Gold Standard for the Global Goals

Climate Security & Sustainable Development

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

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

This document contains the following Sections

KEY PROJECT INFORMATION

Programme of Activity Information – (delete below table if N/A)

GS ID of Programme	10963
Title of Programme	UpEnergy – Social and Climate Impact Programme
Version of POA-DD applicable to this monitoring report	05
Name and GS ID of fully Validated CPA/VPAs (i.e., non-compliance check)	NA

Key Project Information

GS ID (s) of Project (s)	10967 10968 12119
Title of the project (s) covered by monitoring report	Community Carbon Efficient Cooking Programme - VPA1 Community Carbon Safe Water Drinking Programme-VPA2 Community Carbon Efficient Cooking Programme – VPA 16
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	VPA 1- Version 5.0 VPA 2- Version 5.0 VPA 16- Version 3.0
Version number of the monitoring report	1.5
Completion date of the monitoring report	11/10/2023
Date of project design certification	**VPA 1, VPA 2** – 09/12/2021 **VPA 16** – 24/07/2023
Date of Last Annual Report	NA
Monitoring period number	**VPA 1 and VPA 2**- 2nd MP **VPA 16**- 1st MP

Duration of this monitoring period	01/12/2021 – 31/12/2022 (both the days included)[1]
Project Representative	UpEnergy Group and Community Carbon
Host Country	Uganda
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC), version 03.1 Emission Reduction from safe drinking water supply v1.0
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

[1] The Monitoring report consists of 3 VPA (VPA 1, 2 & 16) which are part of PoA.VPA 1, 2 crediting period – 01/12/2021 to 31/12/2022 & VPA 16 – 01/05/2022 to 31/12/2022.

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved		Units / Products
		10967-ICS/EPC	12119-ICS	
13. Climate Action (mandatory)	Emission Reduction	612,951/ 117	163,503	$tCO_2(eq)$
1 (No poverty)	Percentage of users reporting money savings due to reduction in purchased fuel consumption in project	89.40 / 90	90	%
3 (Good Health and Well-being)	Percentage of users reporting reduction in smoke/PM after shifting to ICS in project	89.40 / 90	90	%
5 (Gender Equality)	Percentage of users reporting time saving due to reduction in collected fuel consumption/cooking time/boiling water	89.40 / 90	90	%
7 (Affordable and Clean Energy)	Number of households with operational stoves	137,738/ 18	107,200	Number
8 (Decent Work and Economic Growth)	Total number of jobs created	72	72	-
12 (Responsible Consumption and Production)	Average percentage fuel savings reported by users in the project	48.4 / 61.3	47.6%	%
15 (Life on Land)	Fuelwood equivalent savings reported by users in the project	1061.57 / 0.18	811.57	tonnes-equivalent fuelwood/day

VPA 2

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units / Products
		10968-WPS	
13. Climate Action (mandatory)	Emission Reduction	9,064	$tCO_2(eq)$
1 (No poverty)	Percentage of users reporting money savings due to reduction in purchased fuel consumption in project	100	%
3 (Good Health and Well-being)	Percentage of users reporting reduction in smoke/PM after shifting to ICS in project	100	%
5 (Gender Equality)	Percentage of users reporting time saving due to reduction in collected fuel consumption/cooking time/boiling water	98	%
6 (Clean Water and Sanitation)	Number of people/beneficiaries reporting access to WPS	43,283	Number
8 (Decent Work and Economic Growth)	Total number of jobs created	72	-
12 (Responsible Consumption and Production)	Average percentage fuel savings reported by users in the project	98	%
15 (Life on Land)	Percentage of users reported Fuelwood equivalent savings in the project scenario	98	tonnes-equivalent fuelwood/day

Table 2 – Product Vintages

VPA-10967 (EPC)

		Amount achieved
Start Dates	End Dates	VERs

01/12/2021	31/12/2021	09
01/01/2022	31/12/2022	108

VPA-10967 (ICS)

		Amount achieved
Start Dates	**End Dates**	**VERs**
01/12/2021	31/12/2021	20,767
01/01/2022	31/12/2022	592,184

VPA-10968 (WPS)

		Amount achieved
Start Dates	**End Dates**	**VERs**
01/12/2021	31/12/2021	710
01/01/2022	31/12/2022	8,354

VPA 16-12119 (ICS)

		Amount achieved
Start Dates	**End Dates**	**VERs**
01/05/2022	31/12/2022	163,503

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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The purpose of the VPAs (VPA 1, VPA 2 and VPA 16) is to provide residential users with clean cooking technologies such as electric cooktop/cooker (EPC), energy-efficient cookstoves (ICS) and water purification system (WPS) such as Household water Treatment (HWT) that moves end-users up the energy ladder and aim to provide clean

cooking and safe drinking water that reduce greenhouse gas (GHG) emissions from the burning of non-renewable woody biomass and/or charcoal in Uganda.

The VPAs are implemented by UpEnergy Group (UpEnergy/UpE) & Community Carbon in which UpEnergy Group is also the Coordinating and Managing Entity (CME) of the PoA. UpEnergy will implement the programme in partnership with local partners and would ensure the last-mile distribution/installation of the ICS, EPC and WPS to the beneficiaries.

More than 2.6 billion people in world lack access to clean cooking facilities, relying instead on solid biomass, kerosene or coal as their primary cooking fuel[2]. According to statistics[1], household air pollution, mostly from cooking smoke, is linked to around 2.5 million premature deaths annually worldwide.

The lack of access to clean cooking remains very acute in sub-Saharan Africa with only 17% population having clean cooking access. The vast majority of people in sub-Saharan Africa thus rely on gathering biomass for cooking, in particular in rural areas, which dramatically damages health and impairs productivity improvements. Almost 490,000 premature deaths[3] per year are related to household air pollution from the lack of access to clean cooking facilities, with women and children the worst affected. Forest degradation, sometimes leading to deforestation, is another serious consequence of the unsustainable harvesting of fuelwood. Clean cooking solutions such as Electric cooktop/cooker avoids any use of non-renewable biomass/charcoal and thereby reducing GHG emissions. Improved Cookstoves (ICS) improve heat transfer efficiency as compared to the baseline conventional stoves, thereby reducing both the amount of fuel used by ICS and GHG emissions from the burning of non-renewable woody biomass and/or charcoal.

In Uganda, poor sanitation and hygiene, as well as unequal access to safe drinking water, make thousands of children very sick and at risk of death. Diarrhoea alone, one

[2] IEA (2020), SDG7: Data and Projections, IEA, Paris https://www.iea.org/reports/sdg7-data-and-projections
[3] IEA (2020), SDG7: Data and Projections, IEA, Paris https://www.iea.org/reports/sdg7-data-and-projections

of three major childhood killers in Uganda, kills 33 children every day[4]. According to the Joint Monitoring Programme (JMP)[5], the United Nations and World Health Organization's (WHO) mechanism tasked with monitoring water, sanitation, and hygiene progress, 19% (over 8 million people) of the Ugandan population relies on unimproved or surface water (like streams, ponds, unprotected hand dug wells) for their daily needs. Another 32% of the population "limited" access, meaning the water is likely safe, but it takes over 30 minutes to retrieve it because of distance, overcrowding, or both. There are 2 billion people[6] lacked safely managed services, including 1.2 billion people with basic services, 282 million with limited services, 367 million using unimproved sources, and 122 million drinking surface waters.

CME has assessed VPA 1 (GS ID: 10967), VPA 2 (GS ID: 10968) and VPA 16 (GS ID: 12119) for the eligibility criteria as stated in section B.3 of the design certified PoA (GS ID: 10963) and has approved VPA-1, VPA-2 and VPA-16 to be included under the PoA 10963.

A.2. Location of project

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Host Party: Uganda

Region/State/Province: All across Uganda

City/Town/Community: All across Uganda

The geographical location of Uganda is depicted by the map below. The country is located on the East African plateau lying mostly between latitudes 4°N and 2°S and longitudes 29° and 35°E.

[4] https://www.unicef.org/uganda/what-we-do/wash
[5] https://washdata.org/data/household#!/dashboard/new
[6] https://washdata.org/sites/default/files/2021-07/jmp-2021-wash-households.pdf

Figure A.1 - The physical/geographical boundary of the SSC-PoA: Uganda

A.3. Reference of applied methodology

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- Technologies and Practices to Displace Decentralized Thermal Energy Consumption, version 3.1.
- Emission Reduction from safe drinking water supply v1.0
- Requirements and Guidelines for carrying out usage surveys for projects implementing improved cooking devices.

A.4. Crediting period of project

>>

5 years, renewable twice

PoA Period: 01/01/2021 – 31/12/2040

Crediting period of VPAs covered by the monitoring report are below:

VPA 1 & VPA 2

Crediting period is 01/01/2021 – 31/12/2025

VPA 16

Crediting period is 01/05/2022 – 30/04/2027

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

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The VPA 1 & VPA 16 involves the promotion and distribution of improved cookstoves (ICS) and electric pressure cooker (EPC) in Uganda for use by households. The ICS and EPC disseminated through this programme replace the conventional inefficient biomass stove (3-stone fire)/traditional charcoal stoves with project stoves which combust biomass more efficiently or replaces use of biomass and improves heat transfer to pots, hence reducing use of non-renewable fuel and equivalent greenhouse gas emissions.

There has been zero EPC distribution under VPA 16, for the current monitoring period. As and when EPC distribution happens, same will be recorded in the project database in line with the VPA -DD section A.3.

The VPA 2 involves the promotion and distribution of residential with water purification system (WPS) such as Household water Treatment (HWT) technologies with an aim to provide safe drinking in Uganda for use by households and reduce/avoid greenhouse gas (GHG) emissions from the burning of non-renewable woody biomass and/or charcoal for water treatment in Uganda., hence reducing use of non-renewable fuel and equivalent greenhouse gas emissions.

The VPAs involve marketing, distribution, and creating awareness for ICS, EPC and WPS for low-income households in Uganda.

