

TEMPLATE

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

PUBLICATION DATE 14.10.2020

VERSION v. 1.2

RELATED SUPPORT

- TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2

This document contains the following Sections

Key Project Information

- 0 Description of project
- <u>0</u> Application of approved Gold Standard Methodology (ies) and/or demonstration of SDG Contributions
- 0 Duration and crediting period
- 0 Summary of Safeguarding Principles and Gender Sensitive Assessment
- 0 Outcome of Stakeholder Consultations

<u>Appendix 1</u> – Safeguarding Principles Assessment (mandatory)

- <u>0</u> Contact information of Project participants (mandatory)
- <u>0</u> LUF Additional Information (project specific)
- <u>0</u> Summary of Approved Design Changes (project specific)

KEY PROJECT INFORMATION

GS ID of Project	11544
Title of Project	Maji Safi, Maisha Bora Project
Time of First Submission Date	07/04/2022
Date of Design Certification	N/A
Version number of the PDD	V 3.5
Completion date of version	05/05/2023
Project Developer	Offgrid Sun S.R.L.
Project Representative	Ceres-Enve
Project Participants and any communities involved	Makohaa Genius Watter PENWA Jerri Hydro Expert
Host Country (ies)	Kenya
Activity Requirements applied	 Community Services Activities Renewable Energy Activities Land Use and Forestry Activities/Risks & Capacities N/A
Scale of the project activity	 ☐ Micro scale ⊠ Small Scale ☐ Large Scale
Other Requirements applied	N/A
Methodology (ies) applied and version number	GS Methodology for Emissions Reduction from Safe Drinking Water Supply (v 1.0)
Product Requirements applied Project Cycle:	 GHG Emissions Reduction & Sequestration Renewable Energy Label N/A

🔀 Regular
Retroactive

Sustainable Development Goals Targeted	SDG Impact (defined in B.6.)	Estimated Annual Average	Units or Products
13 Climate Action (mandatory)	Emission reductions	14,315	tCO2e
15 Life on Land	Amount of firewood saved	7,378.2	tonnes
3 Good Health and Well- being	Proportion of target population using safely managed drinking water services without water-borne diseases	95%	Percentage
5 Gender Equality	Proportion of households who perceive saved time from collecting wood and water boiling - Amount of safe	95%	Percentage
6 Clean Water and Sanitation	water served at the required quality by national standards. - Increased awareness due to annual Water hygiene campaigns	- 64,715 - Minimum one campaign per year	-m³ -Number
7 Affordable Clean Energy	Total electricity produced - Renewable	77,692.25	ō kWh
8 Decent work and economic growth	temporary and permanent jobs created	25 jobs created	Number

Table 1 – Estimated Sustainable Development Contributions

SECTION A. DESCRIPTION OF PROJECT

A.1 Purpose and general description of project

OffgridSun, in collaboration with Genius Watter and local partners Makohaa (CBO) Jerri-Hydro Experts and PENWA (water supply system operator); is implementing "Maji Safi, Maisha Bora Project" in Siaya County, located in Western Kenya on the Lake Victoria in the former Nyanza Province. The project is a Community level Water Treatment Technologies (CWT) project where users will retrieve water from distribution points with kiosks.

In rural Kenya, only 51.8% of the total population has basic services of drinking water in 2020 and none has safely managed drinking water services. 12.5% of the population relies on unimproved sources while 24.1% are drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal (JMP data)¹.



Figure 1 Access to drinking water services in rural Kenya in 2020 (%).

During a case study done about drinking water quality in Siaya County, water samples were collected from fourteen major communal water sources across the county including surface sources (WHO CC Newsletter No.29, December 2019²). The study

¹ JMP Data for Kenya (<u>https://washdata.org/data/household#!/dashboard/new</u>)

https://www.researchgate.net/publication/338139285_Impact_of_open_defecation_practice_and_community_drinking _water_quality_A_case_study_of_Siaya_County_Kenya

showed that the majority of the population, over 50%, relies on surface water for domestic water supplies. Chemical and bacteriological water analyses were conducted to determine the extent of pollution on these water sources. The bacteriological test results showed that E. coli was present in all the water sources above the recommended levels by World Health Organization and Kenya Bureau of Standards. This is due to poor sanitation conditions exists in the county. Only 34% of the population use improved sanitation while 16% of them has no sanitation facilities and resort open defecation. In most of the villages, there is low usage of latrines particularly among the poor households.

Furthermore, the dependency on surface water resources is higher in Bondo district of Siaya county compared to other districts. Water point density is less than one water point in 2.5 km^2 in Bondo, whereas north and northeastern districts have more than 3 per km².³

Main objective of the project is to improve the livelihoods of about 50,000 people living in East and West Yimbo Wards, with no safe water access schemes in place. WASREB Impact Report (2019/2020 issue)⁴ shows that water coverage is only 52% (below 80% is unacceptable as per the scoring method explained in Table 3.2 Performance Indicators, Sector Benchmarks and Scoring Regime) of the population and drinking water quality by waters service providers is rated as unacceptable (below 90% as per the same scoring method) with an average of 77% in Siaya County (Table 4.2 (a) County Data for regulated utilities).

A field survey was carried out by the local partners of the project has shown that a water supply and treatment system operated by PENWA CBO. The system is not working due to technical and economic constraints. The public boreholes are very few and none of them is functioning properly. There are small-scale private

 ³ 9.3 Water Infrastructure, Siaya County Spatial Plan 2018-2028 (https://siaya.go.ke/wp-content/uploads/2019/04/DRAFT-SIAYA-County-Spatial-Plan-REVISED-MARCH-2019.pdf)
 ⁴ WASREB Impact Report Issue 13 (https://wasreb.go.ke/impact-report-issue-no-13/)

businesses that pump the water from lake and sell it either untreated or apply chemical tablets. There are also water vendors in the area who sell untreated lake water in jerry cans to the community. The water drawn from lake is either consumed directly or is treated by boiling with firewood and charcoal or applying chlorine.



Figure 2 Water vendors

Water collection is predominantly a women's activity. If the family has bicycle or motorcycle, men fetch the water as they can carry up to 5-6 jerrycans per trip by pushing or riding the bike.





Figure 3 Local people fetching water from the lake.

As per the applied methodology, for users that boil unsafe water for drinking in the pre-project scenario, the general baseline scenario is that users would have boiled water for drinking in the absence of the project activity. For household end-users currently drinking unsafe water, the principles of suppressed demand are applied, such that the general baseline scenario is assumed to be that users would have boiled water for drinking in the absence of the project activity⁵. The project aims to reduce greenhouse gas emissions from boiling unsafe water by introducing zero- emission technologies for water purification. Annual emission reduction is estimated to 14,315 tCO2e by avoiding boiling of more than 64 thousand tons of drinking water. The system will be partly operational on August 2023 and the project will generate 68,131 tCO2e during the first crediting period of 5 years.

The project has started rehabilitation on 15 February 2023 and will start supplying water to the communities through the rehabilitation of existing kiosks by August 2023. The whole system will be operational on 15 December 2023. The workplan is presented in the table below.

⁵ As per GS4GG Principle and Requirements, application of suppressed demand baseline is limited to Micro & Small scale activities

Table 2.	Project	Milestones
----------	---------	------------

NO	Scope of work	Date
1	Start date of works	15 February 2023
2	Rehabilitation of the existing system completed	August 2023
3	Installation of Pump and Solar System	August 2023
4	Construction of new water kiosks	September –
		November 2023
5	Construction of new pipelines and upgrading	September-
	the system	November 2023
6	Full system in operation	December 2023

A.1.1. Eligibility of the project under Gold Standard

The eligibility criteria identified in GS4GG Principles and Requirements (v1.2) are met as follows:

Eligibility criteria	Justification
3.1.1 (a) Types of Project: Eligible	The project is a type of Community level
projects shall include physical	Water Treatment technologies (CWT) and
action/implementation on the ground.	Gold Standard approved Community
Pre-identified eligible project types are	Services Activity Requirements is
identified in the Eligibility Principles and	applicable for the project. The project
Requirements section.	type is, therefore; automatically eligible
	as per section 4.1.3 of GS4GG Principles
	& Requirements.
3.1.1 (b) Location of Project:	Location of the project is Kenya and
Projects may be located in any part of	specified in Section A.2.
the world.	
3.1.1 (c) Project Area, Project	The project is located in Siaya County of
Boundary and Scale:	Kenya and the project boundary and

The Project Area and Project Boundary	scale are defined based on the GS
shall be defined. Projects may be	Methodology: "Emission Reductions from
developed at any scale although certain	Safe Drinking Water Supply".
rules, requirements and limitations may	
apply under specific Activity	Project is small scale as per 9.1.2 c
Requirements, Impact Quantification	Type-3 Other project activities in GHG
Methodologies and Products	Emission Reductions and Sequestration
Requirements.	Product Requirements (v2.1), with a
In order to avoid double counting the	maximum of 60,000 tCO2e ER/year.
Project shall not be included in any other	
voluntary or compliance standards	The project does not seek certification
programme unless approved by Gold	under any other voluntary or compliance
Standard (for example through dual	standards programme.
certification). Also, if the Project Area	The host country, Kenya does not have
overlaps with that of another Gold	an emission reduction cap enforced OR
Standard or other voluntary or	have the possibility to trade emissions
compliance standard programme of a	that include the scope of the proposed
similar nature, the project shall	project.
demonstrate that there is no double	If a risk of double counting exists, the
counting of impacts at design and	project developer commits to retire
performance certification (for example	eligible units equal to the quantity of
use of similar technology or practices	Gold Standard VERs.
through which the potential arises for	
double counting or misestimation of	
impacts amongst projects).	
3.1.1 (d) Host Country	The project is in compliance with all
Requirements: Projects shall be in	related legal, environmental, ecological
compliance with applicable Host	and social regulations. Please see
Country's legal, environmental,	safeguarding principles assessment in
ecological and social regulations.	Appendix.1.
3.1.1 (e)	Contact details can be found in
	Appendix.2

Contact Details: As part of the Project	
Documentation the Project Developer	
shall provide (i) name and (ii) contact	
details of all Project Participants; AND in	
case of an organisation (iii) the legal	
registration details and (iv)	
documentation by the governing	
jurisdiction that proves that the entity is	
in good standing (defined as being a	
legal or other appropriate entity	
registered in or allowed to operate within	
the required jurisdiction and with no	
evidence of insolvency or legal/criminal	
notices placed against it or any of its	
Directors). Gold Standard retains the	
right (at its own discretion) to refuse use	
of the Standard where reputational	
concerns are highlighted.	
3.1.1.(f) Legal Ownership:	Legal ownership of the Products
Full and uncontested legal ownership of	generated by the project will be
any Products that are generated under	transferred from end-users to the project
Gold Standard Certification, (for example	owner. This is explained in detail to the
carbon credits) shall be demonstrated.	stakeholders in the consultation meeting
Where such ownership is transferred	and included in the project design.
from project beneficiaries this must be	
demonstrated transparently and with	
full, prior and informed consent (FPIC).	

Note that for certain Project types there is a requirement for full and uncontested legal land title/tenure to be demonstrated. These are contained within specific Activity or Product Requirements. All projects shall immediately report to Gold Standard any land title/tenure disputes arising. 3.1.1 (g) Other Rights: As well as legal title and ownership, the Project Developer shall also demonstrate where required uncontested legal rights and/or permissions concerning changes in use of other resources required to service the Project (for example, access rights, water rights etc.). Any known disputes or contested rights must be declared immediately to Gold Standard by the Project Developer and resolved prior to further project implementation in affected areas.	The project will rehabilitate un- operational water supply and distribution system that belongs to PENWA. The kiosks will be placed at the existing service points. A memorandum of Understanding is signed with PENWA for transfer of carbon rights. A memorandum of understanding with Siaya County administration is signed on 21/12/2022 for the project implementation, which assures their support and also should avoid risk of overlapping with other public projects in the future
2.1.1 (b) Official Development	ODA declaration has been submitted to
Assistance (ODA) Declaration: All	GS registry.
Project Developers applying for project	
activities located in a country named by	
the OECD Development Assistance	
Committee's ODA recipient list and	
seeking Gold Standard Certification for	
carbon credits shall declare the Official	
Development Assistance (ODA) support.	

The eligibility criteria identified in Community Services Activity Requirements (v1.2) are met as follows:

Eligibility criteria	Justification
2.1.2 All CSA Projects shall lead to	The project will decrease the fuelwood
climate change mitigation and/or	and charcoal consumption in households
adaptation by providing or improving	by providing safe drinking water and
access to services/resources at	eliminate the need for boiling; therefore,
household or community ⁶ or institution ⁷	reduce the GHG emissions.
level. Eligible services include electricity	
and energy, water and sanitation, waste	
management, housing, etc.	
3.1.1 Types of project – (d) Water,	The project is a WASH that reduces
sanitation and hygiene (WASH): WASH	energy requirements for households as
activities contributing to climate change	compared to baseline scenario. The
mitigation and/or adaptation benefits	project will supply safe drinking water to

⁶ Community refers to a group of people who live in the same area (such as a village, city, town, or neighbourhood) and share the services/resources. It shall be treated as guiding principle; the project proponent should refer to applicable rules, regulations, guidelines and official notifications of the host country in this regard.

Community may include variety of end-users for example households, commercial facilities such as shops, public services, residential and commercial buildings, small, medium and micro enterprises (SMMEs), etc. Projects that do not include activities providing services or access to resources for identified user categories as listed here, for example industrial wastewater treatment projects, are not eligible for Gold Standard certification under CS Requirements.

