	WHO standards				
/32/	Audit Checklist				

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7. FINDINGS DOCUMENT

Summary of findings	CAR	CL	FAR (from previous verification)
	02	05	0

Table 1. CL from this verification

CL ID	01	Section no.	-	Date:	31/03/2020
Description of CL					
On page 1 of the submitted MR /01/, PP has mentioned 22/03/2018 as the Date of project design certification however the Date of GS feedback - I round "6-week Registration Review Period" is 08/12/2017. Also PP needs to submit the supportive document for the design change.					
Project participant response					Date: 06/04/2020
PP has uploaded MR in old template for this review as per CL 03 below. PP has added correct date of project design certification as 08/12/2017 to pg. 1 of MR. PP has shared final Design Change Memo as supportive documentation for the design change. PP has previously shared latest PDD and Design Change Review with VVB.					
Documentation provided by project participant					
Design Change Memo GS5125_MR					
DOE assessment					Date: 28/04/2020
The verification team has checked the Design Change Memo, latest PDD and Design Change Review document provided by the PP and confirms that 08/12/2017 is the date of project design certification, which has now been updated in revised MR. Hence, CL 01 is closed.					

CL ID	02	Section no.	-	Date:	31/03/2020
Description of CL					
The project participants mentioned on page 2 of the monitoring report is inconsistent with the registered PDD V9.					
Project participant response					Date: 14/04/2020
PP has corrected this in MR "GS5125_MR" on Page 1 and section A.3 to be consistent.					
Documentation provided by project participant					
GS5125_MR					
DOE assessment					Date: 28/04/2020
The verification team has checked the updated "GS5125_MR" and confirms that CO2balance is the PP of the project activity, which is now consistent in cover page and section A.3 of the MR. Hence, CL 02 is closed.					

CL ID	03	Section no.	-	Date:	31/03/2020
Description of CL					
PP need to clarify whether the verification will be done under GS4GG or the old GS standard as the MR has been filled in the GS4GG template. Accordingly MR needs to be revised.					
Project participant response					Date: 06/04/2020
PP has submitted MR "GS5125_MR" in the old template using old GS standard. GS5125 is currently in transition review to GS4GG and will be submitted under GS4GG at next Performance Review.					
Documentation provided by project participant					
-					
DOE assessment					Date: 28/04/2020
The verification team has checked the updated MR "GS5125_MR" and confirms that it has been updated under the old GS standard template, which in line with registered PDD V9. Hence, CL 03 is closed.					

CL ID	04	Section no.	-	Date: 31/03/2020
Description of CL				
In the submitted monitoring report /01/, Two ex-ante parameter (Tb,y and Pb,y) have been mentioned which was not a part of registered PDD however it is not clarified in the monitoring report.				
Project participant response				Date: 06/04/2020
PP has submitted MR "GS5125_MR" in the old template. Parameters Tb,y and Pb,y have not been mentioned in line with registered PDD V9. These parameters were indicators for GS4GG SDG contributions, however, PP has opted to submit under old GS standard and will be reporting on the sustainable parameters as per the approved passport.				
Documentation provided by project participant				
GS5125_MR				
DOE assessment				Date: 28/04/2020
The verification team has checked the revised Monitoring report "GS5125_MR" and confirms that the ex-ante parameters are as per the old GS standard which are now in line with the registered PDD. Hence, CL 04 is closed.				

CL ID	05	Section no.	-	Date: 31/03/2020
Description of CL				
During the on-site visit, it was found that one of the borehole (Borehole ID- ZD090) was not in working condition for some days during the monitoring period, however the same is not accounted in the ER calculation excel sheet.				
Project participant response				Date: 23/04/2020
PP has uploaded signed Repair Confirmation Form confirming the borehole ZD-090 was closed for repair for 4 days starting on the 2/11/2019. PP has discounted these days from the 2019 PTDs in the ERs v3 and has updated the MR v4 accordingly.				
Documentation provided by project participant				
-				
DOE assessment				Date: 28/04/2020
Verification team has checked the maintenance data for boreholes/26/, revised ER sheet /04/ and revised MR /02/ and found that correction has been done in the revised ER sheet and found acceptable. Hence this CL is closed.				