Improved Cookstoves

Product Model	Dimension (In cm)	Avg. unit weight (In kg)	Thermal Efficiency (In %)	Estimated life (in years)	Fuel Type
SHS-BME	(Ø 23.93 x 24.43 H)	8	31	5	Charcoal
SHS-ILF	(Ø 28 x 26 H)	11.00	38.00	5	
SHS-BOLD	(Ø 26.30 x 24.43 H)	8.9	37.30	5	

TG Stove	(Ø 23.9 x 24.4 H)	6.87	35.90	5	
SpendSmart Stove (SST)	(Ø 23.9 x 24.4 H)	6.87	38.1	5	
EE Stove	(Ø 23.93 x 24.43 H)	8.40	34.90	5	
SHS-PRO	(Ø 28 x 26 H)	12	37.90	5	Charcoal

Electric Pressure Cooker

Model: SmartHome Electric pressure cooker

- Capacity: 6 liters
- Power: 1200 watt
- Voltage: 220-240V; 50/60 Hz
- Size: 38 x 34 x 33 cm
- Weight: 5.9 kg
- Time and Power savings: 70% faster than conventional cooking
- Inner Pot: Aluminum non-stick pot
- Average Lifespan: 5 years

Water Purification System

1. UpEnergy JH-19B Gravity Water filter (Jewin)
   - Dimension: (31 x 31x62) cm
   - Weight: 3.05 Kilograms
   - Capacity: 19 Liters
   - Flow Rate: 1 Liter per hour.
   - Certification: ce, EMC, RoHS
   - Filter life/Capacity: 2400 Liters

2. UpEnergy PEHF521 Gravity Water Filter (Pure Easy)
   - Dimension: (25 x 25 x 60) cms
   - Weight: 2.1 kilograms
   - Flow Rate: 2 Liters/Hour
   - Filter Life/ Capacity:5000 Liters
   - Certification: CNAL, US EPA, SGS

3. UpEnergy Dayliff

- Dimension: (28 X 28 X 22.8) cms
- Weight: 0.25 kilograms
- Flow Rate: 1.25 Liters/Hour
- Filter Life/ Capacity:5000 Liters
- Certification: CNAL, US EPA, SGS

The total number of ICSs, EPCs and WPS included under the VPAs are as follows:

VPA1		VPA2	VPA 16	
ICS Distributed	EPC Distributed	WPS Distributed	ICS Distributed	EPC Distributed
154,078	20	10,563	119,111	0

VPA 1 & VPA 2 -

The implementation of ICS is between 01/01/2021 to 30/04/2022.

The implementation of EPC is between 15/04/2021 to 30/09/2021.

The implementation of WPS is between 30/11/2020 to 19/12/2022.

VPA 16 –

The implementation of ICS is between 01/05/2022 to 18/12/2022.

Smart Home Improved Cookstove

Dayliff Water Purification system

Distribution of ICS included in the VPA 1 & 2 are as follows:

SHS-BOLD	SHS-BME	EE	SHS-ILF	Spend Smart	SHS-PRO	TG Stove	Grand Total
43,467	43,600	8,115	6,755	4,722	46,283	1,136	154,078

Distribution of EPC – Smarthome (Kenwood) - 20

Distribution of WPS included in the VPA are as follows:

Dayliff	Jewin	Pure Easy	Grand Total
158	228	10,177	10,563

Distribution of ICS included in the VPA 16 are as follows:

SHS-BME	SHS-ILF	SHS-PRO	Grand Total
1	3,419	115,696	119,111

B.1.1 Forward Action Requests
>>
There are no FARs raised during the current monitoring period for VPA 1, VPA 2 and VPA 16.

B.2. Post-Design Certification changes
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B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline
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Not Applicable

B.2.2. Corrections
>>
Not Applicable

B.2.3. Changes to start date of crediting period

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Not Applicable

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

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Not Applicable

B.2.5. Changes to project design of approved project

>>

Not Applicable

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

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The monitoring system applied involves a number of key elements to ensure that the CME and VPA-Implementer have high-quality, unbiased and reliable information regarding the performance of the project.

Monitored Systems

1. **Total Distribution Record:** The total distribution record documents the information listed below for the technologies implemented. A carbon waiver including a warranty card has been distributed with each stove distributed. The PP makes every effort to retrieve this information (paper form or electronically but cannot guarantee the collection of information for waivers and warranties with every stove due to challenges such as high rates of illiteracy and logistical challenges. The total distribution record has been kept electronically and with supporting evidence from paper records and/or electronic records and will be provided to the GS-VVB at verification. The Total Distribution Record contains:
    a) Unique identification of stove using stove serial number
    b) Name, address and telephone (as available)
    c) Date of distribution and model/type of project technology distributed
    d) Quantity of project technology distributed as evidenced by invoices

Frequency: Ongoing

2. **Project Database:** Each VPA will have a specific Project Database that records each CEP crediting in that VPA. Every CEP listed in the Total Distribution Record will be transferred into the Project Database of this VPA as needed to expand the number of CEP deployed, until the maximum threshold for this VPA is reached. In addition to the information provided in the Total Distribution Record, the VPA-specific Project Database will record user details (enough for end-user identification and follow-up) for all, or a subset of all, appliances deployed. End-user details recorded are:
    a) Name
    b) Telephone, or address (as available)
    c) Type of CEP (model) and fuel the CEP is replacing: Example – traditional or improved baseline stoves, or wood or charcoal fuel.

3. **Continued use of displaced traditional stoves**

The replaced low efficiency devices are disposed of and not used within the boundary or within the region. Monitoring surveys conducted on households (HH) using CEP also investigate the extent to which baseline traditional stoves are still in use. Whenever it is found that a traditional stove is still used, even in a secondary role, the HH is encouraged to discard their traditional stove through the Disposal Policy. Evidence of use of traditional stoves in other kitchens is not possible as clients are encouraged to return the stove for additional warranty period for project stoves. In any case, the emissions reductions are calculated based on the total fuel usage in the Household (including all stoves), which takes into account any fuel usage in the pre-project devices.

4. **Disposal Policy:** The project activity encourages full adoption of project stove distributed. To incentivize full adoption, the project proponents extend a full-year warranty in exchange for the disposal of a household's traditional stove.

5. **Organizational structure of monitoring and inclusions:**

Person	Role

Project database administrator	The database administrator is responsible for updating and maintaining all electronic databases. Required competencies include experience with data management systems (eg. Excel, STATA, or SPSS), minimum 2 years working experience in a similar field, and at minimum a bachelor's degree from an institution of higher education.
Monitoring team	The monitoring team is assigned by the PP to conduct the user interviews and appliance tests during the periodic sampling and reports the results to the database administrator. Proper training has been provided to all enumerators/monitoring team before every survey exercise. The skills and experience required for the data collection activities include: • Experience conducting surveys/tests • Experience conducting door-to-door surveys of biomass consumption. • Local language skills (especially important for input to questionnaire design and interviewing of end users) • English language skills • Cultural awareness • Numerical proficiency • Data entry skills

6. Quality Assurance / Quality control

As the Project Activity is intended to include multiple regions within a country with a high level of cultural diversity as well as different end user groups, there is no "one size fits all" approach for dealing with these issues. However, in order to avoid many of these problems the PP undertakes the following strategies, tailoring the specific approach to the local circumstances:

1) Ensuring end user awareness. At the time of distribution, the CEP customer is made aware that they are required to participate in monitoring activities. This is done via a written statement (in English and local language where appropriate) on the carbon waiver form, or via alternative means such as training distribution personnel to explain the importance of monitoring to each customer.

2) Questionnaire design. The design of the questionnaire it has been ensured that the questions are non-intrusive and easy to understand for both the interviewee and interviewer. For example, when conducting sampling to estimate the parameter μ_y a simplified approach has been designed to avoid the need for asking customers how much money they spend on fuel.

3) Drawing on local knowledge. The local contractors hired by the PP in the country plays an important role in tailoring the approach to suit local circumstances. For example, in some instances, it is essential for a local person to conduct the interview in order to obtain accurate results, e.g. to explain to the end user that their old stove will not be removed if they admit to its continued use.
4) Quality of contractors. The third parties hired by the PP to carry out sampling is required to demonstrate a high level of cultural awareness, local language skills and appropriate experience with data entry and data management. The PP ensures that contractors are adequately trained for the tasks they are contracted for (e.g., carrying out of KPTs in line with a methodology supported by an appropriate international body/standards). Training is also be provided on how to deal with non-responses, refusals and other problems should these occur.

7. Fuel switch scenario

The potential increase in fuels with different carbon intensities (such as increased charcoal usage on users that consumed originally firewood prior to the purchase of the ICS) will be accounted by monitoring consumption of biomass distinguishing the different fuels as charcoal and firewood[7].

8. Hygiene Campaign

[7] The charcoal fuel consumption will be equivalently calculated in terms of fuel-wood using 1:6 ratio allowed by methodology.

The hygiene campaign will be designed as per the guidelines laid out in the methodology. Water hygiene education campaigns will include the following activities:

a) Educating customers on proper handling and storage of raw and processed water.
b) Emphasizing the importance of hygiene to prevent infections or water borne diseases. The training campaigns would be organised during the product demonstration and repeated on twice in year so that customers remember.
c) Designing survey questionnaire for water filters to include all the necessary questions related to the project in line with JMP Core questionnaire by WHO/UNICEF. On annual basis, customers will be assessed to check the effectiveness of the education campaign. Customers will be selected randomly from the total population.
d) The project will report the activities conducted each year in the annual monitoring report. Any major changes in the health status of the water users as a result of contaminated water (e.g., an outbreak of water related disease) will be reported and, if relevant, a strategy put in place to address it through the hygiene campaign.

SECTION D. DATA AND PARAMETERS

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

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Cookstoves

SDG13

Data/parameter	$EF_{b,CO2}$
Unit	tCO_2/TJ
Description	CO_2 emission factor arising from use of fuels in baseline Scenario
Source of data	IPCC default value as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories, volume 2, chapter 2 (Table2.5)
Value(s) applied	Fuelwood (Residential): 112

Choice of data or Measurement methods and procedures	Default IPCC value for fuelwood is applied
Purpose of data	CO_2 Emission calculation in baseline
Additional comment	-

Data/parameter	$EF_{b,non\text{-}CO2}$
Unit	tCO_2/TJ
Description	Non-CO_2 emission factor arising from use of fuels in baseline scenario
Source of data	IPCC default value considering AR5 GWP.
Value(s) applied	Fuelwood (Residential): VPA 1 - 37.25 VPA 16 – 9.46
Choice of data or Measurement methods and procedures	Default IPCC value for fuelwood is applied
Purpose of data	Non-CO_2 Emission calculation in baseline
Additional comment	Though the value of 37.25 tCO_2/TJ for $EF_{b,non\text{-}CO2}$ has been approved by the GS / SustainCERT in the design certified VPA DD, the PD has calculated the emission reductions for the current monitoring period using IPCC value of 9.46 tCO_2/TJ for $EF_{b,non\text{-}CO2}$, instead the design certified value of 37.25 to be conservative.

Data/parameter	$EF_{p,CO2}$
Unit	tCO_2/TJ
Description	CO_2 emission factor arising from use of fuels in project Scenario
Source of data	IPCC default value as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories, volume 2, chapter 2 (Table 2.5)
Value(s) applied	Fuelwood (Residential): 112

Choice of data or Measurement methods and procedures	Default IPCC value is applied
Purpose of data	CO_2 Emission calculation in project scenario
Additional comment	-

Data/parameter	$EF_{p,non\text{-}CO2}$
Unit	tCO_2/TJ
Description	Non-CO_2 emission factor for methane arising from use of fuels in project Scenario
Source of data	IPCC default value considering AR5 GWP.
Value(s) applied	Fuelwood (Residential): VPA 1 - 37.25 VPA 16 – 9.46
Choice of data or Measurement methods and procedures	Default IPCC value for fuelwood is applied
Purpose of data	Non-CO_2 Emission calculation in project scenario
Additional comment	Though the value of 37.25 tCO_2/TJ for $EF_{p,non\text{-}CO2}$ has been approved by the GS / SustainCERT in the design certified VPA DD, the PD has calculated the emission reductions for the current monitoring period using IPCC value of 9.46 tCO_2/TJ for $EF_{p,non\text{-}CO2}$ instead the design certified value of 37.25 to be conservative.