⁷ An establishment with a specific purpose that serves individuals or group of individuals within its premises such as a hospital, school, etc.

	communities by upgrading the existing
	system by solar power solutions.
3.1.2 Project Area, Boundary and Scale:	The project is located in Siaya County of
Project Area and Boundary shall be	Kenya and the project boundary and
defined in line with the applicable	scale are defined based on the GS
Methodologies or Product Requirements	Methodology: "Emission Reductions from
	Safe Drinking Water Supply".
	The project boundary includes the
	physical, geographical sites of the low-
	or zero-greenhouse gas emitting
	technologies to treat/supply safe
	drinking water installed by the project
	activity and the household, commercial
	and institutional buildings where the end
	users of safe water provided by the
	project are located.
	The project scale is small as per the
	referred definition in 9.1.2 c Type-3
	Other project activities in GHG Emission
	Reductions and Sequestration Product
	Requirements (v2.1):
	"Type 3: Other project activities:
	project involves technologies such Safe
	Water Supply, Waste management, etc.
	not included in Type I or Type II that
	result in GHG emission reductions not
	exceeding 60,000 ton CO2e per year in
	any year of the crediting period. "

	GHG emission reductions achieved by
	the project does not exceed 60,000 ton
	CO2e per annum in any year of the
	crediting period.
3.1.3 Certain Impact Quantification	The project applies Suppressed
methodologies allow projects to account	Demand baseline as a small-scale
Suppressed Demand scenario when	activity and will not stack GS certified
establishing a baseline. In such cases,	impact statements or products.
the application of Suppressed Demand	
baseline is limited to Small Scale and	
Microscale Projects. Where a Suppressed	
Demand baseline is applied, it is not	
possible to 'stack' Gold Standard	
Certified Impact Statements or Products	
as the definition of the baseline may be	
contradictory.	
3.1.4 (a) Projects involving the	The end user are informed that carbon
distribution of a large number of devices	finance is being generated by the
for services such as heating, cooking,	project, and this finance is in turn used
lighting, electricity generation, water	for maintenance of the project. The
treatment technology such as water	project owner has signed an agreement
filter, etc. shall provide a clear	with the community representatives that
description of the ownership of the	they are transferring rights to the VERs
Products that are generated under Gold	generated to the project developer.
Standard Certification all along the	
investment chain. In line with the FPIC	A memorandum of understanding with
requirement, the proofs that end-users	Siaya County administration is signed on
are aware of and willing to give up their	21/12/2022 for the project
rights on Products shall be provided.	implementation, which assures their
	support and also should avoid risk of

	overlapping with other public projects in
	the future.
3.1.4 (b) The transfer of Product	The transfer of rights of carbon credits
ownership shall be discussed during local	were discussed during the explanation of
stakeholder consultations for projects.	how carbon finance would be used to
	support project implementation at the
	level of local stakeholder consultation.

A.1.2. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

The Verified Carbon Reductions (VER) generated by the project belongs to the individual end-users. Carbon Rights Transfer agreement entered between the community representatives and the project proponents includes terms transferring the ownership of VERs from the community to the project proponents. By the signature of the signature of the agreement, the end-users accept to waive the carbon rights.

A.2 Location of project

Republic of Kenya, Siaya County, Bondo District, East and West Yimbo Wards



EAST AND WEST YIMBO WARDS

Figure 4 Map of Project area

Table 3 Coordinates

	Longitude	Latitude
North	34.0761	-0.0304
South	34.0703	-0.1065
West	34.1391	-0.0565
East	34.0420	-0.0756

A.3 Technologies and/or measures

The Project plans to revamp and use the Usigu Community Water Supply System which was built by Action Aid between 2007 and 2011 in East Yimbo. The system was planned to serve both East and West Yimbo Wards. The Community Based Organization called PENWA (Pii E Ngima Women Association, namely "Water is life Women Association") was founded for the management of the water system after Action Aid handed over the operation to the local communities. However, over the years the organization could not manage to run the system due to high operational and management costs. Penwa is officially registered at the Ministry of Labour and Social Protection – State Department for Social Protection – Department of Social Development of Republic of Kenya. A new management was appointed on October 2021 to find solutions to technical and operational problems. The scheme was operational in 2008 but stopped its operations on 15/04/2022⁸. Several renovations and maintenance are required to run the system again. A pre-payment system is also needed be engaged for the sustainability of the water services. Figure below shows the existing situation and planned extensions on the map.



⁸ Letter from PENWA dated 22/09/2022



Figure 5 Project Design Stages

The area covered by the existing water system includes several sub-location within East and West Yimbo wards. The sub-locations are Nyamonye, Bar Kanyango, Usigu (East Yimbo ward), Got Ramogi and Usenge (West Yimbo Ward). In each sub-location there are villages which are reached by the system which are:

- Nyamonye sub-location: Malemo, Kowil, Ragak
- Usigu Sub-location: Lul, Got Kaswan, Nduru, Orom, Ugingo, Nyangera, Ururi, Wambasa, Got Umala.
- Bar Kanyango sub-location: Muguna, Angwenyo, Bar Kanyango.
- Got Ramogi sub location: Uwamba, Kalaka, Kakumu.
- Usenge sub location: Ururi, Usalu.

The intake system is located in Nyamonye area, where the pumps are fed by grid electricity. The suction line is 73 m from lake to Pump house. Then, the water is directed through a main delivery pipeline of 4,815 m long into three big tanks build in concrete: one raw water tank where the water is first stocked, two sand filter tanks. There is also one chlorine tank where the water is treated through a manual procedure. The tanks are located Kinda Umala, which is the highest place in the area. The project will refurbish all 4 tanks and utilize the chlorination tank for clean water storage. An additional 200 m³ tank will be placed to support the system in Kinda Umala. Capacities of all tanks are provided in the Table.4.

The water from storage tanks in Kinda Umala will be pumped to through two main lines. One line goes West and reaches to an elevated tank made of steel and placed nearby Uwambasa Primary School through pipeline. There is also another concrete tank with a capacity for water storage and pumping at the same place. Those two tanks have been built recently by the Siaya county to improve the system. An additional 200 m³ tank will be placed to support the system at this point. The other line reaches to South and supplies water to four vending points already exists.

Existing Tanks	Number	Capacity(m3)	Place
Raw water Tank	1	101.69	Kinda Umala
Sand Filter Tanks	2	139.89	Kinda Umala
Chlorine Tank	1	104.7	Kinda Umala

Table 4.	The	capacities	of	the	tanks.
rabie n	1110	capacitics	0.	CIIC	carmon

Elevated Steel Storage	1	50	Uwambasa Primary School
Tank installed in 2018			
Concrete Storage Tank	1	111.61	Uwambasa Primary School
Plastic water tanks	2	5	Usenge 2 Kiosk
Tanks placed in 2018			Corner Kajairo Kiosk
New Tanks	Number	Capacity(m3)	Place
Storage Tank	1	200	Kinda Umala
Storage Tank	1	200	Wambasa Primary School

Then the water is further transferred from Wambasa to the surrounding areas by gravitation through two secondary pipelines, one of which goes to West to Usenge and the other supplies water to North to Jusa. On the pipeline to Usenge, four tanks were placed in 2018-2019 by the Siaya County; two fixed and two temporary. The Maji Safi Maisha Bora project is going to use two fixed points (shown as Existing kiosks 2018) as water selling points. At the beginning of the road to Uhanya where one of the tanks is located; there exists an extension/diversion of the pipeline to the South (New line Uhanya). Total length of existing distribution line 20kms. There were future plans to extend the pipeline up to Uhanya but has not been realized due to the lack of funds.

There are 10 kiosks, eight of them were build by Action Aid in 2007 and not functioning at all. Two of them were established in 2018 by the Siaya County administration with the storage tanks and located on the area, which were built to sell the water in the communities. Among these 10 kiosks, 2 (Existing kiosks 2018) are on the road to Usenge and the other 8 (Existing kiosks) are dislocated in other points along the whole system. Those kiosks will be rehabilitated and used as vending points at the first stage of implementation. The system will be extending by 10 new water kiosks; 2 located in Kinda Umala, 1 in Usenge/Ovest, 4 in Uhanya and 3 more on the existing pipeline (See Figure.5 above). Total number of vending points will be 20 and total extension pipeline will be 14 kms.

Table 5 The coordinates of Kiosks

Existing Kiosks			
NO	Х	Y	Name

Gold Standard *Climate Security and Sustainable Development*

1	34.0608843	-0.064354	USENGE 2 KIOSK
2	34.0706347	-0.069876	CORNER KAJAIRO KIOSK
3	34.057788	-0.065365	USENGE KIOSK
4	34.082614	-0.054337	RUWE KIOSK
5	34.075138	-0.02844	JUSA KIOSK
6	34.097251	-0.043835	KADERO KIOSK
7	34.082947	-0.063229	NYAGERA KIOSK
8	34.093073	-0.059783	USIGU KIOSK
9	34.120738	-0.053894	MAJENGO KIOSK
10	34.106281	-0.044369	KINDA UMALA KIOSK

	New Kiosks					
NO	Х	Y	Name			
1	34.131404	-0.051734	KAMINYISIA KIOSK			
2	34.1200615	-0.042839	OROM ECDE SCHOOL KIOSK			
3	34.071087	-0.093661	MARIA CHURCH KIOSK			
4	34.0668983	-0.101999	RAPOGY PRIMARY SCHOOL KIOSK			
5	34.069238	-0.104309	NYENYMISORY DISPENSARY KIOSK			
6	34.079095	-0.084777	KANYIBOK SECONDARY SCHOOL KIOSK			
7	34.043114	-0.073213	SANDA PRIMARY SCHOOL KIOSK			
8	34.1067988	-0.055565	KATOMA KIOSK			
9	34.0766299	-0.038372	USENGE/JUSA KIOSK			
10	34.06913148	-0.055261906	RUWE-USENGE KIOSK			

Both the new and the old kiosks will be equipped with smart water kiosks. The technology which is going to be applied is the LORENTZ smartTAP, an off-grid water dispensing and management system which enables revenue collection, water entitlement and sustainable water provision. Each smart water dispenser will be powered by solar panels of 10 W. LORENTZ smartTAP combines hardware, software and predefined business models to allow for water infrastructure to be delivered in an economically sustainable way. Users of the system access water from a tap using a tag. The tag is pre-charged with water credits at a local shop or directly with the connected optional GSM modem (Figure.6).



Figure 6. Metering equipment

The existing system requires the following rehabilitation and upgrading works:

Section	Required improvements
Intake- Suction Line -	Poor intake design causes huge electricity
Pump Intake Station	consumption. The tanks are dislocated away from the
	intake pump. The pump at the intake place is
	connected to electrical grid and it takes at least 3 hours
	to fill up the water storage tanks, which causes high
	electricity bills.
Main Delivery pipe- water	Tanks need maintenance since the structure is eroded
treatment and storage	and there are leakages in the reserve tank
tanks	
Gravity line-Elevated	The bursts of the pipeline are frequent due to the poor
storage- supply line	quality of the piping system, leading to many spillages
including water kiosks and	and high loss of water.
private connections	There are no booster pumps on the system but the water
	flows through gravity according to the Bondo Water
	Officer, causing the problem that the water takes too
	much time to arrive at the end-users.
Control system for	The control system is inadequate and cannot follow up
payment	the consumers who do not pay their bills regularly.

Table 6. List of Improvements

Operation and	General management of the system was weak because
Maintenance	the company lacked qualified technical staff to handle
	the project, and sufficient resource for proper operations
	and maintenance of the project.

The project Maji Safi Maisha Bora will rehabilitate and improve the system by:

- Improving/renovating the current pipeline and water tanks. Two more storage tanks will be added to support the existing tanks; one in Kinda Umala and another in Uwambasa
- Improving the intake system by substituting the current suction line and pump system
- The storage and treatment station in Kinda Umala will be restored and improved (raw tank, twin sand filter tanks, chlorine tank).
- Disconnecting the system by the electrical grid by connecting it to an off-grid solar system which is going to power the whole system
- Extending the pipeline up to Uhanya (South), Usenge/Ovest (West), Kinda Umala (East).
- Restoring the water kiosks by installing smart water kiosks dislocated in the area powered by solar energy where people can buy safe water at an affordable price through pay&go system
- Building additional 10 water kiosks in total on the existing and extended lines
- Improve the organizational and financial management of the system through capacity building to PENWA

Models and average lifetime of the equipment are given in Table.5. The system is expected to be operational for 30 years. The concrete tanks can last quite a long time up to 40 years if well managed, which may lengthen the lifetime of the system up to 37 years by retrofitting the equipment. ⁹

⁹ Confirmation from the contractor



Figure 7. Drawing showing the of off-grid solar treatment and supply system main components

Table 7	Models	and	average	lifetime	of the	equipm	ent
	, mouels	anu	average	metime	or the	equipin	CIIC

Equipment type	Brand	Average lifetime
30 kW submersible	Grundfos SP46-	24 months warranty
pump	2010	20 years expected lifetime
Speed controller	Nastec Vasco	24 months warranty
inverter to power	Solar ¹¹	30 years expected lifetime
pumping system		
Solar panels	Futura Sun	25 years warranty
	375M modules ¹²	40 years expected lifetime

¹⁰ https://www.grundfos.com/it

¹¹ https://nastec.eu/prodotti-per-rete-elettrica/vasco/

¹² https://www.futurasun.com/en/



Off-grid Smart Water	Lorentz ¹³	24 months warranty	
Kiosks		30 years expected lifetime	
Automatic Chlorine	Dosatron	24 months warranty	
Dispenser	D30WL ¹⁴	30 years expected lifetime	
HDPE Pipes	Agro-irrigation	50 years warranty	
		Over 100 years expected lifetime	
Concrete Masonry			
Water tanks		Concrete water tanks can last quite a	
		long time. Generally speaking, they do	
		take 20 to 30 years and with proper	
		maintenance, a high-quality concrete	
		tank can last up to 40 years and above	
		according IS 3370:2009 Part I – IV. (The	
		IS 3370:2009 Part I – IV states that	
		where the concrete underground or	
		surface water is constructed with	
		concrete strength of M 20 and above, the	
		structure can last up to and above 40	
		years.) Whereas we're using concrete	
		strength M 25 and M 30 which is way	
		above.	

Water Filtration is very vital part of water supply system and two robust types of filtration system within the Usigu Water Supply System is designed as described below:

USIGU TWIN SLOW SAND FILTERS

Usigu Filtration System comprises of two concrete tanks with a height of 2.5m high and diameter of 9m wide with filter media arranged as shown on the diagram below.

¹³ https://www.lorentz.de/products-and-technology/products/smarttap-water-dispensing/

¹⁴ https://www.dosatron.com/en-us

The filtration process percolates untreated water slowly through a bed of porous sand to geo-textile membrane layer to gravel park, with the influent water introduced over the surface of the filter from the raw water tank and then drained from the bottom of the tank through the slotted Screen pipes with a flow regulator to control the filtration process. Slow sand filter provides an excellent treated water quality with no chemical added to aid the filtration process and it removes suspended particles with effluent turbidity below 1.0 achieving 90% to 99% reductions in bacteria and viruses.



Figure 8. Water Filtration System

AUTOMATIC CHLORINE CHEMICAL DISPENSER

The second Filtration System in Usigu Water Supply is an automatic Chlorine Chemical Dispenser installed immediately after the twin slow sand filter as shown below. The Dispenser is easy to use and maintain and does not require electricity to operate. In this stage, the Dispenser receives already filtered water from the slow sand filter and dosed it to the clean water tank at Kinda –Umala.