Table 2. CAR from this verification

CAR ID	01	Section no.	-	Date: 31/03/2020
Description of CAR				
CAR corresponding to FAR-01 raise during validation:				
PP need to submit the supportive document for the household's data using the boreholes along with household distance from boreholes.				
Project participant response				Date: 06/04/2020
Please see ER Calcs "GS5125_LS_ERs MP1_v2", sheet "Sales Record" for collapsible household lists showing number of households, adults and children to each handpump. To extend the lists please click '+' symbols in the far-left column. Once extended, column J shows household distance from boreholes in metres. All households are within 1km of boreholes.				
Documentation provided by project participant				
-				
DOE assessment				Date: 28/04/2020
The verification team has checked the "Sales Record" in the ER sheet "GS5125_LS_ERs MP1_v2" mentioning the list of people with access to each handpump and confirms that all the households are within 1 km of the boreholes, as the average maximum distance between a borehole and the household has been found to be 500 m. This was further checked during the on-site visit interview.				
Hence, CAR 01 is Closed.				

CAR ID	02	Section no.	-	Date: 31/03/2020
Description of CAR				
Under section D.2 of the monitoring report:				
- For the monitoring parameter “Np,y”, the Measuring/reading/recording frequency is mentioned as annual however in the registered PDD it is mentioned continuous. - For the monitoring parameter “Up,y”, PP need to mention when the usage survey was done during this monitoring period and whether the monitoring frequency “Annual” was maintained. - Heading “Measured/calculated/default” is not filled for the monitoring parameters. - For the monitoring parameters “Qp,y”, “Qp, cleanboil,y” and “Qp, rawboil, y”, PP need to mention when WCFT survey was done during this monitoring period and whether the monitoring frequency “Biennial” was maintained. - As per the registered PDD, Hygiene campaigns is a monitoring parameter however same is not reported under section D.2 of the monitoring report. - For the monitoring parameter “Quality of Treated Water”, it is not clear how the below requirements (As per the registered PDD) have been followed. At least one test well be conducted during the rainy season where there is the highest chance of contamination. Quarterly The first test will be within 6 months of the rehabilitation. At least one test each year conducted by accredited laboratory.” - Since the project is submitted under old GS standard, PP needs to report the sustainable parameters as per the approved passport however same is not followed. Accordingly section E.1 to E.6 of the monitoring report needs to be revised.				
Project participant response				Date: 06/04/2020
- PP has corrected in MR “GS5125_MR_MP1_v2”. - PP has mentioned usage survey monitoring frequency in Additional Comments section of Up,y parameter box under section D.2 of the MR. Annual monitoring frequency has been maintained throughout the current MP. - PP has filled Measured/calculated/default sections for all parameters in section D.2 of the MR. - PP has mentioned WCFT survey monitoring frequency in Additional Comments section of parameters “Qp,y”, “Qp, cleanboil,y” and “Qp, rawboil, y” parameter box under section D.2 of the MR. Biennial monitoring frequency has been maintained throughout the current MP. - PP has filled in monitoring parameter box for Hygiene campaign in section D.2 of the MR. - Tests are conducted quarterly. Months March, May and July – September (rainy season) all have higher rainfall in Zoba Debub. Non-mentioned months make up the dry season. Since PP conducts WQTs quarterly, at least 2 tests per year are during the rainy season. - WQTs are conducted quarterly on a sample of boreholes using 90/10 precision rule as per TPDDTEC v2 methodology. PP has uploaded all WQTs to date, including an excel sheet “GS5125 WQTs to date” showing quarterly WQTs for 2017-19 and the season. - The first WQT was conducted in Feb/March 2017 but is dated April (when we received the results from the Water Resource Department). This is within 6 months of the start of the rehabilitation on the 21/09/2016. - All tests conducted in the project are by an accredited laboratory – The Ministry of Land, Water and Environment - Water Resource Department is a government accredited laboratory which has facilities in each Zoba in Eritrea. - PP has submitted revised MR and ERs using old standard – please see “GS5125_MR_MP1_v2” and “GS5125_LS_ERs MP1_v2” documents. PP has reported on Sustainable Development Indicators in section D.2 of MR as per old passport. Evidence for measurement of progress towards parameters can be found in ER excel sheet “Sustainability Indicators”.				
Documentation provided by project participant				