Data/parameter	$EF_{el,y}$
Unit	tCO_2/MWh
Description	Emission factor for electricity generation for source j in year y
Source of data	UNFCCC Harmonization of Standards for GHG accounting dated December 2021
Value(s) applied	0.1158

Choice of data or Measurement methods and procedures	Combined margin CO_2 emission factor for the project electricity system applicable to all renewable power generation project activities other than wind and solar for the first crediting period
Purpose of data	Project Emissions calculation for Electric cooking
Additional comment	-

Data/parameter	$TDL_{j,y}$
Unit	Fraction
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Source of data	CDM Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0
Value(s) applied	0.20
Choice of data or Measurement methods and procedures	Default values of 20% as per the tool
Purpose of data	CO_2 Emission calculation in project scenario
Additional comment	-

Data/parameter	NCV_b
Unit	TJ/ton
Description	Net calorific value of the fuels used in the baseline
Source of data	IPCC default 2006, volume 2, chapter 1 (Table 1.2)
Value(s) applied	Fuelwood: 0.0156
Choice of data or Measurement methods and procedures	Default IPCC value for fuelwood is applied
Purpose of data	Emission calculation in project scenario

Additional comment	-

Data/parameter	NCV_p
Unit	TJ/ton
Description	Net calorific value of the fuels used in the project
Source of data	IPCC default 2006, volume 2, chapter 1 (Table 1.2)
Value(s) applied	Fuelwood: 0.0156
Choice of data or Measurement methods and procedures	Default IPCC value for fuelwood is applied
Purpose of data	Emission calculation in project scenario
Additional comment	-

Data/parameter	$f_{NRB,i,y}$
Unit	Fractional non-renewability
Description	Non-renewability status of woody biomass fuel in scenario i during year y
Source of data	Assessment based on CDM Methodological tool 30: Calculation of the fraction of non-renewable biomass, Version 03.0
Value(s) applied	0.89
Choice of data or Measurement methods and procedures	Assessment based on CDM Methodological tool 30: Calculation of the fraction of non-renewable biomass, Version 03.0
Purpose of data	CO_2 Emission calculation in project scenario
Additional comment	The f_{NRB} value will remain fixed during the crediting period

Data / Parameter	$P_{b,y}$

Unit	tonnes/day
Description	Specific fuel consumption for an individual technology in baseline scenario b during year y converted to tons/day
Source of data	Baseline survey and KPT is conducted and value is fixed *ex-ante* for subsequent issuance.
Value(s) applied	Fuel wood: 0.01591
Choice of data or Measurement methods and procedures	Based on baseline Field Test updates. KPT conducted for 3 consecutive dates by measuring fuel and moisture in fuel. Compiled data and averaged the data of 3 days for specific fuel consumption. The details are shown in baseline KPT
Purpose of data	To calculate baseline emissions
Additional comment	This parameter is fixed *ex-ante* for first crediting period.

SDG 1: No Poverty

Data/parameter	$HHS_{baseline}$
Unit	Percentage (%)
Description	% users reporting money saving due to reduced fuel consumption in baseline
Source of data	-
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 1 impact calculation

SDG 3: Good Health and Well Being

Data/parameter	$HHsmoke_{baseline}$
Unit	Percentage (%)
Description	% users reporting reduction in smoke/PM emissions while cooking on improved stove in baseline
Source of data	-

Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 3 impact calculation
Additional Comment	-

SDG 5: Gender Equality

Data/parameter	$HHtime_{baseline}$
Unit	%
Description	% users reporting time savings for cooking /fuel collection
Source of data	-
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 5 impact calculation
Additional Comment	-

SDG 7: Affordable and clean energy

Data/parameter	$HHclean_{baseline}$
Unit	Number
Description	Access to affordable and clean energy (Number of ICS operating)
Source of data	-
Value(s) applied	0
Choice of data or Measurement methods and procedures	-

Purpose of data	SDG 7 impact calculation
Additional Comment	-

SDG 8: Decent Work and Economic Growth

Data/parameter	$EG_{baseline}$
Unit	Number
Description	Quantitative Employment and income generation
Source of data	-
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 8 impact calculation
Additional Comment	-

SDG 12: Responsible Consumption and Production

Data/parameter	$FC_{baseline}$
Unit	tonnes/year
Description	Fuel consumption in baseline
Source of data	-
Value(s) applied	5.807
Choice of data or Measurement methods and procedures	This is calculated from the average fuel consumption per HH in baseline (tonnes eq. fuelwood/HH/day) ie 0.01591 * 365 day = 5.807 tonnes/year
Purpose of data	SDG 12 impact calculation
Additional Comment	-

SDG 15: Life on Land

Data/parameter	$FCHH_{baseline}$
Unit	tonne-eq. fuelwood/HH/day
Description	Average Fuel consumption per HH in baseline
Source of data	Baseline survey
Value(s) applied	0.01591
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 15 impact calculation
Additional Comment	-

Water Purification Systems

SDG 13

Parameter ID	SDWS 2
Data/parameter	Project Technology Description
Unit	N/A
Description	The detailed description of the planned project technology shall include as a minimum: HWT and IWT: - manufacturer name, - product name (if applicable), - technology type, and - performance meets the WHO Quality standards or applicable national standards
Source of data	The following sources shall be used:- Manufacturer specifications - Commercial guarantee
Value(s) applied	HWT and IWT: - manufacturer name - UpEnergy - product name – Dayliff, Pure Easy, Jewin - technology type – Gravity filters - performance meets the WHO Quality standards

Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	-

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.
Source of data	National
Value(s) applied	The project doesn't conflict with host country law. According to "the National system to support drinking water, sanitation and hygiene: Global status report 2019", the country had the target to provide clean water to 79% of the population by 2020 in which it has achieved only 7% clearly demonstrates the gap between policy and actual drive required for adoption. Water access is a human right water in Uganda, which makes the objectives mandatory. However, the policy has not enabled to give water access to 100 % of the population as still 22 million of people lack access to safe water. This is explained by a gap in financing such actions and a lack of human resources needed, as confirmed by the GLAAS survey. This demonstrates that the VPA will lead to a greater level of improvements in the sector and have achieve better penetration rate of safe water supply.
Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	-

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, classify them as improved and unimproved water source.
Source of data	Baseline study
Value(s) applied	Unprotected Well ~14% Municipality Water ~71% Borewell ~13% River ~1% Pond/Lake/any stagnant body of water ~1% These are the prevalent source of water observed during baseline assessment survey[8].
Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	The respondents classified municipal/borewell as unsafe to consume directly without boiling thus categorized as unimproved water system. Few respondents consume raw water as they are unable to afford fuel to boil water.

Parameter ID	SDWS 6

[8] Though as per methodology the source of water could be improved source, but the household response indicated that it's unsafe to drink without treatment (i.e boiling). Thus, the classification of improved or unimproved was redundant as all the household response indicated it is unsafe/unimproved source of water.

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
Value(s) applied	1. Three-stone fired firewood – 27% 2. Traditional Charcoal system without grate or/and chimney – 65% 3. Improved cookstove – 8% These are the prevalent technologies used by respondents who boil water in the baseline scenario
Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	-

Parameter ID	SDWS 7
Data/parameter	Expected technical life of project technology
Unit	Volume
Description	The expected technical life of an individual project technology shall be defined in the PDD. The details include both technology/device life and filter life, if a filter is used and it is replaceable.
Source of data	HWT: - Manufacturer specifications - Commercial guarantee
Value(s) applied	JH-19B Gravity Water filter (Jewin) – 2400 Litres PEHF521 Gravity Water filter (Pure Easy) – 5000 Litres Dayliff Water Filter – 5000 litres
Choice of data or Measurement methods and procedures	-

Purpose of data	-
Additional comment	The replacement filtration parts will be provided to cater based on the consumption need beyond the life of the product.

Parameter ID	SDWS 9
Data/parameter	$EF_{b,f,CO2}$
Unit	tCO_2/TJ
Description	CO_2 emission factor arising from use of fuels in baseline Scenario
Source of data	IPCC defaults
Value(s) applied	Wood: 112 tCO_2/TJ Charcoal: 165.22 tCO_2/TJ (includes charcoal production emissions)
Choice of data or Measurement methods and procedures	Default IPCC value for fuelwood and charcoal is applied
Purpose of data	CO_2 Emission calculation in baseline
Additional comment	-

Parameter ID	SDWS 10
Data/parameter	$EF_{b,f,non\text{-}CO2}$
Unit	tCO_2e/TJ
Description	Non-CO2 emission factor from use of fuels, in case the baseline fuel is biomass or charcoal
Source of data	IPCC defaults
Value(s) applied	Wood: 9.46 tCO_2e/TJ Charcoal: 44.83 tCO_2e/TJ (includes production emissions of CH_4 and N_2O)

Choice of data or Measurement methods and procedures	Default IPCC value for fuelwood and charcoal is applied
Purpose of data	Non-CO_2 Emission calculation in baseline
Additional comment	-

Parameter ID	SDWS 11
Data/parameter	ηwb
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 and literature review .
Value(s) applied	- Three-stone fire without either a grate or a chimney: 10%. - Three-stone fire for charcoal: 16% - Improved cookstoves: Efficiency 37.9[9]%.
Choice of data or Measurement methods and procedures	-
Purpose of data	Baseline emissions calculation
Additional comment	Efficiency of the stoves for baseline water boiling has been mentioned technology wise (i.e. Traditional firewood, traditional Charcoal and improved charcoal) and the specific energy required to boil water (SEw,b,y) is determined for each of these baseline technologies based

[9] This is the rated thermal efficiency of improved cookstove distributed by UpEnergy for conservative consideration of any cross-effects.

	on the respective stove efficiency, in line with the methodology mentioned in the ER estimation worksheet of VPA 2 DD. Please refer to the ER calculation sheet for further details.

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
Source of data	- Baseline survey - Studies by academia, NGOs or multilateral institutions
Value(s) applied	5.51%
Choice of data or Measurement methods and procedures	Based on the baseline survey and raw water test results.
Purpose of data	Calculation of baseline emissions
Additional comment	Fixed *ex-ante* for the first crediting period.