Figure 9. Chlorination

A normal level for drinking water disinfection can range from 1.0 to 4.0 mg/L. Chloramine levels up to 4 milligrams per liter (mg/L) or 4 parts per million (ppm) are considered safe in drinking water hence harmful health effects are unlikely to occur. Therefore, with the use of the Dosatron technology chlorine dosing equipment which comes with two very important features, namely, dosing scale setting and the adjustable dosing rate, we will be able to achieve chlorine doses from any ranges to final treated waters ranging from 0.2–2.0 mg/l of free chlorine to give a residual of about 0.02–0.3 mg/l at the consumer's tap. The system motor flow capacity ranges from 8-30 m3/h with a chemical injection flow ranging between 0.24- 9 l/hr

The Project plans to use solar power for the intake system and establishment of smart water kiosks to overcome the problem of collecting payments. The system will be upgraded with the required renovation works on technical infrastructure. The project partners Offgridsun and Genius Water will undertake the technical work while local partner PENWA will run the system. Makohaa is responsible for capacity building component of the project and will carry out water hygiene campaigns. The carbon revenue gained through project certification will used to recover from the initial investment for the realization of the infrastructural work and afford the upgrading of the system and management costs afterwards.

The project is developed under Sectoral Scope 3: Energy demand

A.4 Scale of the project

The project is small-scale based on project scale defined under GS4GG Product Requirements. The project is Type 3. Other project activities and annual emission reduction achieved will not exceed 60,000 tCO2e per year in any year of the crediting period.

A.5 Funding sources of project

The project will be implemented by the Project Developer, Offgridsun; in cooperation with the local partners or Project Implementers. The funding for the water treatment and distribution system will be provided by Offgridsun that will be legal owner of the VERs. No public funding or Official Development Assistance is involved.

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

Gold Standard Methodology: Emission reductions from safe drinking water supply Version $1.0.^{15}$

Applicable GS4GG requirements are as follows:

- GHG Emissions Reduction & Sequestration Product Requirements v 2.1¹⁶
- Community Services Activity Requirements v 1.2¹⁷

B.2. Applicability of methodology (ies)

Gold Standard Methodology: Emission reductions from safe drinking water supply Version 1.0 defines the following applicability criteria:

Applicability	Justification	
 a. Eligible household water treatment technologies (HWT), institutional water treatment technologies(IWT), and community level water treatment technologies (CWT) include bleach/chlorine, water filter (ceramic, sand, composite, membrane, etc.), UV disinfection, etc. 	The project aims to implement Community level water treatment technology (CWT) to provide safe water to East and West Yimbo Wards near Lake Victoria.	
 b. Eligible community water supply technologies (CWS) include new installation of new borehole hand- 	Zero emission solar powered water treatment system will be used to purify water which will be transferred to water	

¹⁵ https://globalgoals.goldstandard.org/429-ee-sws-emission-reductions-from-safe-drinking-water-supply/

¹⁶ https://www.goldstandard.org/project-developers/standard-documents

¹⁷ https://globalgoals.goldstandard.org/201-ar-community-services-activity-requirements/

pumps, borehole hand-pumps	kiosk through pipeline. All pump will be		
rehabilitation, solar powered drinking	solar powered.		
water pumps, etc. Water pumps			
powered by fossil-fuel engines are			
not eligible, with the exception of			
back- up fossil-fuel engines that are			
used for no more than 10% of			
operating hours (parameter SWDS			
33).			
c All projects involving CWT and CWS	For the technical and economic		
technologies must also include	management of the water treatment and		
ongoing maintenance and repair of	supply systems, a water maintenance		
the project technology	team will be set up for each point of service covering whole Yimbo region.		
	The member of the teams from PENWA		
	will be trained on systems preventive		
	maintenance and monitoring. They will		
	be involved in daily operation of the		
	water treatment plant and distribution		
	system.		
	Maintenance and repair plan will be		
	prepared by Jerri Hydro Expert,		
	specialized to provide such services. The		
	plan will:		
	• Stabilize and reduce system		
	 Maximize the system reliability and 		
	predictability		
	Improve customer image by informing		
	the community of its well-maintained		
	More details could be found in Section		
	B.7.3 Other elements of monitoring plan.		

d. Where the project involves the rehabilitation of an existing technology, the project developer shall provide evidence that the existing technology is non- operational and that there is no planned maintenance or repair for at least 3 months after the date it became non-operational (parameter SWDS 2).	The project owner will repair the existing pipeline system to supply water the kiosk. The system is not operational due to technical problems such as leakages, low pressure in pipes and the unpaid electricity bill.
e. This methodology allows for project activities to include safe water treatment and/or supply technologies implemented for end-users in households, and/or commercial premises such as shops or institutional premises including half or full day/boarding schools, prisons, army camps & refugee camps.	The existing system will be supply safe water to end- users in households both by smart water kiosks in public locations and by limited number of domestic/private connections. The project will upgrade the existing 10 non-operational kiosks and add 10 new kiosks at publicly accessible points. Both the water supplied by the public kiosks and directly connected to the dwellings will be accounted in the project boundary and metered.
 f. In cases where the safe water is retrieved at the CWT or CWS location, the water in its improved form shall be available within a distance of 1 km or less from the end-users, as demonstrated by satellite imaging or GPS coordinates of each CWT or CWS location. 	The water kiosk will be located within the 1 km walking/pedaling distance from the of the end-users in households.

Alternatively, as a proxy, a total	
collection time of 30 minutes or less	
for a round trip, including queuing,	
using the travel modes of walking or	
pedaling may be demonstrated	
(parameter SDWS 1).	
a Project technology performance level	The project is not HWT of IWT.
(HWT and IWT): It shall be	
demonstrated based on report of	
laboratory testing or official	
notification that the project	
technology or equipment achieves	
either (i) the performance target	
classification 3-star or 2-star level	
meaning "Comprehensive	
Protection " as per the WHO	
International Scheme to Evaluate	
Household Water Treatment	
Technologies (World Health	
Organization 2011) or (ii)	
compliance with the national	
standard or quideline for household	
drinking water treatment technology	
if no national guideline or standard is	
available, then the project	
tochoology chall comply with the	
sows 2)	
שטעט צן.	Water quality test will be performed in
h. Project technology performance level	water quality test will be performed in
(CWT and CWS): For each individual	
	for arinking water in Kenya.

CWT or CWS, it shall be	Safe water directly supplied by the
demonstrated at the start of each	project will be assured to achieve the
crediting period with water quality	microbial quality and priority chemical
testing reports that the water directly	contamination and physical and aesthetic
supplied by the project water	contamination and physical and destriction
tochoology/course achieves both	aspects in the with hatonal standards.
technology/source achieves both.	
microbial quality in line with either	
(i) national standards or guidelines for	
microbial quality of drinking water, or	
in the absence of such requirements,	
(ii) the guideline values for	
verification of microbial quality from	
the Guidelines for drinking-water	
quality (Table 7.10, WHO, 2017);	
and	
ii. compliance with (i) national	
standards or guidelines on priority	
chemical contamination and physical	
and aesthetic aspects, or in the	
absence of such requirements, (ii)	
international standards or guidelines	
on priority chemical contamination	
and physical and aesthetic aspects.	
(parameter SWDS 3).	
	The project staff will conduct annual
The project must conduct annual	water hygiene education campaigns for
water hygiene education campaigns	the end-users. The impacts of the
for the end-users. (parameter SDWS	hygiene campaign will be assessed using
20).	the WHO/UNICEF Joint Monitoring
	Programme Core questions for
	- ·

	households ¹⁸ for drinking water and
	hygiene.
j. A project applying this methodology may make SDG claims if relevant monitoring parameter(s) is included in the monitoring plan to demonstrate and confirm the project's contributions to SDGs. See parameter SDWS 19.	For the contribution to SDG 6: The project aims to achieve basic level services by providing households an improved source with water collection times of no more than 30 minutes per round trip. Of the three aspects of accessibility, availability and quality, the project fulfills the quality aspect by monitoring water
	quancy.

B.3. Project boundary

The project boundary includes all infrastructure including the intake pipes, tanks, distribution network, pumps and kiosks that supply treated water and the end users within 1 km of each water kiosk.

¹⁸ Core Questions (https://washdata.org/monitoring/methods/core-questions)



Figure 10 Project boundary (Solstice Platform)

The solar power will be connected only to the pumping system which will be powering the pump for a maximum of 10hours daily. The current electricity on site will only be used for security lights at night and not to power the pump for project sustainability purposes.

The sources and gases included in the project boundary are described in the below table.

Source		GHGs	Inclu ded?	Justification/Explanation
Emissions from wood fuels utilized for obtaining safe drinking water displaced due to the project activity	Emissions from	CO ₂	Yes	Major source of emissions
	wood fuels utilized for obtaining safe drinking water displaced due to the project activity	CH ₄	Yes	Important source of emissions
		N ₂ O	Yes	Can be significant source of emissions for some fuels

Gold Standard *Climate Security and Sustainable Development*
ct irio	Emission from electricity	CO ₂	No	Minor source of emissions
oje ena	pumps	CH_4	Νο	Minor source of emissions
Pro	1 1	N_2O	Νο	Minor source of emissions

B.4. Establishment and description of baseline scenario

According to the applied methodology, baseline scenario is the existing baseline fuel and technology for boiling water by end-user group. The project will apply suppressed demand to the baseline scenario and includes the end users who would have boiled water for drinking in the absence of the project activity. The project is small scale activity and eligible for implementing suppressed demand. The suppressed demand value is determined by a set of questions in the baseline survey by asking households how they would choose to purify drinking water if they were not subject to financial constraints or energy poverty.

Each project shall document the following pre-project conditions that define the specific baseline scenario of the end-user group(s) of the project:

a. Pre-project practices of boiling water, or drinking unsafe water

(suppressed demand): Document the drinking water sources and/or treatment technologies available and used in the project boundary.

b. Efficiency of water boiling systems: Document the baseline stove or water boiling technologies and technologies' thermal efficiency used in the project boundary.

c. Baseline fuels: Document the baseline cooking fuels used and/or fuels used for water boiling in the project boundary.

In order to document the pre-project conditions following surveys have been carried out:

Baseline Survey of target population characteristics

A baseline survey is conducted within the project boundary by interviewing 145 residents during 27-30 January 2022 in Bondo District ,West Yimbo Ward. The households are selected randomly within the project boundary (Figure 11). As the

Gold Standard *Climate Security and Sustainable Development*

estimated population size is greater than 1000; the minimum sample size should be 100 as per the item 4.3.2 of the applied methodology. Over sampling is done to avoid erroneous responses and outliers.



Figure 11 Sampling frame



Figure 12. Pictures from the baseline survey

The data collected is specific to the characteristics of each baseline scenario, and should be tailored accordingly. The following information has been gathered:

- A. Basic Information
 - 1. Name, Surname
 - 2. Address
 - 3. Phone number
 - 4. Gender
 - 5. Age
 - 6. Household Size
 - 7. GPS Coordinates
- B. Source of water for drinking
- C. Water purification
 - 1. Purifying water or not
 - 2. If not purifying, the reasons
 - 3. Method of purification preferred if reason is not relevant anymore
 - 4. Incidents of waterborne diseases
 - 5. Method of purification
 - 6. Purpose of purification
- D. Fetching water
 - 1. Purpose of fetching water
 - 2. Water source and place
 - 3. Walk or pedal
 - 4. Length of each round trip
 - 5. Person that fetches water in the family
- E. Cookstove
 - 1. Cookstove number and type
 - 2. Fuel types used
- F. Boiling water
 - 1. Cookstove used for boiling water
 - 2. Fuel used to boil water
 - 3. Seasonal difference in cookstove type and fuel used
 - 4. Amount of fuel used for boilig water
- G. Fuelwood collection
 - 1. Place of collection
 - 2. Time consumed for collecting fuelwood
- **Gold Standard** *Climate Security and Sustainable Development*

- H. Suppressed demand
 - 1. Willingness to pay for safe water
 - 2. Affordable price

The results are summarized as follows:

Source of water for drinking: The drinking water sources used in the project boundary is identified in the project boundary, and are classified as improved and unimproved water source. 142 respondents out of 145 were drinking water from unimproved sources which is 98% of the population. Most of the people who depends on unimproved sources (92.3%) said that they use lake water while the rest (7.7%) uses river water. The respondents with access to safe water resources are only 3. One respondent is getting water from public tap/ stand pipe while two of them use bottled water.

Water Purification and Suppressed Demand: Proportion of households who suffered from water-borne diseases among the 145 respondents that use lake or river water is 70.3%.

85% of sample group purifies water for mostly drinking proposes while 3% mentioned they drink safe water. The rest (12%) do not purify water and the mostly stated reason for that is unavailability of fuels within area. If no constraints, all of them said they would boil the water.

The most common choice for those who purifies water is boiling with a rate of 41% to the total sample group. The share of users of purification tablets is 22%. The households who use both boiling and purification has the same share of 22% in total population. For this group, it is assumed that they apply 50% boiling and 50% purifying tablets (11%+11%) and added to the percentage of boiling water (41%+11%=52%) and using purification tablets (22%+11%=33%). There are

research showing that chlorination is less preferred then boiling in Kenya and that approach is considered to be conservative¹⁹,²⁰.

Purification method	Number	Share
Boiling	59	41%
Purification tablets	32	22%
Both boiling and purification tablets	32	22%
No treatment	22	15%
Identified barriers	18	12%
Have access to improved water sources	4	3 %
TOTAL	145	100%

Table 8 Preferred purification methods

Gold Standard Climate Security and Sustainable Development

¹⁹ Public Knowledge and Perception of Drinking Water Quality and its Health Implications: An Example from Makueni County, South-Eastern Kenya (https://www.mdpi.com/1660-4601/19/8/4530/htm) shows that 43% of the households boil water while 14% of them uses tablets. The rest uses both methods as well as water filters. (11 February 2022)

²⁰ Water treatment and handwashing practices in rural Kenyan health care facilities and households six years after the installation of portable water stations and hygiene training

⁽https://iwaponline.com/jwh/article/16/2/263/38004/Water-treatment-and-handwashing-practices-in-rural). Although 80% of the community received free chlorine treatment tablets and sachets, the free residual chlorine is detected in only 11.7% of the users. The common barriers are the taste and smell as well as time needed to purify water. (6 February 2018)



Figure 13. Share of purification methods applied to ER calculations.

Therefore, the share of total population including the suppressed demand adds up to 64% as 52% boils water and 12% would boil water to total sample size.

Fetching Water: 91% of the respondents said they fetch water and the rest was buying from the vendors. Most of the sample group fetch water from lake by pedalling or walking and small percentage do both. The length of the journey varies half and hour up to 1 hour in general. Mostly the parents; mother or father fetches the water for the family.

Cookstoves and fuels used for boiling water: 82% of the respondents said they own cookstove. Of the cookstove owners, 70% of them have one stove whereas 29% of them two and 1% of them 3 stoves. Figure.13 and 14 show the stove types and fuels used for boiling water in dry season (current season) and wet season.

Charcoal stoves used are observed to be either "Kenya Ceramic Jiko" or "Metallic Charcoal Stove". The former is identified as a basic efficient charcoal stove that has metal body with heat retaining lining. The latter is a traditional metallic charcoal stoves that do not include a ceramic / clay liner or any other component to help with fuel and thermal efficiency. Figure 12. demonstrates the types of stoves and their classification as improved or traditional²¹.