DOE assessment	Date: 28/04/2020
The revised Monitoring report "GS5125_MR_MP1_v2" has been checked and the verification team confirms the following- 1. In the monitoring parameter "Np,y", the Measuring/reading/recording frequency has been changed to continuous, which is in line with the registered PDD /05/. 2. The revised monitoring frequency of the parameter "Up,y" along with the supportive for Usage survey /09/ provided by the PP has been checked. The verification team confirms that the annual monitoring frequency for the parameter was maintained. 3. All the monitoring parameters have been checked and the "Measured/calculated/default" section is now found to be consistent with the registered PDD /05/. 4. The revised parameters "Qp,y", "Qp,cleanboil,y" and "Qp,rawboil, y" have been checked based on which the verification team confirms that the Biennial monitoring was maintained and PP has added the dates of latest WCFT survey which was found to be consistent with the excel sheet provided. 5. Section D.2 of the MR "GS5125_MR_MP1_v2" has been checked and the verification team confirms that the parameter has been monitored annually in line with the requirements of the registered PDD as confirmed from the hygiene campaign docs /11/ provided by the PP. 6. After the review of WQT results /17/, the verification team confirms that for the parameter "Quality of Treated Water", the monitoring requirements of the PDD /05/ have been accurately followed as the test were conducted quarterly, with at least one test conducted during the rainy season, and all the test were conducted through a government accredited lab "The Ministry of Land, Water and Environment - Water Resource Department". Also, the first test was conducted within 6 months of rehabilitation (i.e. 21/09/2016) as confirmed by the WQT result dated 20/04/2017 which was conducted for feb/march 2017. 7. The verification team has checked the revised Monitoring report "GS5125_MR_MP1_v2" and supporting documents /05/ to confirm that all has been revised as per the old GS standard, which is in line with the registered PDD. Also, the sustainable development parameters are now as per the approved passport. Hence, CAR 02 is closed.	

Table 3. FAR from this verification
No FAR raised.

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

8. CERTIFICATE OF COMPETENCE

Personnel Name:		Chetan Swaroop Sharma	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☒
Technical Reviewer	☒	Local Expert	☒
Area(s) of Technical Expertise			
Sectoral Scope	Technical Area		
Energy Industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar		
Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources		
Energy Demand	TA 3.1: Energy Demand		
Waste Handling and Disposal	TA 13.1 Waste Handling and Disposal TA 13.2 Manure		
Approved by (Manager C & T)	Akhilesh Joshi		
Approval date:	11/12/2015		

Personnel Name:		Ms. Shikha Sharma	
Qualified to work as:			
Team Leader	☐	Technical Expert	☐
Validator/Verifier	☒	Financial Expert	☐
Technical Reviewer	☐	Local Expert	☐
Area(s) of Technical Expertise			
Sectoral Scope	Technical Area		
-	-		
Approved by (Manager C & T)	Sanjay Kandari		
Approval date:	26/11/2019		

Personnel Name:		Rohit Badaya	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☒
Technical Reviewer	☒	Local Expert (India)	☒
Area(s) of Technical Expertise			
Sectoral Scope	Technical Area		
Energy industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar		
	TA 1.2: Energy generation from renewable energy sources		
Energy demand	TA 3.1. Energy Demand		
Waste Handling and Disposal	TA 13.1 Solid waste and wastewater TA 13.2 Manure		



Approved By	Manager Competency & Training
Approval date:	16/10/2017

History of the document

Version	Date	Nature of revision	Reviewed by	Approved by
4.0	14/12/2013	Guidance included/improved	Manager CDM Quality 23/12/2013	Managing Director 23/12/2013
3.1	29/10/2012	Updated for EB69 Annex6	Manager CDM Quality 29/10/2012	Managing Director 29/10/2012
3.0	31/08/2012	Revised for VVS Track	Manager CDM Quality 08/09/2012	Managing Director 10/09/2012
2.0	21/12/2011	Comprehensively revised	Manager CDM Quality 21/12/2011	Managing Director 21/12/2011