Parameter ID	SDWS 8
Data/parameter	x_f
Unit	Percentage of fuel f use in target population
Description	The proportion of each different cooking fuel f used in the project boundary by end-users:
Source of data	- Baseline survey - Studies by academia, NGOs or multilateral institutions
Value(s) applied	Three stove fire – 27% Traditional Charcoal – 65% Improved Charcoal Cookstove – 8%

Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Parameter ID	SDWS 21
Data/parameter	$f_{NRB,f,y}$
Unit	Percentage
Description	Fractional non-renewability status of woody biomass fuel during year y, in case the baseline fuel is biomass or charcoal.
Source of data	Assessment based on CDM Methodological tool 30: Calculation of the fraction of non-renewable biomass, Version 03.0
Value(s) applied	0.89
Choice of data or Measurement methods and procedures	Assessment based on CDM Methodological tool 30: Calculation of the fraction of non-renewable biomass, Version 03.0
Purpose of data	Calculation of baseline emissions
Additional comment	The f_{NRB} value will remain fixed during the crediting period

Parameter ID	SDWS 14
Data/parameter	NCV_f
Unit	TJ/fuel units, i.e., mass or volume units
Description	Net calorific value of fossil fuel f
Source of data	IPCC defaults
Value(s) applied	-

Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	There is no use of fossil fuel in the project scenario. In case a new model is introduced then IPCC default values of that corresponding fuel will be used.

Parameter ID	SDWS 15
Data/parameter	EF_f
Unit	tCO_2/TJ
Description	Emission factor of fossil fuel f
Source of data	IPCC defaults
Value(s) applied	-
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	There is no use of fossil fuel in the project scenario. In case a new model is introduced then IPCC default values of that corresponding fuel will be used.

Parameter ID	SDWS 16
Data/parameter	EF_{ec}
Unit	tCO_2/kWh
Description	Emission factor associated with the electricity use
Source of data	Default values
Value(s) applied	Not applicable for the current monitoring period.

Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	There is no use of electricity in the project device anticipated to be implemented under the VPA. In case a new model which requires electricity, is introduced then the below default values will be used accordingly. 0.001 tCO_2/kWh if annual consumption is more than 250 kWh/year/household. 0.0008 tCO_2/kWh if annual consumption is less than 250 kWh/year/household.

Parameter ID	SDWS 17
Data/parameter	TDL_{ec}
Unit	%
Description	Transmission and distribution losses associated with the electricity use
Source of data	Default values
Value(s) applied	20%
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	There is no use of electricity in the project device anticipated to be implemented under the VPA. In case a new model is introduced then default values will be used.

SDG 1: No Poverty

Data/parameter	$HHS_{baseline}$
Unit	Percentage (%)
Description	% users reported reduced money spent on fuel consumption in baseline scenario

Source of data	Baseline survey
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 1 impact calculation

SDG 3: Good Health and Well Being

Data/parameter	$HHclean_{baseline}$
Unit	Percentage (%)
Description	% users using clean technology to access safe water in baseline scenario
Source of data	Baseline survey
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 3 impact calculation

SDG 5: Gender Equality

Data/parameter	$HHtime_{baseline}$
Unit	Percentage (%)
Description	% users reporting time savings for boiling/fuel consumption/access to water
Source of data	Baseline survey
Value(s) applied	0
Choice of data or Measurement methods and procedures	-

Purpose of data	SDG 5 impact calculation

SDG 6: Clean Water & sanitation

Data/parameter	$BENclean_{baseline}$
Unit	Number
Description	Beneficiaries with access to safe water in baseline scenario
Source of data	Baseline survey
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 6 impact calculation

SDG 8: Decent Work and Economic Growth

Data/parameter	$EG_{baseline}$
Unit	Number
Description	Generation of employment in baseline scenario
Source of data	Baseline survey
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 8 impact calculation

SDG 12: Responsible Consumption and Production

Data/parameter	$FC_{baseline}$

Unit	Percentage (%)
Description	% users confirming boiling using fuel in baseline scenario
Source of data	Baseline survey
Value(s) applied	100
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 12 impact calculation

SDG 15: Life on Land

Data/parameter	$FRC_{baseline}$
Unit	Percentage (%)
Description	% users reported fuelwood equivalent savings in baseline scenario
Source of data	Baseline survey
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 15 impact calculation

D.2 Data and parameters monitored

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Cookstoves/EPCs

SDG 13

Data / Parameter	$P_{p,y}$
Unit	tonnes/day
Description	Specific fuel consumption for an individual technology in project scenario p during year y converted to tons/day

Source of data	Project Kitchen Performance Test
Value(s) applied	VPA 1: 0.00820 VPA 16: 0.00834
Measurement methods and procedures	Kitchen Performance Test is carried out in accordance with Annex 4 of the applied methodology TPDDTEC
Monitoring frequency	Every 2 years
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	To calculate emission reductions
Additional comment	A single project fuel consumption parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario. The value of Charcoal would be converted into equivalent fuelwood, by using 1:6 conversion factor from charcoal to wood. PD would like to state that the baseline fuel consumption fixed *ex-ante* for VPA 1 and VPA 16 considered only the primary fuel consumed and not any secondary fuel used by the sampled HHs; however, the project fuel consumption for the current monitoring period for VPA 1 and VPA 16, includes fuel consumption from all the stoves used by the sampled HHs i.e., primary stove (project stove), stove 1, stove 2, etc., as evident from the monitoring survey results and KPTs conducted. Additionality, PD would like to share that the National charcoal survey of Uganda (2015)[10] carried out by Ministry of Energy and Mineral Development (MEMD) calculates average charcoal production efficiency at 12.5% using traditional kiln methods which puts the wood to charcoal conversation ratio at 1:8; however, the project fuel consumption and inturn the emission reduction calculation applies wood to charcoal conversion ratio of only 1:6.

Data / Parameter	$U_{p,y}$

[10] https://pfccparliament.go.ug/wp-content/uploads/2019/04/NationalCharcoalSurvey_FINAL.pdf

Unit	Percentage
Description	Usage rate in project scenario p during year y
Source of data	Annual usage survey
Value(s) applied	VPA 1: 89.4% VPA 16: 90.0%
Measurement methods and procedures	Ex-post monitoring and surveys carried out to determine the number of appliances still in operation by field survey
Monitoring frequency	Annual
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	To calculate emission reductions
Additional comment	TPDDTEC Usage Requirements has been followed. PD would like to state that even though a higher usage rate (90.12% for VPA 1 ICS and 92.62% for VPA 16 ICS) has been demonstrated through the usage surveys conducted, PP has applied the maximum cap of 90% on stove vintage-wise usage rate and arrived at a weighted average usage rate of 89.4% for VPA 1 ICS and 90% for VPA 16 ICS, complying with the requirements pertaining to “good practice”.

Data / Parameter	$N_{p,y}$
Unit	Project technologies credited (units)
Description	Technologies in the project database for project scenario p through year y
Source of data	Total sales record
Value(s) applied	**VPA 1: -** ICS: 154,078 EPC: 20 **VPA 16: -** ICS: 119,111
Measurement methods and procedures	The total number of appliances deployed during period y is tracked in the Project Database of the specific VPA, which is updated regularly. All appliances distributed will be recorded. Any appliance not recorded in the Project Database will not be credited for emission reductions.
Monitoring frequency	Continuous
QA/QC procedures	Transparent data analysis and reporting

Purpose of data	To calculate emission reductions
Additional comment	The total sales record is divided based on project scenario to create the project database

Data / Parameter	$LE_{p,y}$
Unit	tCO_2e per year
Description	Leakage in project scenario p during year y
Source of data	Baseline and monitoring surveys
Value(s) applied	**VPA 1 and 16**: 0
Measurement methods and procedures	Not applicable
Monitoring frequency	Every two years
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	To calculate emission reductions
Additional comment	The potential leakage probability is very low due to the following reasons: 1. The project developer encourages clients to return back their traditional stove by creating incentive such as additional warranty. Thus, it will not be reused outside the project boundary. 2. The project does not have any significant impact on NRB fraction in the project boundary Aggregate leakage can be assessed for multiple project scenarios, if appropriate.

Data / Parameter	μ_y
Unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices (baseline stove) in the project scenario during the year y
Source of data	Monitoring/usage surveys
Value(s) applied	Value captured in the $P_{p,y}$
Measurement methods and procedures	Monitoring surveys to capture cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating

	questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	To calculate emission reduction
Additional comment	The project developer encourages clients to return back their traditional stove by creating incentive such as additional warranty. Emissions reductions are calculated based on the total fuel usage in the Household (including all stoves – baseline and project ICS), which takes into account any fuel usage in the pre-project devices.

Data / Parameter	$EG_{P,d,y}$
Unit	MWh/yr
Description	Quantity of electricity consumed by the project electricity consumption source j in year y
Source of data	Calculated
Value(s) applied	**VPA 1**: 4.36
Measurement methods and procedures	Direct measurement method has been used. The project developer has used an appropriate instrument to determine the electricity consumption. The monitoring of quantity of electricity consumed by project activity is determined by conducting 3-day consecutive kitchen performance test in which the energy meter will be fixed to the device to monitor the consumption of electricity for entire day. On the second day, record the final reading before start the cooking. This has been repeated for the third day. The fourth day the final reading has been captured. The average reading of three days provided the consumption of electricity per day. The measurement for three days has then been extrapolated for the entire year.
Monitoring frequency	Annual
QA/QC procedures	Calibration details of the energy meters used

	Sr.No	**Accuracy**	**Calibration date**	**Validity date**
	04234334 59	0.02	21/09/2021,08/09/2022	20/09/2022,07/09/2023
	04234334 56	0.02	21/09/2021,08/09/2022	20/09/2022,07/09/2023
	04234334 58	0.02	21/09/2021,08/09/2022	20/09/2022,07/09/2023
Purpose of data	To calculate project emissions			
Additional comment	The $EG_{P,d,y}$ parameter has been monitored by direct measurement method through energy meters following the requirements & guidelines of the KPT procedure, in line with registered VPA DD monitoring plan.			

Data / Parameter	$H_{p,y}$
Unit	Hours
Description	Project technology-hours in the project database for project scenario p through year y
Source of data	-
Value(s) applied	-
Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comment	PP has chosen the direct measurement method, hence there is no requirement of measuring $H_{p,y}$ and use of rated wattage for the current monitoring period.

Data / Parameter	$P_{ep,y}$
Unit	Tonnes/day
Description	Quantity of fuel consumed by the baseline technology in the project scenario in year y
Source of data	Monitored
Value(s) applied	**VPA 1** – 0.00616

Measurement methods and procedures	A single project fuel consumption parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario. Kitchen Performance Test carried out in accordance with Annex 4 of the applied methodology.
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	To calculate project emissions
Additional comment	-

Data / Parameter	$\eta_{new,i}$
Unit	Percentage
Description	Efficiency of the project cookstove
Source of data	-Performance report -WBT Test
Value(s) applied	NA
Measurement methods and procedures	-
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	To calculate project emissions
Additional comment	Since KPT has been conducted for the current monitoring period, no WBT has been conducted for this monitoring period. PP has not applied WBT based approach (ageing test approach) to calculate project fuel consumption for the current monitoring period.