Siaya County Integrated Development Plan 2018- 2022 indicates the usage rate of Ordinary Jiko or Kenya Ceramic Jiko as 10.8%²². The same percentage is applied to the sample group (11% of 114 stoves) and the default thermal efficiency for Ordinary Jiko is taken as 24.5% as per research done in 2018²³. The remaining charcoal stoves (25% of all stoves) is expected to be Metallic Charcoal Stoves and their efficiency is assumed as 12%. The project will use the default values for thermal efficiencies of traditional stoves as indicated in the methodology.

Fuel used for boiling water is mainly fuelwood in dry season (62%) while charcoal is more preferred in wet season (59%). The shares presented in Figure.14 include those who stated to use both fuel types assuming an equal usage rates.

The results deemed to be conservative compared to the reported stove types and fuel use in Siaya County. The main cooking appliance is traditional three stone fire with a percentage of 71.4% and the main source of cooking fuel is firewood with a percentage of 84.2% as per the official records¹⁶.

²¹ 2019 Kenya Cooking Sector Study, 3.2 Technologies and Fuel Stacking

⁽https://openknowledge.worldbank.org/handle/10986/22521)

²² 13.3 Energy Access, page 20, (https://repository.kippra.or.ke/bitstream/handle/123456789/1218/2018-

^{2022%20%20}Siaya%20County%20CIDP.pdf?sequence=1&isAllowed=y)

²³ Figure.5, Design of an Improved cooking stove using high density heated rocks and heat retaining techniques (https://www.researchgate.net/publication/328578252_Design_of_an_Improved_Cooking_Stove_Using_High_Density _Heated_Rocks_and_Heat_Retaining_Techniques)



Figure 14. Cookstove types used in Kenya (Annex A.1)¹⁰



Figure 15. Cookstoves used for boiling water





Fuelwood Collection: 47% of the sample group buys fuelwood whereas 36% of them fetches firewood from different sources. The rest both fetches firewood and buys occasionally. More of those who fetches firewood uses the areas close to farm fields (40%) and almost an equal percentage (38%) goes to forest. The rest told using both options.

Baseline Survey for counting of project beneficiaries within the project boundary: A survey for house counting was carried out during 12-22 December 2021 in West Yimbo. 6,312 houses were counted in total. The households have been selected within the 1km circle of the planned locations of water kiosks where the people can retrieve the safe drinking water. Total population counted was 27,905. The average household size is 4.11 persons in West Yimbo excluding the large size families.



Figure 17 The coverage of the first survey done on December 2021

Once the project design has been revised to include PENWA system, another survey has been carried out to include East Yimbo to count the houses and understand the available water resources to the community on 19-21/05/2022. 5,743 houses have been counted and 101 residents were interviewed. Average household size was found to be 4.97 persons and total population is calculated as **28,543** in East Yimbo. During the survey, 67% of the respondent said they use lake water and the most of the rest depends on rainwater collection. 80% of the respondents said they purify water before drinking.



Figure 18. The coverage of the second survey done on May 2022

Baseline survey was carried out in West Yimbo on 27-30 January 2022 and the household size was predicted to be 4.88 persons excluding the outliers. The first survey carried out previously includes high amount data for West Yimbo and the household size is 4.11. Therefore, we opted to use the conservative value for our calculations.

In order to do that, the population of West Yimbo has been re-calculated by subtracting the overlapping houses counted during the survey in East Yimbo and eliminating the houses outside the 1 km circle of the water kiosks. The total population is revised as **19,338** in West Yimbo; that is approximately 4,705 houses each with a household size of 4.11 persons.

Figure.15 below shows the data collection points for house counting with existing and planned serving points. Each water kiosk location is surrounded by 1 km radius circle to determine the service area. Black circles indicate the coverage area for existing 10 kiosks and the coloured circles indicate the extension areas for additional water kiosks. There is a pump house located Nyamonye area 100 meters from the lake intake but not operational due to unpaid energy bills. A population of 17,313 will be served once those points are active again. Total population served with 20 serving points in Yimbo wil reach to **47,881** people. Considering that each water kiosk can serve up to 500 households, i.e. 2000- 2,500 persons in total and there will be domestic and private connections; this figure is acceptable for ex-ante estimation of quantity of water provided. The total population served for each kiosk is also checked from Solstice database provided under mWater platform, the resultant population is estimated to be higher than estimated. The water service points are placed in the map on the platform and 1km radius is drawn for each point. The platform has the specific formula defined to calculate the population within 1 km circle. Please see below comparison of the data collected on field and calculated for existing kiosks ²⁴.

	Survey	mWater
Name	Report (Pop.)	Calculation(Pop.)
USENGE KIOSK	5,639	17,804
RUWE KIOSK	1,637	2,874
JUSA KIOSK	1,130	2,778
KADERO KIOSK	1,230	1,941
NYAGERA KIOSK	1,107	3,463
USIGU KIOSK	1,435	3,576
MAJENGO KIOSK	1,735	3,249
KINDA UMALA KIOSK	1,445	1,835

Table 9.	Comparison	of ex-ante	estimate	for population	within	1km	of each	kiosk
----------	------------	------------	----------	----------------	--------	-----	---------	-------

²⁴https://share.solstice.world/v3/dashboard_link/c86d3cba3cf242d4a7b4f5892d6cfc14?share= d1ab413afdf24405835633afe55d1bfa

COUNTY KIOSK CORNER (KAIJARIO)	1,955	9,575
TOTAL	17,313	47,095



Figure 19. Houses within the West and East Yimbo Wards, covered by all water kiosks

B.5. Demonstration of additionality

Specify the methodology, activity requirement or product requirement that establishes deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	Activity Requirement for Community based technologies: 4.1.9. Projects that meet any of the following criteria are considered as deemed additional and therefore are not required to prove Financial Additionality at the time of Design Certification: (a) Positive list (Annex B) (b) Projects located in LDC, SIDS, LLDC (c) Micro-scale projects
Describe how the proposed project meets the criteria for deemed additionality.	The project is additional as per the paragraph in Annex.B: 1.1.5 Project activities that involves technologies and/or practices providing thermal energy to the use that have less than 20% adoption rate. As per the footnote 16; examples of these technologies include but not limited to the introduction of improved biomass or fossil fuel cookstoves, ovens, dryers, space and water heaters (solar and otherwise), heat retention cookers, solar cookers, biodigesters, safe water supply and treatment technologies that displace the boiling of water, thermal insulation in cold climates, etc. The safe water supply and treatment technology has an adoption rate less than 20%. Please see the explanation below.

The share of water kiosks serving in Kenya has been calculated by using the mWater platform database. The water kiosks have a share of 10.7% and piped into dwelling has 2.4% share²⁵.





Figure 20 Share of water point types in Kenya

Water kiosks are stationary vending locations, staffed by attendants, where water is distributed by the container. They differ from public taps in that water is sold and not free as generally is the case of community standposts. Kiosks can help increase access to safe supply in communities without access to a piped network, or where the proportion of households connected to the network is small. They provide households without access to piped water an alternative source of potable supply with no up-front payment or connection fee.

²⁵https://share.solstice.world/v3/dashboard_link/e3504d427e13421cafc026fc3daa5930?share=d82511dacbe74390807 18c7ec42d5cbd

Ultimately the goal of every utility and family is to have access to a safe and reliable water supply within the house. Piped systems require coordination and long-term planning to ensure sustainability. Inefficiency in utilities operations leads to a vicious cycle of no water, inaccurate billing, non-payment, no maintenance.

Total share of the safe water supply technologies implemented by the project is 13.1% in the whole country; which is below 20%. The project is deemed additional in terms of the technology introduced to the country.

The project would not take place without the carbon finance. A high percentage of the financial resources for the project activities is required during the improvements of the existing system. This is due to the repairs in existing structures, upgrading the treatment system, installation of solar panels and building the water kiosks. The maintenance and sustainability of the system will be assured by the continuous support provided to the local staff.

B.5.1 Prior Consideration

The project is applying under regular project cycle and demonstration of prior consideration is not required.

B.5.2 Ongoing Financial Need

>>N/A

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

Sustainable	Most relevant	SDG Impact
Developme	SDG Target	
nt		
Goals		Indicator (Proposed or
Targeted		SDG Indicator)
13 Climate	13.b. Promote mechanisms for raising	Emission reductions
Action	capacity for effective climate change-related	achieved by fuelwood
(mandatamy)	planning and management in least	savings at household
(manualory)	developed countries and small island	level

	developing States, including focusing on women, youth and local and marginalized communities	
15 Life on Land	15.1.By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	Amount of firewood saved by the project stoves per year
3 Good health and well-being	3.9. By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Proportion of target population using safely managed drinking water services without water- borne diseases
5 Gender Equality	5.4. Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate	Proportion of households who perceive saved time from collecting wood and water boiling
6 Clean Water and Sanitation	6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all.	 Amount of safe water served at the required quality by national standards. Increased awareness due to annual Water hygiene campaigns.
7 Affordable Clean Energy	7.2. By 2030, increase substantially the share of renewable energy in the global energy mix	Total electricity produced. Renewable

8 Decent Work and	8.5. By 2030, achieve full and productive employment and decent work for all women and men, including for young people and	Number of temporary and
Growth	persons with disabilities, and equal pay for work of equal value	permanent jobs created

B.6.1 Explanation of methodological choices/approaches for estimating the SDG Impact

SDG 13: Climate Action

Parameter: Emission reductions achieved by fuelwood and charcoal savings at household level.

As per the applied GS methodology, The baseline emission factor shall be calculated as follows:

$$EF_{b} = SE_{w,b,y} * \sum_{f} (x_{f} * (EF_{b,f,CO2} * f_{NRB,f,y} + EF_{b,f,nonCO2})) \div 10^{9} \qquad Eq. 1$$

Where:

EFb	=	Emission factor for the use of fuel to obtain safe water in the baseline (tCO_2e/L) $$
SE _{w,b,y}	=	Specific energy required to boil water (kJ/L), to be calculated as per the paragraph below
x_f	=	Proportion of fuel <i>f</i> used in the baseline (fraction determined based on an energy basis)
$EF_{b,f,CO2}$	=	CO_2 emission factor from use of fuel f (t CO_2/TJ)
EF _{b,f,nonCO2}	=	Non-CO ₂ emission factor arising from use of fuel f , when the baseline fuel f is biomass or charcoal (tCO ₂ e/TJ). This parameter is omitted when f is a fossil fuel.

f _{NRB,f,y}	=	Fractional non-renewability status of woody biomass fuel during year y (fraction). For biomass, it is the fraction of woody biomass that can be established as non-renewable. This parameter is omitted when f is a
		fossil fuel.
f	=	Index for baseline fuel types

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

$$SE_{w,b,y} = 360.83/\eta_{wb} \qquad Eq. 2$$
Where:

$$360.83 = Default amount of energy required to obtain 1 L of water after 5 minutes of boiling from a first principles approach kJ/l
$$\eta_{wb} = Efficiency of the stoves for baseline water boiling (%).$$
Weighted average of baseline stove types.$$

The baseline emissions shall be calculated as follows:

$$BE_{y} = EF_{b} \times (1 - C_{b} - X_{cleanboil,y}) \times Q_{y} \times M_{q,y}$$
 Eq. 3

Where:

BE_y	=	Baseline emissions from the use of fuel to obtain safe water in the baseline (tCO_2e)
C _b	=	Proportion of project end-users who in the baseline were already using a safe water supply that did not require boiling (%)
$X_{cleanboil,y}$	=	Proportion of project end-users that boil safe water in the project year y (%)
Q_y	=	Quantity of safe drinking water provided by the project in year y (L)
$M_{q,y}$	=	Modifier for the water quality in year y

The quantity of safe drinking water provided by the project is calculated using Method 1 applies to CWT and CWS;

In the case of CWT and CWS, the quantity of safe drinking water provided by the project Q_v is determined as follows:

$$Q_y = \min(Q_{m,y}, Q_{pop,y}) \qquad \qquad Eq. 4$$

Where:

$Q_{m,y}$	=	Monitored quantity of safe water provided by the project in year y (L).
$Q_{pop,y}$	=	Quantity of safe drinking water that could be consumed by project end-users in year y (L)

Quantity of safe drinking water shall be calculated as follows:

$$Q_{pop,y} = \sum_{p} HH_{p,y} \times HN_{p,y} \times QPW_{p} \times DO_{p,y}$$
 Eq. 5
Where:

W

$HH_{p,y}$	=	Number of premises type p served by the project in year y
$HN_{p,y}$	=	Number of individuals per premises type p (e.g. household, school) in year y
QPW _p	=	Volume of drinking water per person per day for premises type p (L). Apply the default value or monitored value through water consumption field tests in the project scenario, capped at 5.5 L per person per day.
$DO_{p,y}$	=	Days the project technology is operational for end- users in premises p in year y

> Project emissions

Project emissions may result from the operation of new low-emission water treatment technologies. Project emissions (PE_{ν}) shall be calculated as follows:

$$PE_y = PE_{ff,p,y} + PE_{ec,p,y}$$

Where:

Eq. 8

PE_y	=	Project emissions in year y (tCO ₂)
$PE_{ff,p,y}$	=	Project emissions from fossil fuel use in year y (tCO ₂)
$PE_{ec,p,y}$	=	Project emissions from electricity use in year y (tCO ₂)

There will be **no fossil fuel use** in the project therefore project emissions from fossil fuel use will be **zero**. The solar power will be connected only to the pumping system which will be powering the pump for a maximum of 10 hours daily. The current electricity on site will only be used for security lights at night and not to power the pump for project sustainability purposes.

> Leakage emissions

The potential sources of leakage have been evaluated as per the methodology. Leakage risks deemed very low can be ignored as long as the case for their insignificance is substantiated. The leakage of the project implementation is deemed to be very low and is expected to be zero.

Members of the population who do not	In the baseline scenario, mainly
participate in the project, and previously	fuelwood and charcoal are used for water
used lower emitting energy sources,	purification along with chlorine tablets.
instead use the non-renewable biomass	No renewable energy is applicable. The
saved under the project activity.	leakage could be caused by the
	population (22%) who only use chlorine
	tablets switching to boiling water.
	However, the fuel is unavailable in the
	area (baseline study) and generally
	purchased. The availability of fuelwood
	or the price is not expected to change
	significantly by the implementation of
	the project. Therefore, the leakage risk
	is deemed to be very low and neglected.
The project significantly reduces the NRB	Only 28 respondents out of 145 stated
fraction within an area where other GHG	collecting firewood from forest (19.3%)
mitigation project activities account for	and the project is not expected to impact
NRB fraction in their baseline scenario.	

	NRB fraction in other areas. There are no
	other CDM or VER projects in the area.
The project population compensates for	The space heating effect of boiling water
loss of the space heating effect of water	is expected to be minimal. The
boiling by adopting some other form of	cookstoves are already being used for
space heating or by retaining some	cooking, it is highly unlikely that another
baseline wood fuel-burning practices.	technology will be used for heating.