SDG 1: End poverty

Data / Parameter	$HHS_{project}$
Unit	Percentage
Description	Percentage of households confirming money saving with improved cookstove
Source of data	Database
Value(s) applied	**VPA 1:** 89.40% for ICS and 90% for EPC **VPA 16:** 90.0% for ICS

Measurement methods and procedures	The number of clean energy products distributed are recorded as part of the CME database which will be used to estimate this parameter
Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	Monitoring of SDG 1
Additional comment	-

SDG 3: Good Health and Well-being

Data / Parameter	$HHsmoke_{project}$
Unit	Percentage (%)
Description	Percentage of households confirming less smoke with the use of improved stove
Source of data	Monitoring Survey
Value(s) applied	**VPA 1:** 89.40% for ICS and 90% for EPC **VPA 16:** 90.0% for ICS
Measurement methods and procedures	This parameter will be monitored as part of the monitoring survey. Users will be asked as part of monitoring survey if there is less smoke with the use of improved stove.
Monitoring frequency	Once every 2 years (biennially)
QA/QC procedures	-
Purpose of data	Monitoring of SDG 3
Additional comment	The parameter will be measured qualitatively.

SDG 5: Gender Equality

Data / Parameter	$HHtime_{project}$
Unit	Percentage (%)
Description	% HH reporting time saving associated with cooking and fuel collection
Source of data	Monitoring Survey
Value(s) applied	**VPA 1:** 89.40% for ICS and 90% for EPC **VPA 16:** 90.0% for ICS
Measurement methods and procedures	This parameter will be monitored as part of the monitoring survey. Users will be asked as part of

	monitoring survey if they have been able to save time due to use of clean energy products
Monitoring frequency	Once every 2 years (biennially)
QA/QC procedures	-
Purpose of data	Monitoring of SDG 5
Additional comment	The parameter will be measured qualitatively.

SDG 7: Affordable and Clean Energy

Data / Parameter	$HHclean_{project}$
Unit	Number
Description	Access to affordable and clean energy (Number of ICS operating)
Source of data	CME Database
Value(s) applied	**VPA 1 -** ICS: 137,738 EPC: 18 **VPA 16 –** ICS: 107,200
Measurement methods and procedures	The number of improved cookstoves distributed will be recorded as part of the CME database which will be used to estimate this parameter
Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	Monitoring of SDG 7
Additional comment	-

SDG 8: Decent Work and Economic Growth

Data / Parameter	$EG_{project}$
Unit	Number
Description	Total no of jobs created
Source of data	CME Database
Value(s) applied	72
Measurement methods and procedures	CME will maintain a record of jobs created as a result of implementation of this programme in form employee list/ payroll system/ contracts/ pay slips

Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	Monitoring of SDG 8
Additional comment	Total number of jobs created during the monitoring period includes for VPA 1 ,2 and 16, as the sales agents or sales persons sell both WPS and ICS.

SDG 12: Responsible Consumption and Production

Data / Parameter	$FC_{project}$
Unit	tonnes/HH/annum
Description	Consumption of non-renewable biomass per household
Source of data	Monitoring survey
Value(s) applied	**VPA 1:** ICS: 2.99 EPC: 2.25 **VPA 16:** ICS: 3.04
Measurement methods and procedures	This will be recorded during KPT conducted in HH.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Monitoring of SDG 12 and 15
Additional comment	-

SDG 15: Life on Land

Data / Parameter	$FCHH_{project}$
Unit	Tonnes eq.fuelwood/day
Description	Average Fuel consumption per HH in project scenario
Source of data	-
Value(s) applied	**VPA 1:** ICS: 0.00820 EPC: 0.00616 **VPA 16:** ICS: 0.00834

Measurement methods and procedures	-
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Monitoring of SDG 12 and 15
Additional comment	-

Water Purification System

SDG 13

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	Option 1: Apply the default value per person. - Residential (Full-day premise): 4 L/person/day - Option 2: Water Consumption Field Tests. - In all cases, the value is capped at 5.5 L/person/day
Value(s) applied	4.00
Monitoring methods and procedures	Option-1 has been chosen
Monitoring frequency	Every two years, if option 2 is selected.
QA/QC Procedures	Water consumption field tests would be compared with qualitative response of the users on the usage frequency/quantity and household size, in case option 2 is selected.
Purpose of data	Calculation of baseline emissions
Additional comment	In case of Option-2, minimum sample size for HWT is 30.

Parameter ID	SDWS 13
Data/parameter	q_i
Unit	Litres per hour

Description	Capacity of the household or institutional water treatment technology
Source of data	- Manufacturer specifications - Commercial guarantee by the seller
Value(s) applied	1.967 litres/hour
Monitoring methods and procedures	-
Monitoring frequency	Continuous
QA/QC Procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	This depends on water filtration device model and fixed for each model introduced. In case different technology such as chlorine tablets it comes with recommended dose per liter to determine treatment capacity.

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
Monitoring methods and procedures	This parameter is determined through representative survey.
Monitoring frequency	Annually
QA/QC Procedures	-
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	-

Parameter ID	SDWS 18

Data/parameter	$M_{q,y}$
Unit	Fraction
Description	Ongoing water quality indicated as the fraction of the samples that pass microbial quality standard requirements specified in relevant microbial quality standard for drinking water of the host country. In case a national standard is not available, the water quality shall comply with WHO Guideline values for verification of microbial quality i.e., all water directly intended for drinking must not have detectable E.Coli in any 100 ml sample i.e., less than 1 Colony Forming Unit (CFU) of E.Coli /100 ml.
Source of data	Testing of water from all appliances or at a representative sample of end-users at the following point where the water reaches the end-user premises: HWT: testing of the water that exits the treatment technology.
Value(s) applied	1
Measurement methods and procedures	Field testing kits using Most Probable Number (MPN) method have been used.
Monitoring frequency	Annually
QA/QC procedures:	Testing kits shall be tested for its accuracy and robustness prior to application for project level monitoring
Purpose of data	Estimation of CO_2 emissions
Additional comment	If the proportion of samples not meeting Safe Drinking Water Quality Standards exceeds a permissible limit of <1 Colony Forming Unit (CFU)/100 ml[11] no emission reductions will be claimed for the corresponding monitoring period. A minimum sample size of 30 will be selected.

Parameter ID	SDWS 28

[11] https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/water.html

Data/parameter	$N_{p,y}$
Unit	Number
Description	Accumulated number of premises type p with at least one individual project technology in year y
Source of data	Sales or distribution records
Value(s) applied	10,563
Measurement methods and procedures	-
Monitoring frequency	Continuous
QA/QC procedures	Sales or distribution records to include: i. Date of sale/distribution ii. Geographic area of sale iii. Model/type of project technology sold iv. Quantity of project technologies sold Name and telephone number, and address (if available) or other traceable indicator of premises identity and location for all end users.
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	Yearly distribution scheduled indicative is mentioned in the Emission reduction calculation. The actual implementation could be different based on demand.

Parameter ID	SDWS 29
Data/parameter	$U_{p,y}$
Unit	Percentage
Description	Usage rate of the project technology by premises type p during year y
Source of data	Survey the premises with a project technology to determine the usage rate of the project technology during the year. Option 1: In-person survey of project premises Households that show at least once-in-two-days use may be counted as users. The resulting fraction is multiplied by 100% to get $U_{p,y}$.
Value(s) applied	100%

Measurement methods and procedures	In-person representative survey
Monitoring frequency	Annually
QA/QC Procedures	Where a WCFT is undertaken to determine QPW_p, this may be used to cross check the usage percentage.
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	The usage survey provides a single usage parameter that is representative for project technologies in the total sales record. Applies to all HWT and IWT technologies and projects. The minimum sample size for HWT - for individual technology age group shall be minimum 30 household.

Parameter ID	SDWS 31
Data/parameter	$DP_{p,y}$
Unit	Days
Description	Average days the project technology is present for end-users in the premises p in year y
Source of data	Sales or distribution records. “Date of sale/distribution” determine for each project device how many days of the 365 days of the year it was in the premises and within its technical life. Average for all the project technology by premises type p to obtain this parameter.
Value(s) applied	138
Measurement methods and procedures	-
Monitoring frequency	Annually
QA/QC Procedures	-
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	-

Parameter ID	SDWS 30
Data/parameter	$t_{p,y}$

Unit	Hours per day
Description	Usage time of the project technology by premises type p in year y
Source of data	Will be determined via Project survey based on anyone of the option below: Option 1. Observational sample-based survey of project household practices. Option 2. Interview survey performed by telephone or messaging (e.g., text, app). Option 3. Default of 5 hours.
Value(s) applied	10.23
Measurement methods and procedures	Representative survey
Monitoring frequency	Annually
QA/QC Procedures	-
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	-

Parameter ID	SDWS 32
Data/parameter	$DN_{p,y}$
Unit	Number
Description	Average number of individual project technologies in each project premises type p in year y
Source of data	Sales or distribution records.
Value(s) applied	1
Measurement methods and procedures	Based on the sales or distribution records of “Quantity of project technologies sold”, the average number of project devices per premises.
Monitoring frequency	Annually
QA/QC Procedures	NA
Purpose of data	Estimation of CO_2e emission reductions

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	Any of the following sources will be used: - Project survey - Official government publications or statistics
Value(s) applied	4.10
Measurement methods and procedures	-
Monitoring frequency	Annually
QA/QC Procedures	-
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	-

Parameter ID	SDWS 33
Data/parameter	$P_{p,f,y}$
Unit	mass or volume units (e.g. kg, Litres, standard m^3)
Description	Quantity of fossil fuel f that is consumed in the project during year y
Source of data	Any of the following methods will be used: - Direct measurement with meter, scales - Estimation with e.g. tank capacity table - Taken from fuel invoice or purchase receipt, or - In the case of direct fuel use by water treatment systems, may be estimated from the manufacturer's specification of the equipment and operating hours or volumes (e.g., fuel consumption per hour times utilization hours or fuel consumption per litre times the litres of water treated).
Value(s) applied	0 (Gravity filters don't use any electricity or fossil fuel in project scenario)

Measurement methods and procedures	Any of the following methods will be used: - Direct measurement with meter, scales - Estimation with e.g., tank capacity table - Taken from fuel invoice or purchase receipt, or - In the case of direct fuel use by water treatment systems, may be estimated from the manufacturer's specification of the equipment and operating hours or volumes (e.g., fuel consumption per hour times utilization hours or fuel consumption per litre times the litres of water treated)
Monitoring frequency	Continuously
QA/QC Procedures	If measured, devices should be calibrated.
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	-

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	Any of the following methods will be used: - Direct measurement with electric meter - Sample based using electricity loggers, or - In the case of direct electricity use by water treatment systems, may be estimated from the manufacturer's specification of the equipment and operating hours or volumes (e.g., electricity consumption per hour times utilization hours or electricity consumption per litre times the litres of water treated).
Value(s) applied	0 (Gravity filters don't use any electricity or fossil fuel in project scenario)
Measurement methods and procedures	Any of the following methods will be used: - Direct measurement with electric meter - Sample based using electricity loggers, or - In the case of direct electricity use by water treatment systems, may be estimated from the manufacturer's specification of the equipment and operating hours or volumes (e.g., electricity consumption per hour times utilization hours or electricity consumption per litre times the litres of water treated).

Monitoring frequency	Continuously
QA/QC Procedures	If measured, devices should be calibrated.
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	-

Parameter ID	SDWS 35
Data/parameter	LE_y
Unit	tCO_2/year
Description	Leakage emissions during year y
Source of data	Survey
Value(s) applied	0
Measurement methods and procedures	Representative survey will be carried out to determine this parameter.
Monitoring frequency	Every two years
QA/QC Procedures	Compliance with the general requirements for sampling and general requirements for data and information sources.
Purpose of data	Estimation of CO_2e emission reductions
Additional comment	-

Parameter ID	SDWS 20
Data / Parameter	Water hygiene education campaigns
Unit	-
Description	Hygiene campaigns carried out among project safe water end-users.
Source of data	Report of annual hygiene campaigns results
Value(s) applied	Report of the annual hygiene campaign
Measurement methods and procedures	-
Monitoring frequency	Annually

QA/QC procedures	The fraction of the households where Safe water and Hygiene practices are found to fulfill “safely managed” or “basic” requirements is expected to increase over time as a result of the hygiene campaigns.
Purpose of data	-
Additional comment	The report of annual hygiene campaign for the monitoring period, highlighting various activities undertaken, has been shared with the VVB.

SDG 1: End poverty

Data / Parameter	$HHS_{project}$
Unit	Percentage (%)
Description	% users reporting money saving due to reduction in purchased fuel consumption in project
Source of data	Representative survey/CME Database
Value(s) applied	100
Measurement methods and procedures	Survey
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Monitoring of SDG 1
Additional comment	-

SDG 3: Good Health and Well-being

Data / Parameter	$HHclean_{project}$
Unit	Percentage (%)
Description	% users using clean technology to access safe water in project scenario
Source of data	Representative survey/CME Database
Value(s) applied	100

Measurement methods and procedures	The number of water purification devices distributed is recorded as part of the CME database which will be used to estimate this parameter
Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	Monitoring of SDG 3
Additional comment	-

SDG 5: Gender Equality

Data / Parameter	$HHtime_{project}$
Unit	Percentage (%)
Description	% users reporting time saving associated with cooking and fuel collection
Source of data	Monitoring Survey
Value(s) applied	98
Measurement methods and procedures	This parameter will be monitored as part of the monitoring survey. Users will be asked as part of monitoring survey if they have been able to save time due to use of clean energy products
Monitoring frequency	Once every 2 years (biennially)
QA/QC procedures	-
Purpose of data	Monitoring of SDG 5
Additional comment	The value of 4 hours is based on the similar project developer developed in Uganda region. The parameter will be measured qualitatively

SDG 6: Clean Water and Sanitation

Data / Parameter	$BENclean_{project}$
Unit	Number
Description	SDG 6.1.1 Contributions (i) Level of Service: Safely managed service (ii) Project contributions Number of beneficiaries

Source of data	CME Database Water Quality Tests
Value(s) applied	43,283
Measurement methods and procedures	The total number of water purification systems distributed to average family member from project survey is used to estimate this parameter.
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Monitoring of SDG 6
Additional comment	-

SDG 8: Decent Work and Economic Growth

Data / Parameter	$EG_{project}$
Unit	Number
Description	Generation of employment in project scenario
Source of data	Employee List
Value(s) applied	72
Measurement methods and procedures	CME will maintain a record of jobs created as a result of implementation of this programme in form employee list/ payroll system/ contracts/ pay slips
Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	Monitoring of SDG 8
Additional comment	Total number of jobs created during the monitoring period includes for VPA 1 2 & 16, as the sales agents or sales persons sell both WPS and ICS/EPC.

SDG 12: Responsible Consumption and Production

Data / Parameter	$FC_{project}$
Unit	Percentage (%)
Description	% users confirming boiling using fuel in project scenario
Source of data	Monitoring survey
Value(s) applied	98

Measurement methods and procedures	Survey
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Monitoring of SDG 12
Additional comment	-

SDG 15: Life on Land

Data / Parameter	$FRC_{project}$
Unit	Percentage (%)
Description	% users reported fuelwood (eq.) savings in project scenario
Source of data	Monitoring survey
Value(s) applied	98
Measurement methods and procedures	Survey
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Monitoring of SDG 15
Additional comment	-

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

VPA 1

Improved Cookstove

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
$P_{p,y}$	0.00820	0.00799
$N_{p,y}$	154,078	35,988
$U_{p,y}$	89.40 %	89.68%

Electric Pressure Cooker

Data / Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
$P_{ep,y}$	0.00616	0.00543
$N_{p,y}$	20	20
$U_{ep,y}$	90%	90%
$EG_{p,d,y}$	4.36	1.06

VPA 16

Improved Cookstove

Data / Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
$P_{p,y}$	0.00834	NA
$N_{p,y}$	119,111	NA
$U_{p,y}$	90 %	NA

VPA 2

Water Purification System

Data / Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
$N_{p,y}$	10,563	351
$U_{p,y}$	100%	100%
$DP_{p,y}$	138	162
q_i	1.967	1.285
$t_{p,y}$	10.23	11.83
$DN_{p.y}$	1.00	1.00
$QPW_{p,y}$	4.00	4.00
$HN_{p,y}$	4.10	3.91
$M_{q,y}$	1.0	1.0
$X_{cleanboil,y}$	0	0

D.4. Implementation of sampling plan

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Cookstoves

There are two project scenarios under the VPA 1 and VPA 16 – domestic stove and electric pressure cooker. Project technologies especially the domestic stoves which are part of the VPA have similar design and performance characteristics. All have same fundamental combustion technology and their respective thermal efficiencies or specific consumptions do not differ by more than +/-5% in absolute terms which can be verified by the technical specification sheet. Hence, these will be included under a single project scenario. Furthermore, EPC is considered as a separate project scenario. Sampling will be undertaken separately for different project scenarios. This project will employ representative sampling in line with the requirements of the TPDDTEC version 3.1. If homogeneity of population can be demonstrated, or differences are taken into account (stratification) in the sample size calculation then 90/10 confidence/precision will be applied.

Monitoring / Usage survey

The usage monitoring was conducted for a period of one month which was started on 7th April 2023 and ended on 2nd June 2023. KPTs performed from 11th April 2023 and ended on 5th June 2023.

For the verification of the designated monitoring period from 01/12/2021 to 31/12/2022 (MP2) for VPA 1 & 2, a monitoring survey had been scheduled between November and December of 2022, in accordance with GS requirements for monitoring survey frequency aligned with VPA DD. However, on September 20, 2022[12], the Ugandan government confirmed an outbreak of the Sudan strain of the Ebola virus in the central part of the country, which is the Mubende district near Kampala. Subsequent cases were confirmed in various other districts. The virus had spread to a total of nine districts in Uganda, resulting in 55 deaths out of 164 reported infections, highlighting the escalating and detrimental nature of the outbreak.

Due to the severe impact of Ebola and the associated risk attributed to its higher mortality rate, which stands at approximately 50%[13] compared to a 3.4% fatality rate of COVID-19[14], the project proponent had decided to postpone the monitoring survey

[12] https://www.who.int/emergencies/situations/ebola-uganda-2022
[13] https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease
[14] https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---3-march-2020

for the relevant VPAs until after the Ebola virus has been contained. The survey was been rescheduled for April 2023, following the official end of the Ebola Virus on January 11th, 2023[15]. Subsequently, the project proponent reorganized all the necessary plans for the monitoring survey, and it was effectively carried out in April 2023. Comprehensive evidence pertaining to the Ebola virus during these specific months has been provided to the GS VVB.

As a result of the ongoing delay in conducting the project's monitoring survey due to the impact of the Ebola Virus in Uganda, which continued until January 11, 2023, PP has patiently waited for an additional two months for the first MP verification to conclude in March 2023 for performance certification. This period of waiting was primarily to determine if any issues or concerns related to project monitoring, particularly for VPA 1 and 2, had arisen during the performance review. So that after the first performance review, PP has started the monitoring survey for all VPAs (VPA 1 ,2 & 16) by 7th April 2023.

Also, since the captured results from the current monitoring survey are conservative due to the degraded efficiency of the project cookstoves, PP has used the current survey results of April 2023 for the entire monitoring period of 01/12/2021 to 31/12/2022.

The monitoring survey investigates changes over time in a project scenario by surveying end users with project technologies on an annual basis. A usage survey determines the drop off rates as project technologies age and users switch back to the baseline technology.

Random sampling has been applied for determining the usage rate for each project scenario separately. The sample size determined has been distributed within each age category based on percentage of stoves in corresponding age category. For example, if only technologies in the first year of use (age 0-1) are being credited, a usage parameter must be established through a usage survey for technologies age 0-1. If technologies in the first year of use (age 0-1) and second year of use (age 1-2) are credited, a usage parameter is required that is weighted to be representative of drop

[15] https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON433

off rates for technologies age 0-1 and age 1-2. The minimum total sample size is 100, with at least 30 samples for project technologies of each age being credited.

The required samples Vs actual samples monitored in the monitoring period is shown below. The total samples required is 100 which is in line with the TPDDTEC methodology.

Technology	Vintage / Age	Required samples / vintage	Samples monitored
ICS	2021(1 to 2) 2022 (0 to 1)	100 samples and 30 per vintage	**2021** VPA 1:79 **2022** VPA 1:103 **2022** VPA 16: 149
EPC	2021(1 to 2) 2022 (0 to 1)	20	**2021** VPA 1: 20

As can be seen from the above table it is evident that the condition of minimum samples of overall sales and vintage split for both ICS and EPC are as per the applied methodology TPDDTEC version 3.1.

All interviews in the monitoring and usage survey have been conducted by UpEnergy staff or by hired experts who would be trained before and include expert observation by the interviewer within the kitchen in question. The GS cookstove usage rate guidelines have been followed in arriving at the usage rate for ICS and EPC for the current monitoring period.

The monitoring survey has been carried out along with the usage survey, to assess end-user characteristics such as technology use, fuel consumption and seasonal variation.

Project KPT

For determining the fuel consumption in the project scenarios, KPTs have been conducted. the KPT sample size determination is based on . the guideline given in TPDDTEC version 3.1.

Table 2 : Sample sizes in cases of INDEPENDENT samples (households sampled in the project situation are different from households sampled in the baseline situation). This is the size required for each of the baseline and project samples.

COV	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2
90/30 precision	90	105	122	140	159	180	201	224	248

According to the initial study, a coefficient of variation (CoV) of 1.2 was determined. The methodology stated that 90 samples should be randomly selected from the ICS age group. Accordingly, for the current monitoring period, PP has conducted KPT on 113 HHs for VPA 1 & 103 HHs for VPA 16.These KPT household are subset of usage survey households which were selected randomly as explained under Monitoring/Usage survey paragraph of this section D.4.
Since there are only 20 EPC (VPA 1) during this monitoring period, KPTs conducted for all 20 units.