> Emission reductions

The emission reductions are calculated as follows:

$ER_y = BE_y - B$	PE_y -	$-LE_y$	Eq. 11
Where:			
$ER_{\mathcal{Y}}$	=	Emission reductions in year y (tCO ₂ e/yr)	
BEy	=	Baseline emissions in year y (tCO ₂ e/yr)	
PEy	=	Project emissions in year y (tCO ₂ e/yr)	
LEy	=	Leakage emissions in year y (tCO ₂ e/yr)	

SDG 15: Life on Land

Parameter: Amount of firewood saved by the project per year. The total firewood and charcoal saved will be calculated based on the amount of water served by the following formula:

Amount of fuelwood saved = $(SEw, b, y * ((1 - Cb - Xcleanboil, y) * Qy) / NCV_{fuelwood})$

NCV: Net calorific value for fuelwood (0.0156 TJ/t)

SDG 3: Good health and well-being Parameter:

Gold Standard *Climate Security and Sustainable Development*

Proportion of target population using safely managed drinking water services without water-borne diseases

The beneficiaries will be asked to evaluate any improvement in their health conditions compared to baseline situation during the household survey. Whether the number incidents of water borne diseases has been increased or not will be explored.

SDG 5: Gender Equality

Parameter: Proportion of households who perceive reduced time for collecting wood and water boiling

During the household survey, questions about the perception of time spent on water boiling and fuelwood collection will be asked to women. If the response is positive, the surveyors will further explore for what kind of activities people are using their time saved.

SDG 6: Clean Water and Sanitation

Parameter: Amount of safe water served at the required quality by national standards.

Amount of safe water served by the project will be metered or calculated.

Parameter: Increased awareness due to annual Water hygiene campaigns. Number of people reached through hygiene campaigns will be monitored.

SDG 7: Affordable Clean Energy

Parameter: Total electricity produced: Renewable Amount of electricity produced by the solar panels will be metered or calculated.

SDG: 8: Decent work and economic growth

Parameter: Number of temporary and permanent jobs created

Number and type of jobs created will be recorded with employment status and duration.

B.6.2 Data and parameters fixed ex ante

SDG13

a. Related to water quality

Parameter ID	SDWS 1
Data/parameter	Number of household/institution per CWT/CWS
Unit	Number of end-user premises, quantity
Description	End users premises (e.g. households, institutions) within 1 km distance of project water source
Source of data	House counting
Value(s) applied	4,705 counted in West Yimbo
	5,743 counted in East Yimbo
Choice of data or Measurement methods and procedures	House counting survey: The households has been selected within the 1km circle of the planned locations of water kiosks where the people can retrieve the safe drinking water.
Purpose of data	Determination of number of eligible households.
Additional comment	N/A

Parameter ID	SDWS 2
Data/parameter	Project technology description
Unit	N/A
Description	The project applies zero emission solar powered technologies.
Source of data	Manufacturer Specifications, Workplans, Technical Assessment Report.
Value(s) applied	N/A
Choice of data or Measurement methods and procedures	Manufacturer Specifications and Technical Assessment Report as per the applicable standards.

Purpose of data	Confirmation on technology specifications and performance level
Additional comment	N/A

Parameter ID	SDWS 3
Data/parameter	Project technology performance level (CWT or CWS)
Unit	N/A
Description	 The water directly supplied by the project must comply with: ii. Microbial quality in line with (i) national standards or guideline for microbial quality of drinking water, or in their absence, (ii) the guideline values for verification of microbial quality from the Guidelines for drinking-water quality, 4th edition (Table 7.10, WHO, 2017²⁶); and iii. Chemical quality (i) national standards or guidelines on priority chemical contamination and physical and aesthetic aspects, or in the absence of such requirements, (ii) international standards or guidelines and physical and aesthetic aspects Once at the start of the crediting period, and microbial
	quality at the CWS and CWT location must be retested following an event that could lead to contamination of the source water (e.g. flooding).
Source of data	Water quality test reports
Value(s) applied	N/A
Choice of data or Measurement methods and procedures	Laboratories with quality accreditation will be used for water quality testing. The accreditation confirms adequate quality management plan in place which addresses both quality assurance and quality control test procedures. The project will comply with the quality standards defined in "Guidelines on Drinking Water Quality and Effluent

²⁶ https://www.who.int/publications/i/item/9789241549950

	Monitoring ²⁷ " published by Water Services Regulatory Body (WASREB) that is authority to determine standards for the provision of water services to consumers and to monitor compliance with established standards for the operation and maintenance of the facilities for water services.
Purpose of data	Calculation of project scenario
Additional comment	N/A

Parameter ID	SDWS 4
Data/parameter	Regulatory framework for safe water supply
Unit	N/A
Description	List and provide a summary of any national, sub-national and local regulations or guidance for safe drinking water supply, operation and maintenance, including any tariff requirements. Describe how the project complies with the regulatory framework. Update at the start of each crediting period.
Source of data	National, sub-national and local authorities
Value(s) applied	N/A
Choice of data or Measurement methods and procedures	in The project is in compliance with Water Act 2016 ²⁸ , Kenya. The Act defines ownership of and rights in water resources of Kenya.
	The Water Act 2016 under Section 72 requires Water Services Regulatory Board (WASREB) to determine and prescribe national standards for the provision of water services. Guidelines on Drinking Water Quality and Effluent Monitoring ²⁹ contain information on establishing the minimum number of samples to be taken, water quality parameters to be measured, recording and reporting/ publication of results. Compliance with this

²⁷ https://wasreb.go.ke/downloads/Water_Quality_&_Effluent_Monitoring_Guidelines.pdf
²⁸ https://wasreb.go.ke/downloads/Water%20Act%202016.pdf

²⁹ https://wasreb.go.ke/downloads/Water_Quality_&_Effluent_Monitoring_Guidelines.pdf

	guideline is a condition of the licence granted to the water services board.
Purpose of data	Confirmation that the project does not undermine or conflict with any national, sub-national and local regulations or guidelines for safe drinking water supply, operation and maintenance, including any tariff requirements.
Additional comment	N/A

Parameter ID	SDWS 5
Data/parameter	Water sources in the project boundary
Unit	N/A
Description	Identify the water sources in the project boundary, and identify whether they are used for drinking water, and for all that are used for drinking water, classified as improved and unimproved water source.
Source of data	Baseline Survey (Final_Baseline Survey Data_889 Maji Safi Solar.xlsx)
Value(s) applied	98% of the target population uses unimproved water sources.
Choice of data or Measurement methods and procedures	Baseline Survey was performed
Purpose of data	Calculation of baseline scenario.
Additional comment	N/A

b.Related to emission reductions

Parameter ID	SDWS 6
Data/parameter	Stove technologies used in the project boundary
Unit	N/A

Description	The proportion of different stove types used in premises in the geographical area of the project.			
Source of data	Baseline Survey (Final_Baseline Survey Data_889 Maji Safi Solar.xlsx)			
Value(s) applied	 The following categories of stove types are identified in the project boundary: Three-stone fire Charcoal stoves Metallic Charcoal Stove (a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system) Kenya Ceramic Jiko (improved charcoal cookstove) 			
	• Improved cookstoves ($\geq 20\%$ thermal efficiency)			
	Only 3 stone fire 52% 32%			
	Only charcoal cookstove49%		49%	
	Both 3 stone and charcoal	17%	17%	
	Improved fuelwood	1%	1%	
Choice of data or Measurement methods and procedures	Baseline assessment prior to validation for classification and clustering (if applicable) of baseline stove types is being conducted.			
Purpose of data	Calculation of baseline scenario			
A shalf the second second second	N/A			

Parameter ID	SDWS 7
Data/parameter	Expected technical life or project technology
Unit	Time period

Description	The operation lifetime of the project technology is at least 30 years as per the manufacturer specifications
Source of data	Manufacturer specifications
Value(s) applied	at least 30 years
Choice of data or Measurement methods and procedures	Manufacturer specifications
Purpose of data	Assessment of technical life against crediting period and if necessary (total crediting period \geq expected technical life) inclusion of appropriate replacement mechanism as part of the project design.
Additional comment	N/A

Parameter ID	SDWS 8		
Data/parameter	$X_{ m f}$		
Unit	Percentage of fuel f use in target population		
Description	Percentage of fuel f use in target population		
Source of data	Baseline survey (Final_Baseline Survey Data_889 Maji Safi Solar.xlsx)		
Value(s) applied	Fuel type	Dry season	Wet season
	Fuelwood	62%	42 %
	Charcoal	38%	58%
Choice of data or Measurement methods and procedures	Questions about fuel used for water boiling were asked to the participants to the baseline survey for both seasons. Please refer to the Baseline Survey results.		
Purpose of data	Calculation of baseline scenario		
Additional comment	-		

Parameter ID	SDWS 9
Data/parameter	EF _{b,f,CO2}
Unit	tCO ₂ e/TJ
Description	CO ₂ emission factor arising from use of wood fuel in baseline scenario
Source of data	Calculated from IPCC defaults; Volume 2:2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2, Table 2.5
Value(s) applied	Fuelwood- 112
	Charcoal- 165.22
Choice of data or Measurement methods and procedures	Deemed valid by Methodology
Purpose of data	Calculation of baseline scenario
Additional comment	-

Parameter ID	SDWS 10
Data/parameter	EFb,f,non CO2
Unit	tCO ₂ e/TJ
Description	Non-CO ₂ (CH ₄ and N ₂ O) emission factor arising from use of wood fuel in baseline scenario

Source of data	EF _{b,non} co ₂ ; calculated from IPCC defaults; Volume 2:2006 IPCC Guidelines for National Greenhouse Gas Inventories ³⁰ , Chapter 2, Table 2.5
	Global Warming Potential (GWP); from IPCC Fifth Assessment Report (AR5) Climate Change 2013: The Physical Science Basis ³¹
Value(s) applied	Fuelwood- 9.46
	Charcoal-44.83
Choice of data or Measurement methods and procedures	Deemed valid by Methodology
Purpose of data	Calculation of baseline scenario
Additional comment	-

Parameter ID	SDWS 11		
Data/parameter	η_{wb}		
Unit	Percentage		
Description	Weighted average efficiency of the baseline water boiling devices. Calculate the weighted average of the water boiling efficiency in the project boundary using the proportion of different stove types used and the stove efficiencies.		
Source of data	Baseline survey (Final_Baseline Survey Data_889 Maji Safi Solar.xlsx)		
Value(s) applied	Wet season 12.4%	Dry season 13.6%	

³⁰ https://www.ipcc-nggip.iges.or.jp/public/2006gl/
³¹ https://www.ipcc.ch/report/ar5/wg1/

Choice of data or Measurement methods and procedures	The following default values for cookstoves are applied to calculate the weighted average of the water boiling efficiency.		
	Cookstove Type Efficiency		
	Three-stone fire	10%	
	Kenya Ceramic Jiko	24.5%	
	Metallic Charcoal Stove	12%	
	Charcoal Stoves Average	16%	
	Improved fuelwood	30%	
Purpose of data	Calculation of baseline scenario		
	 Metallic charcoal stoves are classified as diffiproved in the report Kenya Household Cooking Sector Study 2019 by Ministry of Energy³². Table 24 summarizes the default values for voluntary performance targets and tiers. Further in page 159, A.1.7 Categorization of cookstoves and fuels chart; three-stone fire is classified as Tier 0 (<10%) and metallic charcoal stoves (without insulation) is classified as Tier 0-1 (up to 10%). Water Boiling Test will be done to determine the thermal efficiency of metallic charcoal stoves before the first monitoring period. Siaya County Integrated Development Plan 2018- 2022 indicates the usage rate of Ordinary Jiko or Kenya Ceramic Jiko as 10.8%³³. The same percentage is applied to the sample group (11% of 114 stoves) and the rest of charcoal stoves (25% of all stoves) are assumed to be Metallic Jiko. 		

 ³² https://eedadvisory.com/wp-content/uploads/2020/09/MoE-2019-Kenya-Cooking-Sector-Study-compressed.pdf
 ³³ 13.3 Energy Access, page 20, (https://repository.kippra.or.ke/bitstream/handle/123456789/1218/2018-2022%20%20Siaya%20County%20CIDP.pdf?sequence=1&isAllowed=y)

Parameter ID	SDWS 12	
Data/parameter	C _b	
Unit	Percentage	
Description	Proportion of project end-users who in the baseline were already using safe water, either from an improved water source, or from a water treatment method other than boiling. At the start of each crediting period	
Source of data	Baseline survey (Final_Baseline Survey Data_889 Maji Safi Solar.xlsx)	
Value(s) applied	36%	
Choice of data or Measurement methods and procedures	The percentages for population with access to safe water (3%) and using chlorine (33%) have been summed to calculate the percentage who do not boil water.	
Purpose of data	Calculation of baseline scenario	
Additional comment	The primary purification method preferred by households are crosschecked by the following study:	
	Public Knowledge and Perception of Drinking Water Quality And Its Health Implications: An Example From The Makueni County, South-Eastern Kenya (11 February 2022). 43% of the respondents boil water, 14% use chlorine-based disinfectant and the rest uses both two methods as well as water filters ³⁴ .	

 $^{^{34}}$ V) Watre treatement, page 13 (https://www.mdpi.com/1660-4601/19/8/4530/htm)

Parameter ID	SDWS 21
Data/parameter	fnrb,f,y
Unit	Percentage
Description	Non-renewability status of woody biomass fuel during year y in case the baseline fuel is biomass or charcoal
Source of data	Determined by:
	CDM TOOL30, calculation of the fraction of non- renewable biomass
	https://cdm.unfccc.int/DNA/fNRB/index.html
Value(s) applied	0.76
Choice of data or Measurement methods and procedures	Calculated as per referred tool version 3.0 by 9 Eylul University, Izmir, Turkey.
Purpose of data	Calculation of baseline scenario
Additional comment	-

Parameter ID	SDWS 24
Data/parameter	QPW_p
Unit	Liters/person/day
Description	Volume of drinking water per person per day for premises type p
Source of data	Default value in the methodology
Value(s) applied	4
Choice of data or Measurement methods and procedures	Option 1 : Apply the default value per person. In the case of institutions, such as schools, the value should reflect the expected drinking water use per person while on the premises of the institution, in line with the following defaults:

Gold Standard	Climate Security and Sustainable Development	
---------------	--	--

	 Full-day premises: 4 L/person/day Boarding school: 4 L/person/day Half-time premises: 3 L/person/day The default value for full-day premises is used.
Purpose of data	Calculation of baseline scenario
Additional comment	-

Parameter ID	SDWS 16
Data/parameter	EF _{ec}
Unit	tCO2/kWh
Description	Emission factor associated with electricity use
Source of data	Default value in the methodology
Value(s) applied	0.0008
Choice of data or Measurement methods and procedures	The grid electricity use is expected to be none or minimal (less than 250kWh/yr) during the implementation of the project.
Purpose of data	Calculating project scenario
Additional comment	

Parameter ID	SDWS 17
Data/parameter	TDL
Unit	%
Description	Transmission and distribution losses associated with the electricity use

Gold Standard	Climate Security and	Sustainable Development
---------------	----------------------	-------------------------
Source of data	Default value in the methodology	
--	----------------------------------	
Value(s) applied	20	
Choice of data or Measurement methods and procedures	-	
Purpose of data	Calculating project scenario	
Additional comment		

B.6.3 Ex ante estimation of SDG Impact

>>

SDG 13: Take urgent action to combat climate change and its impacts

Parameter: Emission reductions achieved by fuelwood savings at household level

Following assumptions are made for the calculation of ERs:

- Those who purify drinking water both by boiling and using purification tablets are assumed to use each method equally.
- The users of both charcoal and firewood together are assumed to consume each fuel equally.
- The users of charcoal stoves are assumed to have Metallic Jiko and Kenya Ceramic Jiko at percentages 25% and 11% respectively (Siaya County Integrated Development Plan 2018- 2022).
- Metallic Jiko and Kenya Ceramic Jiko have 12% and 24.5% thermal efficiencies. The weighted average of thermal efficiencies as per the usage rate is calculated as 16%.
- The users of both charcoal stove and three-stone fire; are assumed to use each method equally.

Emission factors for fuelwood and charcoal are calculated by the following formula:

 $EFb = SEw, b, y * \Sigma(xf * (EFb, f, CO2 * fNRB, f, y + EFb, f, nonCO2)) \div 10^9$

Parameter	Unit	Description	Data Source	Value for Dry Season	Value for Wet Season
<i>xf</i> (Firewood)		Proportion of fuel f	Baseline	0.62	0.42
<i>xf</i> (Charcoal)	Fraction	used in the baseline	Survey	0.38	0.58
<i>EFb,f,CO</i> 2 (Fuelwood)	+CO2/T1	CO2 emission	Default value for Firewood	112	
<i>EFb,f,CO</i> 2 (Charcoal)		fuel f	Default value for Charcoal	165.22	
fNRB,f,y	Fraction	Fractional non- renewability status of woody biomass fuel during year y	Calculated	0.76	
<i>EFb,f,nonCO</i> 2) (Fuelwood)	tCO2/TJ	Non-CO2 emission factor arising from use of fuel f, when	Default value for firewood	9.46	
EFb,f,nonCO2) (Charcoal	tCO2/TJ	the baseline fuel f is biomass or charcoal	Default value for firewood	44.83	
<i>EFb</i> fuelwood	tCO2e/	Emission factor for	Calculated	0.000207	0.000129
EFb charcoal	L	obtain safe water	Calculated	0.000224	0.000312
EF b	tCO2e/ L	(tCO2e/L)	Calculated	0.000431	0.000441

Specific energy required is calculated with the following formula

Gold Standard *Climate Security and Sustainable Development*

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

Where; ηwb is the weighted average efficiency of the baseline water boiling devices. Dry Season:

SEw,*b*,*y* = 360.83/ 12.4% = 2,900.09 kJ/L

Wet season:

 $SEw_{,b,y} = 360.83/\eta wb = 360.83/13.6\% = 2,661.03 \text{ kJ/L}$

EFb is calculated separately for each fuel type and season by the formula above. EFb for each season is then calculated as the sum of EFb for fuel types:

EFb= *EFb* fuelwood + *EFb* charcoal

Baseline emission is calculated as follows:

$BEy = EFb \times$	(1 -	Cb –	<pre>Xcleanboil,y)</pre>	$\times Qy$	/ X	Mq,y
--------------------	------	------	--------------------------	-------------	-----	------

Parameter	Unit	Description	Data Source	Value
СЬ	Percentage	Proportion of project end-users who in the baseline were already using a safe water supply that did not require boiling	Baseline Survey	36%
Xcleanboil,y	Percentage	Proportion of project end-users that boil safe water in the project year y	Assumed	0%

Parameter	Unit	Description	Data Source	Value
Qy	L	Quantity of safe drinking water provided by the project in year y	Calculated	Dry Season: 31,600,972 Wet Season: 33,113,988
HNp,y	Number	Number of individuals per premises type p (e.g. household, school) in year y	House count	4.11 for West Yimbo; 4.97 for East Yimbo
ННр,у	Number	Number of premises type p served by the project in year y	House count	5,743 for East Yimbo;4,705 for West Yimbo
QPWp	L/pp	Volume of drinking water per person per day for premises type p	Default value	4
Mq,y	Fraction	Modifier for the water quality in year y	Assumed	0.95

Parameter	Unit	Description	Data Source	Value
		Days the project	The system is	
	Days	technology is operational for end-	assumed to be operational	Dry season: 165 ³⁵ Wet season: 182 ³⁶
		users in premises p	95% of the	
DOp,y		in year y	time	

Total population and amount of water served are calculated as follows:

Pop _{East Yimbo} = 5,743 houses x 4.97 person per house = 28,543Pop _{West Yimbo} = 4,705 houses x 4.11 persons per house = 19,338Total Pop=47,881

 Q_y = 47,881 x 4 lt x 165 days=31,600,972 Lt for Dry season Q_y =47,881 x4 lt x 182 days =33,133,988 Lt for Wet Season

Total $Q_y = 64,714,959$ Lt/year

BE for dry season = 6,889 tCO2e calculated as follows:

BEy= 0.000431 x (1-0.36-0) x 31,600,972 Lt x 0.76=6,889 tCO2e

BE for wet season = 7,426 tCO2e

BEy = 0.000441 tCO2e/lt x (1-0.36-0) x 33,133,988 Lt x 0.76 =7,426 tCO2e

Total annual BE avoided = 14,315 tCO2e once all system is operational.

Project emissions due to the grid electricity use is expected to be none or minimal during the operation. Therefore, not included in the calculations.

³⁵ Dry season is assumed to be shorter due to the maintanance work carried out during the season. Total serving days is 347.

³⁶ The Lake Victoria Basin falls under the equatorial hot and humid climate with a bi-modal rainfall pattern with long rains from March to May (3 monhts) and short rains from October to December (3 months). Lake Victoria Basin- Flood and Drought (<u>https://fdmt.iwlearn.org/resolveuid/082bbc0e-6e1a-4740-a407-85b173f87571</u>)

Leakage emission are deemed to be negligible due to the nature and size of the project.

SDG 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Parameter: Amount of firewood saved by the project per year

Amount of firewood saved will be calculated by the formula: Amount of fuelwood saved= $(SEw,b,y * ((1 - Cb - Xcleanboil,y)*Qy)/ NCV_{fuelwood})$

=(2,900.09 kJ/L*(1-0.36-0)*31,600,972 L)+(2,661.03 kJ/L* *(1-0.36-0)* 33,113,988 L)/0.0156 TJ/t* 10⁹ kJ/TJ =7,378.2 tonnes of firewood

SDG 6. Ensure availability and sustainable management of water and sanitation for all Amount of safe water served at the required quality by national standards will be calculated by the product of metered water with $Mq_{,y}$ modifier for the water quality. Increased awareness due to annual Water hygiene campaigns will be monitored by the number of people accessed by the campaigns.

For SDG 7, the electricity generated by the solar panels is calculated by using EU Photovoltaic Geographical Information System³⁷. For an installed capacity of 44 kW photovoltaic system, the annual electricity production is estimated to be 77,692.25 kWh.

For **SDG 3** and **SDG 5**, the results of household survey will be used, no calculation is applicable.

³⁷ https://re.jrc.ec.europa.eu/pvg_tools/en/tools.html#PVP

For **SDG 8**, the project database and training records will be used.

B.6.4 Summ	nary of ex	ante estimate	es of each SDG	Impact
------------	------------	---------------	----------------	--------

SDG 13

Year	Baseline estimate	Project estimate	Net benefit
01/08/2023- 31/12/2023	2,556 ³⁸	0	2,664
2024	14,315	0	14,315
2025	14,315	0	14,315
2026	14,315	0	14,315
2027	14,315	0	14,315
01/01/2028- 30/07/ 2028	8,314	0	8,314
Total	68,131	0	68,131
Total number of crediting years	5 year		
Annual average over the crediting period	13,626		

SDG 15

Year	Baseline estimate (t)	Project estimate	Net benefit
01/08/ 2023- 31/12/ 2023	1215.1	0	1215.1
2024	7,378.2	0	7,378.2
2025	7,378.2	0	7,378.2
2026	7,378.2	0	7,378.2
2027	7,378.2	0	7,378.2

 $^{\rm 38}$ 10 kiosks will be operational on 01/08/2023 serving 37% of the population. All kisosk will be operational on 01/12/2023.

01/01/2028- 30/07/ 2028	4,285.4	0	4,285.4
Total	35,013.4	0	35,013.4
Total number of crediting years	5 year		
Annual average over the crediting period	7,002.7		

Proportion of households who experienced reduced incidents of water borne diseases is estimated to be 95%

SDG 5

Proportion of households who perceive reduced time for collecting wood and water boiling is estimated to be 95%

Year	Baseline estimate(L)	Project estimate	Net benefit
01/08/2023- 31/12/2023	10,658,153	0	10,658,153
2024	64,714,959	0	64,714,959
2025	64,714,959	0	64,714,959
2026	64,714,959	0	64,714,959
2027	64,714,959	0	64,714,959
01/01/2028- 30/07/2028	37,587,867	0	37,587,867
Total	307,105,857	0	307,105,857
Total	5 year		
number of			
crediting			
years			

Annual	61,421,171	
average		
over the		
crediting		
period		

At least one water hygiene campaign will be held annually.

SDG 7

Year	Baseline estimate(kWh)	Project estimate (kWh)	Net benefit
01/08/2023- 31/12/2023	0	9,713.173	9,713.173
2024	0	77,692.250	77,692.250
2025	0	77,692.250	77,692.250
2026	0	77,692.250	77,692.250
2027	0	77,692.250	77,692.250
01/01/2028- 30/07/2028	0	45,125.362	45,125.362
Total	0	365,607.5	365,607.5
Total number of crediting years	5 year		
Annual average over the crediting period	73,121.5		

SDG 8

Number of permanent jobs provided will be determined as per the number of serving points and the staff required to run the water treatment process. At least 25 job opportunities are estimated to be created for local people.

Gold Standard *Climate Security and Sustainable Development*

B.7. Monitoring plan

B.7.1 Data and parameters to be monitored

SDG 13

a.Related to Water quality

SDWS 18
M _{q,y}
Fraction
Ongoing water quality indicated as the fraction of the samples that pass microbial quality standard requirements specified in relevant microbial quality standard for drinking water of the host country. In case a national standard is not available, the water quality shall comply with WHO Guideline values for verification of microbial quality i.e., all water directly intended for drinking must not have detectable E.Coli in any 100 ml sample i.e., less than 1 Colony Forming Unit (CFU) of E.Coli /100 ml.
Water quality test for samples taken from the transport containers when it reaches the end-user premises (e.g. household, institution).
0.95
The water quality test applies the bacterial quality standard <1 cfu E.coli/100ml, and the sampling determines the proportion of pass and fail results. A minimum sample size 30 will be selected.
Annual sampling, and the first round of testing will be conducted at least after six months from the start date.
Laboratories used for water quality testing will be approved by local health authorities and/or have quality accreditation; and have an adequate quality management plan in place which addresses both quality assurance and quality control test procedures. The project will comply with the quality standards defined in "Guidelines on Drinking Water Quality and

	Effluent Monitoring ^{39"} published by Water Services Regulatory Body (WASREB) that is authority to determine standards for the provision of water services to consumers and to monitor compliance with established standards for the operation and maintenance of the facilities for water services.
Purpose of data	Calculation of project scenario
Additional comment	

SDG.6

Parameter ID	SDWS 20
Data / Parameter	Water hygiene education campaigns
Unit	N/A
Description	Hygiene campaigns carried out among project safe water end-users.
Source of data	Report of annual hygiene campaign results
Value(s) applied	To be determined
Measurement methods and procedures	The impacts of the hygiene campaign shall be assessed using the WHO/UNICEF Joint Monitoring Programme Core questions for drinking water and hygiene to determine the fraction of the households and institutions where Safe water and Hygiene practices are found to fulfill "safely managed" or "basic" requirements.
	In-person or telephone or by messaging (e.g. text, app) based survey shall be conduct covering all the JMP core questions for drinking water and core questions for hygiene.
Monitoring frequency	Annually
QA/QC procedures	The fraction of the households where Safe water and Hygiene practices are found to fulfill "safely managed"

 $^{^{39}\} https://wasreb.go.ke/downloads/Water_Quality_\&_Effluent_Monitoring_Guidelines.pdf$

	or "basic" requirements is expected to increase over time as a result of the hygiene campaigns.
Purpose of data	Calculation of project scenario
Additional comment	

b. Related to emission reductions

SDG 13

Parameter ID	SDWS 22
Data / Parameter	X _{cleanboil,y}
Unit	Percentage
Description	Proportion of project end-users that boil safe (treated, or from safe supply) water after installation of project technology in year y
Source of data	Project Survey
Value(s) applied	0
Measurement methods and procedures	This survey may be performed in person, by telephone, by messaging (e.g. text, app), appropriate to the context.
Measurement methods and procedures Monitoring frequency	This survey may be performed in person, by telephone, by messaging (e.g. text, app), appropriate to the context. Annually
Measurement methods and procedures Monitoring frequency QA/QC procedures	This survey may be performed in person, by telephone, by messaging (e.g. text, app), appropriate to the context. Annually Random sampling will be done among the users within the project boundary. This shall be cross-checked by GPS coordinates or addresses of the participants to the survey.
Measurement methods and procedures Monitoring frequency QA/QC procedures Purpose of data	This survey may be performed in person, by telephone, by messaging (e.g. text, app), appropriate to the context. Annually Random sampling will be done among the users within the project boundary. This shall be cross-checked by GPS coordinates or addresses of the participants to the survey. Calculation of project scenario

SDG 6, SDG 13

Parameter ID	SDWS 23
Data / Parameter	Q _{m,y}
Unit	Litres/year
Description	Monitored quantity of safe water provided by the CWT project in year y

Gold Standard Climate Security and Sustainable Development
--

Source of data	At the central location of the CWT: Option 1: Flow meter measures water volume directly Option 2: Operation sensor measures directly operation time or pump stroke count, and volume is calculated as capacity (defined in Project technology description) multiplied by operation time or pump strokes, depending on the sensor type.
	The smart kiosks will be monitored from remote and it will be possible to check the quantity of water which is supplied. Option 1 is selected.
	Meter readings will be carried out regularly for the domestic/private connections.
Value(s) applied	64,248,306
Measurement methods and procedures	Direct measurement
Monitoring frequency	Continuously
QA/QC procedures	Follow manufacturer, sector, national or international standards or guidelines for calibration and maintenance of the measurement device.
Purpose of data	Calculation of project scenario
Additional comment	-

Parameter ID	SDWS 25
Data / Parameter	HN _{p,y}
Unit	Number
Description	Number of individuals per premises type p in the project boundary in year y
Source of data	Project Survey
Value(s) applied	4.11 for West Yimbo 4.97 for East Yimbo
Measurement methods and procedures	Direct measurement

Monitoring frequency	Annual
QA/QC procedures	The value applied shall be cross-checked against at least one other source on the list. For cross-check purposes, sources applied may be up to 5 years old. Further, cross-check with older sources may be used provided they provide conservative results.
Purpose of data	Calculation of project scenario
Additional comment	East Yimbo value is taken from Survey carried out on 19-21/05/2022. West Yimbo value is based on House Counting results done 12-26 December 2021.