In case, for future reporting periods, if PP opts for the ageing test approach instead of biennial project KPTs, annual WBTs would be conducted on a representative sample of each age group. The sample size would be calculated using student's t-distribution approach for mean based parameter. The sample size is appropriately sampled from each age group and enough so that the results comply with the 90/10 rule. In case of not meeting the required confidence/precision, lower bound value will be used. The WBT shall be carried out along with the project KPTs prior to 1st issuance and then subsequently WBTs shall be carried out annually to monitor the degradation in the efficiency of the ICS. The WBTs should be conducted in the last 3 months of the monitoring period or after the monitoring period, provided it is representative of each age group. For this monitoring period, WBTs are not conducted.

Sampling Plan for monitoring parameters

The objective of the sampling plan for this VPA is to determine:

(i) $U_{p,y}$: Usage rate in project scenario p during year y. This would be based on usage survey, to be conducted upon the representative sample of operational stoves.

(ii) μ_y: Adjustment to account for any continued use of pre-project devices (baseline stove) in the project scenario during the year y. Survey

questionnaires administered to a sample of end users will elicit visual inspections of the household and if necessary, an interview to confirm whether they are still using a baseline stove and, in that case, to obtain self-reported estimates of the amount of non-renewable biomass consumed per day in traditional stoves in parallel to the project stove.

(iii) $P_{p,y}$: Specific fuel consumption for an individual technology in project scenario. The actual value has been determined based on the Kitchen Performance Test, which has been carried out in accordance with Annex 4 of the applied methodology TPDDTEC version 3.1.

(iv) $EG_{P,d,y}$: The monitoring of quantity of electricity consumed by project activity will be done for 3-consecutive days similar to kitchen performance test in which the energy meter will be fixed to the device to monitor the consumption of electricity for entire day. On the fourth day the final reading will be captured.

(v) $P_{ep,y}$: Quantity of fuel consumed by a baseline technology y in project scenario. The actual value has been determined based on the Kitchen Performance Test, which has been carried out in accordance with Annex 4 of the applied methodology TPDDTEC version 3.1.

The objective of the sampling was to obtain an unbiased and reliable estimate of the proportion or mean value of the above listed parameters over the course of the monitoring period, and with 90/10 confidence/precision as demonstrated in the ER sheet tabs “Sample Size Cal and Results_ICS” and “Sample Size Cal and Results_EPC”.

PP has applied the usage rate of 90% or lower as actual for ICS and 90% for EPC for VPA 1 and for VPA 16 - 90.0% for ICS.[16], complying with the requirements pertaining to “good practice” as explained below:

Step 1: Defining stove use and non-use:

[16] Please refer to the ER sheet for further details

As evidenced from the usage survey forms, usage of project stove (details like stove usage, stove usage frequency in a day and week, average hours of cooking in a day, whether baseline stove still in use, etc.) are captured.

Step 2. Household Usage Survey:
The project developer has carried out an in-person usage survey to determine stove use. The sample size considered for the usage survey is 182 for VPA 1 & 149 for VPA 16, which is in line with the requirements mentioned in the applicable methodology. The usage survey included the following key elements.

i: Kitchen observation: The surveyors have visited the household during the time of survey, to gather objective information to support the usage survey findings (e.g., if the stove is warm to the touch, ashes present etc.). This can be substantiated from section 4 of the usage survey which clearly states that the surveyor should observe the stove which is operational (Ash/char/spillage observed near the stove, Is it warm to touch).

ii. Interview with the primary cook: The surveyor interviewed the primary cook of the household to gather information on stove use patterns. This can be substantiated from section 4.4 to 4.9 of the usage survey.

iii. Photos of the cooking area(s): Surveyors have taken photographs of the project stoves to gather visual data on the status of the stove. This can be substantiated from section 4.1 of the usage survey which clearly states that the surveyor should take 2 to 3 photos inside the kitchen along with project stove and other stoves, if any. Sample photographs have been shared with the VVB.

iv. GPS coordinates: As per the guideline, photographs taken under iii. above may also be used to meet this requirement. Surveyor has also taken GPS co-ordinates of the household during usage survey. This can be substantiated from section 2.6.1 of the usage survey which clearly states that GPS coordinates information.

Step 3. Verification checks:
As required by the guideline (5-10% of the surveyed households), 20 number for VPA 1 & VPA 16 of ICS users verification checks have been performed by the PP prior to

verification by the VVB. The details collected through telephone have been recorded and shared with the VVB.

Step 4: Field team training and supervision:
The PD has provided training and supervision necessary to ensure field teams have the capacity required to complete usage survey successfully. The necessary documents like training attendance sheet, pictures of the training have been shared with the VVB during the verification process.

Step 5: End-User Training and follow up visits:
The PD has provided end-user training on project stove use via demonstrations during ICS sale and follow-up visits. This can be substantiated from section 1.4 of the usage survey through the response to the question 'Was the training on project stove usage demonstrated'.

Step 6: Awareness campaign:
The PD has organized several awareness campaigns to make end-user aware about the benefits of continuous use of project stove and key product attributes through 'last mile distribution' campaign, end user training. Pictures from last mile distribution have been shared with the VVB.

Data obtained from the samples were used to estimate proportions and mean values for the parameters described above. The values were then being factored into the emissions reduction calculations. For the demonstration of required confidence/precision being met, please refer to the ER calculation sheet for detailed calculation.

Water Purification Systems

A statistically valid sample can be used to determine parameter values, as per the relevant requirements for sampling in the "Methodology for Sampling and surveys for CDM project activities and programme of activities." Minimum 90% confidence interval and a 10% margin of error requirement shall be achieved for the sampled parameters. In any case, for proportion parameter values, a minimum sample size of 30, or the whole group size if this is lower than 30, must always be applied.

When a baseline and project survey is used the following sample size guidelines should be applied, unless otherwise stated for specific parameters:

Water quality testing

- The sample for water quality testing is made following the 90/10 precision rule indicated by the applied methodology.

Usage Survey

- The minimum total sample size for Usage Survey is 100 if group size is more than 1000, with at least 30 samples for project technologies of each age being credited.

  The project developer has carried out an in-person usage survey. The sample size considered for the usage survey is 121 for VPA 2, which is in line with the requirements mentioned in the applicable methodology.

- In line with the applied methodology, any sampling methods can be used, provided that the sample is selected randomly. If sampling approach other than simple random sampling is applied, 'Guidelines for sampling and survey for CDM project activities and program of activities'[17] must be followed.
- When applicable the Usage Survey and the Project Survey will be implemented together using the same sample.

Sampling Plan for monitoring parameters

The objective of the sampling plan for this VPA is to determine:

i. $U_{p,y}$: Usage rate of the project technology by premises type p during year y. This would be based on usage survey, to be conducted upon the representative sample of operational technology.
ii. $M_{q,y}$: Water quality. Testing of water at a representative sample of endusers where the water reaches the end-user premises.

[17] https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20151023152925068/Meth_GC48_%28ver04.0%29.pdf (site visited 03/06/2020)

iii. $X_{cleanboil,y}$: The actual value will be determined based survey to be conducted upon representative sample.

iv. QPW_p: Volume of drinking water per person per day for premises type p.

v. $t_{p,y}$: Usage time of the project technology by premises type p in year y.

vi. $DN_{p,y}$: Average number of individual project technologies in each project premises type p in year y. The actual value will be determined based survey to be conducted upon representative sample.

Data obtained from the samples were used to estimate proportions and mean values for the parameters described above. The values were then being factored into the emissions reduction calculations. For the demonstration of required confidence/precision being met, please refer to the ER calculation sheet for detailed calculation.

Conservativeness approach followed during the monitoring period: -

1. PD would like to state that the baseline fuel consumption fixed *ex-ante* for VPA 1 and VPA 16 considered only the primary fuel consumed and not any secondary fuel used by the sampled HHs; however, the project fuel consumption for the current monitoring period for VPA 1 and VPA 16, includes fuel consumption from all the stoves used by the sampled HHs i.e., primary stove (project stove), stove 1, stove 2, etc., as evident from the monitoring survey results and KPTs conducted.
2. Additionality, PD would like to share that the National charcoal survey of Uganda (2015)[18] carried out by Ministry of Energy and Mineral Development (MEMD) calculates average charcoal production efficiency at 12.5% using traditional kiln methods which puts the wood to charcoal conversation ratio at 1:8; however, the project fuel consumption and in-turn the emission reduction calculation applies wood to charcoal conversion ratio of only 1:6.
3. Also, PD would like to state that even though a higher usage rate (91.26% (Vintage 2022) for VPA 1 ICS and 92.62% for VPA 16 ICS) has been demonstrated through the usage surveys conducted, PP has applied the

[18] https://pfccparliament.go.ug/wp-content/uploads/2019/04/NationalCharcoalSurvey_FINAL.pdf

maximum cap of 90% on stove vintage-wise usage rate and arrived at a weighted average usage rate of 89.4% for VPA 1 ICS and 90% for VPA 16 ICS, complying with the requirements pertaining to “good practice”.

4. Further the number of ICS samples considered for usage survey are 82% and 49% more than the minimum required ICS samples for VPA 1 and VPA 16 respectively and for VPA 2, 21% more WPS samples have been considered. Similarly, for KPT, 25% and 14% more samples (than the minimum required) have been considered for VPA 1 and VPA 16 respectively.
5. Also, as evidenced from the monitoring survey results, its worth to mention that the HHs which have been using the project ICS for the entire monitoring period but stopped using the ICS just few days /weeks before the usage survey have not been considered in the emission reduction calculation.
6. Additionally, as it be could verified from the KPT results, the percentage of HH using baseline stove is more than the percentage of HH using baseline stove identified in the usage survey, resulting in having a conservative project fuel consumption for both VPA 1 and VPA 16.
7. Though the value of 37.25 tCO_2/TJ for $EF_{b,non\text{-}CO2}$ & $EF_{p,non\text{-}CO2}$ has been approved by the GS / SustainCERT in the design certified VPA DD, the PD has calculated the emission reductions for the current monitoring period using IPCC value of 9.46 tCO_2/TJ for $EF_{b,non\text{-}CO2}$ & $EF_{p,non\text{-}CO2}$, instead the design certified value of 37.25 to be conservative.

With all the above details, PD would like to demonstrate their commitment towards integrity and the conservative approach adopted in the calculation of emission reductions achieved by the project activity during the monitoring period.