Parameter ID	SDWS 26
Data / Parameter	HH _{p,y}
Unit	Number
Description	Number of premises type p served by the project in year y
Source of data	Project Survey
Value(s) applied	4,705(counted in West Yimbo)
	5,473 (counted in East Yimbo)
Measurement methods and procedures	How often the premises within 1km distance of the water kiosks used the project source during a year will be checked. Premises that report at least every-two days use will be counted. A minimum 100 samples will be selected.
Monitoring frequency	Annually
QA/QC procedures	Numbers will be cross-check with Google maps counting or county population records whichever is available.
Purpose of data	Calculation of project scenario
Additional comment	The parameter will be used for SDG claims to predict number of households with limited services: Households using an improved source with water collection times of no more than 30 minutes per round trip are classified as having basic services, and those using improved sources with water collection times exceeding 30 minutes.

Parameter ID	SDWS 27
Data / Parameter	DO _{p,y}
Unit	Days
Description	Days the project technology is operational for end-users in premises p in year y
Source of data	Project Survey
Value(s) applied	165 Dry season
	182 Wet season
Measurement methods and procedures	In order of preference: 1. Measure directly using operation sensor, or 2. Demonstrate from log of operation and maintenance system.
Monitoring frequency	Annually
QA/QC procedures	Values higher than 347 days may only be applied when option 1 is used.
Purpose of data	Calculation of project scenario
Additional comment	The maintenance work is assumed to be done in dry season as the weather conditions would be convenient to carry out the field work. That is the reason for the number of serving days in dry season is lower than wet season.

Parameter ID	SDWS 34
Data / Parameter	EC _{p,y}
Unit	kWh
Description	Quantity of electricity that is used by the project during year y
Source of data	Manufacturer's specification
Value(s) applied	0
Measurement methods and procedures	In case the pumps use grid electricity, hours of use will be recorded and multiplied by the pumps' specific electricity use per hour.
Monitoring frequency	Annual

QA/QC procedures	Manufacturer's guidelines will be followed to calculate the electricity consumption.
Purpose of data	Calculation of project scenario
Additional comment	

Parameter ID	SDWS 35
Data / Parameter	LEy
Unit	tCO2e per year
Description	Leakage emissions during year y
Source of data	Project Survey
Value(s) applied	0
Mener were entry otherde	Questions related to purification method implemented
and procedures	ex ante and ex post the project will be asked to the respondents who stated they still purify water.
Measurement methodsand proceduresMonitoring frequency	ex ante and ex post the project will be asked to the respondents who stated they still purify water. Every two years
Measurement methods and procedures Monitoring frequency QA/QC procedures	ex ante and ex post the project will be asked to the respondents who stated they still purify water. Every two years Compliance with the general requirements for sampling and general requirements for data and information sources.
Measurement methods and procedures Monitoring frequency QA/QC procedures Purpose of data	ex ante and ex post the project will be asked to the respondents who stated they still purify water. Every two years Compliance with the general requirements for sampling and general requirements for data and information sources. Calculation of project scenario

Data / Parameter	Reduced incidents of water borne diseases
Unit	Percentage
Description	Proportion of the households who experienced reduced incidents of water borne diseases
Source of data	Project Survey
Value(s) applied	95
Measurement methods and procedures	Questions about the incidents of water borne diseases in the family will be asked.
Monitoring frequency	Annually

QA/QC procedures	GPS locations of the respondents are recorded during the survey and will be checked if they are within the project boundaries.
Purpose of data	Calculation of project scenario
Additional comment	-

Data / Parameter	Perception of time savings
Unit	Percentage
Description	Proportion of the households who perceived reduced time for collecting wood and water boiling.
Source of data	Project Survey
Value(s) applied	95
Measurement methods and procedures	Questions will be asked to understand if less time is spent on fetching firewood and water boiling.
Monitoring frequency	Annually
QA/QC procedures	GPS locations of the respondents are recorded during the survey and will be checked if they are within the
	project boundaries.
Purpose of data	Calculation of project scenario

Parameter ID	Total electricity produced: Renewable
Data / Parameter	RE
Unit	kWh
Description	Quantity of electricity that is produced by the solar panels during year y
Source of data	Manufacturer's specification
Value(s) applied	77,692.25
Measurement methods and procedures	The net electricity produced is remotely measured.

Monitoring frequency	Continuously
QA/QC procedures	The total electricity will be cross- checked by pumping hours.
Purpose of data	Calculation of project scenario
Additional comment	

Data / Parameter	Jobs created
Unit	Number
Description	Temporary and permanent jobs created during the implementation of the project.
Source of data	Project database
Value(s) applied	25
Measurement methods and procedures	All employees will be registered and trained for implementing health and safety measures.
Monitoring frequency	Annually
QA/QC procedures	Employees' contracts will be used to cross-check the number of jobs.
Purpose of data	Calculation of project scenario
Additional comment	

Parameter ID	Amount of firewood saved by the project per year
Data / Parameter	Amount of fuelwood saved
Unit	ton
Description	Amount of fuelwood saved due to avoided water boiling for purification.
Source of data	Project database
Value(s) applied	7,378.2
Measurement methods and procedures	Amount of fuelwood used will be calculated by the following formula:

	Amount of fuelwood saved= $(SEw, b, y * ((1 - Cb - Xcleanboil, y)*Qy)/ NCV_{fuelwood}$
Monitoring frequency	Annually
QA/QC procedures	The total fuelwood saved will be cross- checked by questions regarding the use of fuelwood during the project survey.
Purpose of data	Calculation of project scenario
Additional comment	

Safeguarding Principle 9.5 Hazardous and non-hazardous waste

Data / Parameter	Transfer of chlorine
Unit	N/A
Description	The chemicals will be transferred and stored in impermeable containers.
Source of data	Pictures
Value(s) applied	-
Measurement methods and procedures	All employees will be trained about handling chlorine safely and measures to be taken in case of leakage.
Monitoring frequency	Annually
QA/QC procedures	The amount of chlorine will be recorded and checked by the operating staff. Necessary measures will be taken to avoid leakages. Dosatron technology is applied which is safe to avoid leakages.
Purpose of data	Maintaining safe operation of the water treatment facility.
Additional comment	

B.7.2 Sampling plan

The sampling frame is the project boundaries, including the houses within 1km of the serving points. There are two options considered to build the database of end-users:

- (1) The end users may be selected from the database of house counting survey done. Each data point house has unique GPS coordinates. To ensure a random selection of end users, random number generators shall be applied. GPS coordinates of randomly selected houses will be checked to be located within the 1km circle of the serving points.
- (2) The end-users who wish to participate to the surveys will be asked to share contact details and addresses at the serving points and/or during water hygiene campaigns. They will be called or texted for the purpose of data collection only. At least contact details of 100 end-users will be collected randomly from all serving points.

Baseline Survey:

For baseline survey, samples are randomly selected among households within 1 km of the planned serving points. The minimum sample size required by the methodology is 100 for population over 1000.

145 samples have been selected from the houses within the planned points of service for baseline survey. Questions related to the household size, purifying method used, cookstove type and fuel type were asked to the interviewees. The results of the survey is summarized above in Section B.4.

Water Quality Test:

The sampling results shall satisfy at minimum the 90/10 rule, i.e. the endpoints of the 90% confidence interval lie within +/- 10% of the estimated proportion in relative unit. Minimum sample size is 30 which will be taken from transport containers when it reaches to the end-users' premises. Annual sampling will be done and the first round of testing will be conducted at least after six months from the start date.

Project Surveys:

The monitoring survey investigates changes over time in the project scenario by surveying end-users who benefits from the project on an annual basis. Following parameters will be monitored:

- 1) Proportion of project end-users that boil safe water
- 2) Number of individuals per premises
- Number of premises served. Premises that report at least every-two days use will be counted
- 4) WASH related questions about hygienic handling of clean water
- 5) Instances of water-borne diseases
- 6) Time savings due to omitted water boiling

B.7.3 Other elements of monitoring plan

The Monitoring Plan applied involves a number of key elements that ensure highquality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Verified Emission Reductions (VERs) on the basis of the amount of non-renewable biomass saved by the project activity. The key elements are the following:

- Date of installation of water kiosks
- GPS Coordinates of the serving points
- Storage capacity of each kiosk
- Total volume of water directly metered/measured by operation sensor and sold
- Days of the project technology is operational during a year
- Sample Plan for the Project Survey
- Data Quality, Consistency and Duplication Checks
- Monitoring Reporting

Project Developer will coordinate and manage Project Implementer and assist them in implementing each element of the monitoring plan.

Total volume of water directly metered and sold:

The project will supply water through (1) smart water kiosks (2) domestic/private connections.

(1)Smart kiosks: The Digital Pre-Paid Water meters are installed at every water kiosk secured with anti-tamper lockable metal structure housing. This type of Meter is very safe, efficient and easy to use. It also improves the revenue collection, saves time and money. Users of the system access water from a tap using a tag. The tag is pre-charged with water credits at a local shop or directly with the connected optional GSM modem. The tag securely holds customers water credit and identification. Tags can be recharged by a local water seller or charged directly using mobile money. The water dispensers add and decrement credits.

The Kiosk caretaker is mandated to monitor the water pipeline within their zones of operations and report with immediate effect any leakages, illegal tapping of water and any other eventualities to the technical team for quick action. Data concerning the water consumption per day at each kiosk will be recorded and stored virtually thanks to the cloud-based management system which is provided by the Lorentz technology.

Total volume of water sold will be cross-checked by at metering done at the pump house and at the tank outlets:

- (a) Bulk master meter at the pump house: The bulk master meter is installed just immediately after the pump in the pump house at the intake point on the Lake Victoria. It helps in monitoring the gross amount of water pumped per day, per week and even per month which plays a big role in planning for water zoning distribution areas supply criteria and pump servicing and maintenance.
- (b) Sub-water meters at the tank outlets: Additional water meters are installed at every tank outlet to check and monitor the amount of water released to the line and also manage leakages swiftly. The water meter readings are recorded daily at the end of the business and analysed for any adjustment in water distribution per area in regards to consumption needs.
- (2)Domestic/private connections: The metering of each private connection will be done at the mainline point and not at the residential area unless only where the pipeline passes across it and in such cases, proper lockable tamper proof housing must be installed to safeguard the meter. Meter readings will be done on regular basis for the purpose of online billing.

Water hygiene education campaigns

Water, Sanitation and Hygiene (WASH) training at community level will be held annually. Small gathering around the each serving points will be organized to promote best WASH practices. A WASH report evaluating the success of the campaigns will be submitted.

Maintenance Plan:

Once the Usigu Water Supply System is renovated and extension works are fully completed, Jerri-Hydro Experts will establish a strong and robust maintenance and repair plan that will focus on increasing the level of the water system maintenance to maximize the useful life of the critical infrastructure. The maintenance and repair plan will be developed in conjunction with system operations plan and both will comply with country permits and relevant regulations. The basic routine maintenance program for each water system component will be on daily, weekly, monthly, quarterly and annual routines and will be listed on the maintenance list book.

The trained PENWA operations staff and technical team will be involved in daily operation of the water treatment plant and distribution system. They will also support the system maintenance by routine inspections. In the routine operation of the system, the operators will perform inspections, perform planned preventative maintenance and respond to customer service calls and emergencies. Operations Supervisor will be responsible to carry out maintenance and repairs schedule and will arrange service orders. Service work orders (SWO) are typically indicative of system problems; such as high or low pressure, dirty or smelly water, leaks, meter problems or main breaks, will be documented monthly.

Specialized training is required for certain maintenance tasks such as control valve or PRV adjustment or rebuilding, and operators form PENWA would be trained in basic electricity, hydraulics, pumping, construction techniques and safety measures and control by Jerri-Hydro Experts during the project implementation process.

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1 Start date of project15/02/2023 (Start date of works)C.1.2 Expected operational lifetime of project15 years

C.2. Crediting period of project

C.2.1 Start date of crediting period

01/08/2023 (expected date of first 10 kiosks to be operational)

C.2.2 Total length of crediting period

5 years renewable twice, 15 years of total crediting period.

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1 Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in <u>Appendix 1</u>, ongoing monitoring is summarised below.

Principle 1. Human Rights: The project will be implemented under the national laws and will not lead to violations of human rights in any kind.

Principle 2. Gender Equality: The project addresses the issues related with safe water access. The women will save time from boiling water and collecting fuelwood.

Principle 3. Community Health, Safety and Working Conditions: The project supports health of communities by providing safe drinking water. The project will provide safe working conditions for all workers.

Principle 4. Cultural Heritage, Indigenous Peoples, Displacement and Resettlement: The project does not involve and is not complicit in the alteration, damage or removal of any critical cultural heritage, does not cause the involuntary relocation of people or affect indigenous communities. The treatment plant will be located in areas where land tenure rights are agreed in advance. Principle 5. Corruption: The project participants will not be involved, complicit or contribute towards corruption.

Principle 6. Economic Impacts: The project will not have a negative economic consequences. The project will be financially sustainable through the sale of metered water. The project participants will follow all applicable labour laws and regulations in the country.

Principle 7. Climate and Energy: The project will rather reduce emissions due to water boiling and utilized solar power.

Principle 8. Water: The project will purify lake water which already consumed directly by the target communities.

Principle 9. Environment, ecology and land use: The project does pose any risk to the environment or release pollutants. The project technology will make use of Chlorine for water treatment. A monitoring parameter for safe handling of chlorine is identified.

Principles	Mitigation Measures added to the Monitoring Plan	
Drinciple 9 5	The project involves the use of Chlorine in water	
Hazardous and	treatment. The chemicals will be transferred and stored	
non-bazardous	in impermeable containers. Necessary health and safety	
wasta	measures will be taken in order to minimize the	
waste	exposure to the environment.	

D.2. Assessment that project complies with GS4GG Gender Sensitive

requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	The project is gender sensitive and considers gender aspect in all phases. Women and young girls are responsible
	for water boiling for purification. The
	project will provide safe water available
	at shorter distances so that they will not
	have to travel long distances to fetch

	water. There will be no need to boil	
	water therefore, the time for fetching	
	firewood will be saved.	
	The project will provide job opportunities	
	for women for the control of kiosks	
Question 2 - Explain how the project	Strategic Plan 2019-2024 ⁴⁰ published by	
aligns with existing country policies, strategies and best practices	National Gender and Equity Commission	
	that is established by an Act of	
	Parliament in 2011. The commission acts	
	in line with following articles of the	
	Constitution among others:	
	Article 43. Every person has the right	
	(d)to clean and safe water in adequate	
	quantities	
	Article 56. affirmative action	
	programmes designed to ensure that	
	minorities and marginalized groups (a)	
	participate and are represented in	
	governance and other spheres of life; (b)	
	are provided special opportunities in	
	educational and economic fields; (c) are	
	provided special opportunities for access	
	to employment; (d) develop their	
	cultural values, languages and practices;	
	and (e) have reasonable access to water,	
	health services and infrastructure.	
	The project addresses issues related with	
	The project duaresses issues related with	
	access to water for all, particularly poor	

⁴⁰ https://www.ngeckenya.org/Downloads/NGEC-Strategic-Plan-2019-2024.pdf

	communities who cannot afford clean water services.	
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	Gender issues raised by Gold Standard Safeguarding principles are all addressed under the Safeguarding Principles Assessment in Appendix.1. No risks have been foreseen by the stakeholders and	
	project developer.	
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	As per Stakeholder Consultation Requirements, the project developer invites all stakeholders to give feedback on the design and the implementation of the project. During the consultation process, particular importance is given to the equal participation of women. Gender related organizations who actively work in rural areas have been invited to the meeting.	

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

Please refer to the separate Stakeholder Consultation Report for a complete report on the initial consultation and stakeholder feedback round.

E.1 Summary of stakeholder mitigation measures

The stakeholders confirmed that the project will provide net SDG benefits and will not pause any risks towards safeguarding principles. Therefore, no alterations are foreseen based on the comments received.

E.2 Final continuous input / grievance mechanism

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

Continuous Input / Grievance Expression Process Book (mandatory)	The process books will be placed in the local villages chiefs' offices.	
GS Contact (mandatory)	help@goldstandard.org	
	 A local number will be available for minor inputs and grievance that require immediate response. For Kenya: +254725 658 150 For Italy:+39 3516142230 	
Other	 Email and internet are being used by local and international NGOs. projects@offgridsun.com Project documentation is available at 	
	https://offgridsun.com/en/carbon-credits/	

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into <u>SECTION D</u> above. Please refer to the instructions in the <u>Guide to Completing</u> this Form.

Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
 The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights The Project shall not discriminate with regards to participation and inclusion 	No	 The Republic of Kenya is a member of the United Nations and the African Union. It has ratified many UN Human Rights Conventions and thus has made binding international commitments to adhere to the standards laid 	N/A

		down in these universal	
		human rights	
		documents. ⁴¹ The	
		project will be	
		implemented under the	
		national laws and will	
		not lead to violations of	
		human rights in any	
		kind.	
		2. There is no limitation to	
		the participation to the	
		project.	
Principle 2. Gender Equality			

⁴¹ http://www.claiminghumanrights.org/kenya.html

Gold Standard *Climate Security and Sustainable Development*

				Т	
1.	The Project shall not		1	The project provides	N/A
	directly or indirectly lead		9	safe drinking water to	
	to/contribute to adverse	No	t	the communities. The	
	equality and/or the	NO	t	time spending for fuel	
	situation of women			wood collection and	
2.	Projects shall apply the		1		
	principles of		١	water boiling will	
	nondiscrimination, equal		1	reduce. The women will	
	treatment, and equal		ł	have more time for	
-	pay for equal work		(other activities. The	
3.	The Project shall refer to		r	project will also provide	
	aender strategy or		r ;	ich opportunities for	
	equivalent national		J	Job opportunities for	
	commitment to aid in		١	women.	
	assessing gender risks		2. 1	Both women and men	
4.	(where required)		١	will benefit from the	
	Summary of opinions		I	project, no group will	
	and recommendations of		ł	be excluded from	
	an Expert Stakeholder(s)			participating in the	
			ŀ		
			ļ	project activities.	
			F	Principles of equal	
			t	treatment, equal pay	

		for equal work will be strictly followed. 3. The Project respects the country's gender policy. The project addresses gender issues related with access to clean water. 4. N/A	
Principle 3. Community Heal	th, Safety and Working Condi	tions	
 The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community 	No	The project increases the rate of access to safe drinking water and supports health of communities by decreasing waterborne diseases. The project will follow the requirements in Occupational	N/A

		Health and Safety Act 2007 ⁴² . The Project Implementers will provide safe workplace, machinery and equipment for the artisans.		
Principle 4.1 Sites of Cultura	and Historical Heritage			
Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture?	Νο	The project does not involve and is not complicit in the alteration, damage or removal of any critical cultural heritage.	N/A	
>>				
Principle 4.2 Forced Eviction and Displacement				
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	Νο	The project does not require or cause the involuntary relocation of people.	N/A	

⁴² https://www.health.go.ke/wp-content/uploads/2015/09/OSH%20Act%202007.pdf

Gold Standard Climate Security and Sustainable Development

>>						
Principle 4.3 Land Tenure and Other Rights						
 a. Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership? b. For Projects involving land use tenure, are there any uncertainties with regards to land tenure, access rights, usage rights or land ownership? 	No	The treatment plant will be located in areas where land tenure rights are agreed in advance. The water kiosks will be placed in public location, permits will be acquired from local government.	N/A			
Principle 4.4 - Indigenous pe	onle					
Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	Νο	There are no indigenous communities in the project area. The project respects all feedbacks and concerns from core stakeholders as beneficiaries of the project.	N/A			
>>		beneficiaries of the project.				
Principle 5. Corruption						

1. The invc or ir cont rein corr	Project shall not lve, be complicit in nadvertently cribute to or force corruption or upt Projects	No	The project will act in line with Anti-corruption and Economic Crimes Act 2012 ⁴³ of Kenya. The project participants will not be involved, complicit or contribute towards corruption.	N/A		
Principle 6.1 Labour Rights						
1. The shall emp com labo heal and and in th conv	Project Developer ensure that all loyment is in pliance with national ur occupational th and safety laws with the principles standards embodied the ILO fundamental ventions	No	 Kenya ratified ILO N°17 Workmen's compensation convention and ILO N°19 and 118 Equality of treatment in 1964⁴⁴. Occupational Health and Safety Act 2007 of Kenya article 27(1)b 	N/A		

⁴³ https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/98809/117654/F-1718951145/KEN98809.pdf
 ⁴⁴ https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200COUNTRYID:103264

Gold Standard Climate Security and Sustainable Development

2. Workers shall be able to	refers to all	
establish and join labour	international legislation	
organisations	about the health and	
3. Working agreements	safety. The project	
workers shall be		
documented and	participants will employ	
implemented and	all workers in	
include:	accordance with all	
a) Working hours (must	applicable national	
not exceed 48 hours	laws.	
per week on a regular	2. Kenya ratified ILO N°98	
b) Duties and tasks AND	Right to organise and	
c) Remuneration (must		
include provision for	collective bargaining	
payment of overtime),	convention in 1964.	
AND	The project participants	
d) Modalities on health	will not restrict any	
Insurance, AND	workers from	
termination of the	establishing and joining	
contract with provision	labour organisations	
for voluntary	2 Konva ratified ILO N220	
resignation by	5. Kenya ratineu ILO N°29	
employee, AND	Forced Labour	
f) Provision for annual	Convention in 1964. All	
---------------------------	-------------------------	
leave of not less than	permanent workers will	
10 days per year, not	he provided with	
including sick and	be provided with	
casual leave.	individual work	
4. No child labour is	agreements, including	
allowed (Exceptions for	working hours,	
children working on their	description of duties	
ramiles' property		
Stakeholder opinion)	and tasks,	
5 The Project Developer	remuneration, health	
shall ensure the use of	insurance, termination	
appropriate equipment,	of the contract, annual	
training of workers,	leave.	
documentation and	4. Kenya ratified ILO	
and incidents and	Nº182 Worst Form of	
emergency		
preparedness and	Child Labour	
response measures	Convention in 2001 and	
	ILO Nº138 Minimum	
	Age Convention in	
	1979. The project	
	participants do not	

		engage in any form of child labour.	
		The project participants will provide safe working environment, machinery and appropriate equipment during the construction of water treatment facilities. Accidents and incidents will be monitored and reported.	
Principle 6.2 Negative Economic Consequences			
 Does the project cause negative economic consequences during and after project implementation? 	No	The project will not cause any negative economic consequences. The project will be financially sustainable through the sale of metered	N/A
>>		water.	
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	The project will not lead to any increase in greenhouse gas emissions. The project	N/A

		will rather reduce emissions due to water boiling.	
Principle 7.2 Energy Supply			
Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	The project does not utilize any form of energy supply that is also being used by other users. The project technology is solar powered and does not require an additional energy	N/A
>>		source.	
Principle 8.1 Impact on Natural Water Patterns/Flows			
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No	The project does not negatively affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed. The project will purify lake water which already consumed directly by the	N/A
>>		target communities.	
Principle 8.2 Erosion and/or Water Body Instability			

 a. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? b. Is the Project's area of influence susceptible to excessive erosion and/or water body instability? 	No	The project does not directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion. The project does not increase the erosion and/or lead to water body instability.	N/A
>>			
Principle 9.1 Landscape Modification and Soil			
Does the Project involve the use of land and soil for production of crops or other products?	No	The project implements zero emission purification technologies. No use of land or soil is applicable.	N/A
>>			
Principle 9.2 Vulnerability to Natural Disaster			
Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding,	No	The project implements zero emission purification technologies. No such risk is foreseen.	N/A

drought or other extreme climatic conditions?			
>>			
Principle 9.3 Genetic Resource	ces		
Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?	No	Not relevant.	N/A
>>			
Principle 9.4 Release of pollu	itants		
Could the Project potentially result in the release of pollutants to the environment?	No	The project does not involve the release of pollutants to the environment.	N/A
>>			
Principle 9.5 Hazardous and Non-hazardous Waste			
Will the Project involve the manufacture, trade, release,	Potentially	The project technology will make use of Chlorine for	The chemicals will be transferred and stored in

and/ or use of hazardous and non-hazardous chemicals and/or materials? >>		water treatment. Transportation, storage and handling of those chemicals will be done with utmost care in line with related environmental regulations.	impermeable containers. Necessary health and safety measures will be taken in order to minimize the exposure to the environment.
Principle 9.6 Pesticides & Fei	rtilisers		
Will the Project involve the application of pesticides and/or fertilisers?	No	Not relevant	N/A
>>			
Principle 9.7 Harvesting of F	orests		
Will the Project involve the harvesting of forests?	No	The project aims to reduce firewood consumption by	N/A
>>		eliminating the need for water boiling. This will reduce the harvest rate of forests.	
Principle 9.8 Food			
Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration	No	Not relevant	N/A

or export or economic incentives?			
>>			
Principle 9.9 Animal husban	dry		
Will the Project involve animal husbandry?	No	Not relevant	N/A
>>			
Principle 9.10 High Conserva	ation Value Areas and Critica	l Habitats	
Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No	Implementation of the project will have a positive impact on forests; thus, to conservation of HCV ecosystems, critical habitats, landscapes, key biodiversity areas or other sites, by reducing the firewood harvesting.	N/A
Principle 9.11 Endangered Species			
a. Are there any endangered species identified as potentially being present within the Project boundary (including	No	Not relevant	N/A

those that may route through the area)?		
b. Does the Project potentially impact other areas where endangered species may be present through transboundary affects?		
>>		

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	Offgridsun S.R.L.
Registration number with relevant authority	05013960280
Street/P.O. Box	Via Verdi 45
Building	
City	Cittadella
State/Region	Padova
Postcode	35013
Country	Italy
Telephone	+39 049 7382413
E-mail	info@offgridsun.com
Website	www.offgridsun.com
Contact person	Valentina Quaranta
Title	Project Manager
Salutation	Ms
Last name	Quaranta
Middle name	n.a.
First name	Valentina
Department	International Cooperation
Mobile	+393516142230
Direct tel.	
Personal e-mail	v.quaranta@offgridsun.com

Organization name

Makohaa

Registration number with relevant authority	UG/932011/3515
Street/P.O. Box	111-40606 Sigomre Road
Building	
City	Unjunia
State/Region	Siaya County
Postcode	
Country	Kenya
Telephone	+254 725658150/711534298
E-mail	makohaa@gmail.com
Website	
Contact person	Orodi Odhiambo
Title	
Salutation	Mr
Last name	Odhiambo
Middle name	
First name	Orodi
Department	
Mobile	
Direct tel.	
Personal e-mail	

Organization name	Genius Water
Registration number with relevant authority	P.IVA 05119350287
Street/P.O. Box	Via Postumia 9/B CAP 35010
Building	
City	Carmignano di Brenta
State/Region	Padova-Veneto
Postcode	
Country	Italy
Telephone	+39 347 44 04 545
E-mail	info@geniuswatter.com
Website	
Contact person	Dario Traverso
Title	CEO
Salutation	Mr
Last name	Traverso
Middle name	
First name	Dario
Department	
Mobile	+39 347 44 04 545
Direct tel.	
Personal e-mail	d.traverso@geniuswatter.com

Organization name	PENWA
Registration number with relevant authority	BON/CBO/303
Street/P.O. Box	

Building	
City	Bondo
State/Region	Siaya County
Postcode	
Country	Kenya
Telephone	+254723164868
E-mail	ogolla33@gmail.com
Website	
Contact person	Margreth Ogolla
Title	Secretary
Salutation	Ms
Last name	Ogolla
Middle name	
First name	Margreth
Department	
Mobile	+254723164868
Direct tel.	
Personal e-mail	ogolla33@gmail.com

Organization name	Jerri Hydro Expert
Registration number with relevant authority	BN/2009/39470
Street/P.O. Box	P.O. Box 74408 00200
Building	
City	Nairobi
State/Region	Nairobi
Postcode	

Country	Kenya
Telephone	+254 722 312 996
E-mail	info@jerrihydro.com
Website	
Contact person	Jeremiah Ouma
Title	CEO
Salutation	Mr
Last name	Ouma
Middle name	
First name	Jeremiah
Department	
Mobile	+254 722 312 996
Direct tel.	
Personal e-mail	oumajeremiah@gmail.com

APPENDIX 3- LUF ADDITIONAL INFORMATION

N/A

APPENDIX 4-SUMMARY OF APPROVED DESIGN CHANGES

N/A

TEMPLATE- T-PreReview_V1.2-Project-Design-Document