SECTION E. CALCULATION OF SDG IMPACTS

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

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The Baseline value for the current monitoring period has been calculated as follows:

Cookstoves

SDG 13: Climate Action

The baseline emissions in case of different fuel in project and baseline scenario is calculated using the below equation:

Baseline Emissions

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

Where:

$BE_{b,y}$	Emissions for baseline scenario b during the year y in tCO_2e
$B_{b,y}$	Quantity of fuel consumed in baseline scenario b during year y, in tons
$f_{NRB,b,y}$	Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass, 0.89
$NCV_{b,fuel}$	Net calorific value of the fuel that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/ton)
$EF_{b,fuel,CO2}$	CO_2 emission factor of the fuel that is substituted or reduced. 112 tCO_2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel
$EF_{b,fuel,nonCO2}$	Non-CO_2 emission factor of the fuel that is reduced, 9.46 tCO_2/TJ

$B_{b,y} = N_{p,y} * P_{b,y}$

Where:

$B_{b,y}$	Quantity of fuel consumed in baseline scenario b during year y, in tons
$P_{b,y}$	Specific fuel consumption for an individual technology in baseline scenario b during year y converted to tons/day
$N_{p,y}$	Project technology-days in the project database for project scenario p through year y

VPAs	Technology	Baseline Emissions
VPA 1	ICS	1,415,433
VPA 1	EPC	214
VPA 16	ICS	381,788

Water Purification System

SDG 13: Climate Action

The baseline emissions for the current monitoring period is calculated using the below equation as per the VPA-DD:

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

Where:

BE_y	Baseline emissions from the use of fuel to obtain safe water in the baseline (tCO_2e)
EF_b	Emission factor for the use of fuel to obtain safe water in the baseline (tCO_2e/L)

C_b	Proportion of project end-users who in the baseline were already using a safe water supply that did not require boiling (%) *fixed ex-ante*
$X_{cleanboil,y}$	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, fraction

$$EF_b = SE_{w,b,y} * (\sum x_f * (EF_{b,f,CO2} * f_{NRB,f,y} + EF_{b,f,nonCO2})) \div 10^9$$

Where:

EF_b	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 f used in the baseline (fraction determined based on an energy basis)
$f_{NRB,b,y}$	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.
$EF_{b,fuel,CO2}$	CO_2 emission factor from use of fuel f (tCO_2/TJ)
$EF_{b,fuel,nonCO2}$	Non-CO_2 emission factor arising from use of fuel f, when the baseline fuel f is biomass or charcoal (tCO_2e/TJ). This parameter is omitted when f is a fossil fuel.
f	Index for baseline fuel types

$$SE_{w,b,y} = 360.83/\eta_{wb}$$

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
η_{wb}	Efficiency of the stoves for baseline water boiling (%). Weighted average of baseline stove types

Hence $SE_{w,b,y}$ for traditional firewood, traditional charcoal and improved charcoal are as follows

$SE_{w,b,y}$ for traditional firewood = 360.83 / 10% = 3608.30 kJ/litre

$SE_{w,b,y}$ for traditional charcoal = 360.83 / 16% = 2255.19 kJ/litre

$SE_{w,b,y}$ for improved charcoal = 360.83 / 37.9% = 952.06 kJ/litre

The quantity of safe drinking water provided by the project Qy is determined as follows:

$Q_y = \sum_p N_{p,y} \times U_{p,y} \times QPW_{hh,p,y} \times DP_{p,y}$

Where:

Q_y	Quantity of safe drinking water provided by the project in year y (L)
$N_{p,y}$	Number of premises type p with at least one project technology in year y
$U_{p,y}$	Usage rate of the project technology by premises type p during year y (%)
$QPW_{hh,p,y}$	Volume of drinking water per premises p per day in year y (L)
$DP_{p,y}$	Days the project technology is present for end-users in the premises p in year y

Volume of drinking water per premised is determined as follows:

$QPW_{hh,p,y} = \min ((q_i \times t_{p,y} \times DN_{p,y}), (QPW_p \times HN_{p,y}))$

Where:

$QPW_{hh,p,y}$	Volume of drinking water per premises p per day in year y (L)
q_i	Capacity of the HWT individual project technology (L/h)
$t_{p,y}$	Usage time of the project technology by premises type p in year y (h/day)
$DN_{p,y}$	Average number of individual project technologies in each project premises type p 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. Applying default value of 4 litre/person/day
$HN_{p,y}$	Number of individuals per premises type p (e.g. household, school) in year y

Hence,

$QPW_{hh,p,y}$	= min ((1.967 * 10.23 * 1), (4* 4.10)) = 16.39 litre
Q_y	= 10,563 * 100% * 16.39* 138 = 23,852,083 litres
EF_b	= 0.0004022 tCO_2e/litre[19]
BE_y	= 0.0004022 * (1- (5.51%/100) – 0%) * 23,852,083 * 1 = 9,064 tCO_2e

VPA	Technology	Baseline Emissions
VPA 2	WPS	9,064

[19] For detailed calculation, please refer to the ER calculation sheet.

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

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Cookstoves

SDG 13: Climate Action

Project emissions due to biomass consumption is applicable for this project. For the current monitoring period, ICS project emissions are calculated as follows.

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

$B_{p,y} = N_{p,y} * ((P_{p,y} * U_{p,y}) + (P_{b,y} * (1 – U_{p,y})))$

Where:

$PE_{p,y}$	Emissions for project scenario p during the year y in tCO_2e
$B_{p,y}$	Quantity of fuel consumed in project scenario p during year y, in tons
$f_{NRB,y}$	Fraction of biomass used in year y that can be established as non-renewable biomass, 0.89
$NCV_{p,fuel}$	Net calorific value of the project fuel that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/ton)
$EF_{p,fuel,CO2}$	CO_2 emission factor of the fuel that is substituted or reduced. 112 tCO_2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel
$EF_{p,fuel,nonCO2}$	Non-CO_2 emission factor of the fuel that is reduced, 9.46 tCO_2/TJ
$N_{p,y}$	Project technology-days in the project database for project scenario p through year y
$P_{p,y}$	Specific fuel consumption for an individual technology in project scenario p during year y converted to tons/day
$U_{p,y}$	Cumulative usage rate for technologies in project scenario j during year y, based on cumulative installation rate and drop-off rate
$P_{b,y}$	Specific fuel consumption for an individual technology in baseline scenario b during year y converted to tons/day

VPAs	Technology	Project Emissions
VPA 1	ICS	802,482
VPA 16	ICS	218,284

EPC Project emissions:

Project emissions due to electricity consumption from the grid is also applicable for EPC, along with emissions due to project fuel consumption.

$PE_y = \sum_d EG_{p,d,y} \times EF_{el,y} \times (1+TDL_{j,y})$

$PE_y = B_{ep,y} * ((f_{NRB,y} * EF_{p,fuel,CO2}) + EF_{p,fuel,nonCO2}) * NCV_{p,fuel}$

$B_{ep,y} = N_{p,y} * ((P_{ep,y} * U_{p,y}) + (P_{b,y} * (1- U_{p,y})))$

Where:

Σ_d	Sum over all relevant devices
PE_y	Project emissions from electricity consumption in year y (t CO_2/yr)
$EG_{p,d,y}$	Quantity of electricity consumed by the project device d in year y (MWh/yr)
$EF_{el,y}$	Emission factor for electricity system in year y (t CO_2/MWh), 0.1158
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y
j	Sources of electricity consumption in the project
PE_y	Project emissions from the use of biomass in year y (t CO_2/yr)
$B_{ep,y}$	Quantity of fuel consumed in project scenario p during year y, in tons
$f_{NRB,y}$	Fraction of biomass used in year y that can be established as non-renewable biomass
$NCV_{p,fuel}$	Net calorific value of the fuel that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/ton)
$EF_{p,fuel,CO2}$	CO_2 emission factor of the fuel that is substituted or reduced. 112 tCO_2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel
$EF_{p,fuel,nonCO2}$	Non-CO_2 emission factor of the fuel that is reduced (9.46 tCO_2/TJ)

VPAs	Technology	Project Emissions
VPA 1	EPC	97

Water purification System

SDG 13: Climate Action

Project emissions in year y (t CO2e/yr)

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

Where:

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)

As the filters don't use fossil-fuel or electricity for filtration,

$PE_y = 0$

E.3. Calculation of leakage

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For both the technologies (i.e., improved cookstoves consisting of ICS & EPC and Water purification system), leakage is not applicable for the current monitoring period.

Emission Reductions

VPA 1: For ICS:

ERy = ΣBE,b,y - ΣPE,p,y - ΣLEp,y

Where:

ER_y	Emission reduction for total project activity in year y (tCO_2e/yr)
$PE_{p,y}$	Emissions for project scenario p during the year y in tCO_2e
$BE_{p,y}$	Baseline emissions for baseline scenario b in year y (tCO_2e/yr)
$LE_{p,y}$	Leakage for project scenario p in year y (tCO_2e/yr)

VPAs	Baseline Emissions	Project Emissions	Emissions Reduction
VPA 1	1,415,433	802,482	612,951
VPA 16	381,788	218,284	163,503

For EPC:

ERy = ΣBE,b,y – ΣPE,p,y – ΣLEp,y

Where:

ER_y	Emission reduction for total project activity in year y (tCO_2e/yr)
$PE_{p,y}$	Emissions for project scenario p during the year y in tCO_2e
$BE_{p,y}$	Baseline emissions for baseline scenario b in year y (tCO_2e/yr)
$LE_{p,y}$	Leakage for project scenario p in year y (tCO_2e/yr)

VPAs	Baseline Emissions	Project Emissions	Emissions Reduction
VPA 1	214	97	117

VPA 2: For WPS:

ERy = ΣBEy - ΣPEy - ΣLEy

Where:

ER_y	Emission reduction for total project activity in year y (tCO_2e/yr)
PE_y	Emissions for project scenario p during the year y in tCO_2e
BE_y	Baseline emissions for baseline scenario b in year y (tCO_2e/yr)
LE_y	Leakage for project scenario p in year y (tCO_2e/yr), 0

VPAs	Baseline Emissions	Project Emissions	Emissions Reduction
VPA 2	9,064	-	9,064

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

VPA 1

Improved Cookstove

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	Emission Reductions	0 tCO_2e	612,951 tCO_2e	612,951 tCO_2e
1	Percentage of users reporting money savings due to reduction in purchased fuel consumption in project	0%	89.40	89.40
3	Percentage of users reporting reduction in smoke/PM after shifting to ICS in project	0%	89.40	89.40
5	Percentage of users reporting time saving due to reduction in collected fuel consumption/cooking time	0%	89.40	89.40
7	Number of households with operational stoves	0	137,738	137,738
8	Total number of jobs created	0	72	72
12	Average percentage fuel savings reported by users in the project	5.81	2.99	48.4 %

15	Fuelwood eq savings reported by users in the project	0.0159 tonnes-equivalent fuelwood/day	0.0082 tonnes-equivalent fuelwood/day	1061.57 tonnes-equivalent fuelwood/day

VPA 16

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	Emission Reductions	0 tCO_2e	163,503 tCO_2e	163,503 tCO_2e
1	Percentage of users reporting money savings due to reduction in purchased fuel consumption in project	0%	90 %	90 %
3	Percentage of users reporting reduction in smoke/PM after shifting to ICS in project	0%	90 %	90 %
5	Percentage of users reporting time saving due to reduction in collected fuel consumption/cooking time	0%	90 %	90 %
7	Number of households with operational stoves	0	107,200	107,200
8	Total number of jobs created	0	72	72
12	Average percentage fuel savings reported by users in the project	5.81	3.04	47.6%

15	Fuelwood eq savings reported by users in the project	0.0159 tonnes-equivalent fuelwood/day	0.00834 tonnes-equivalent fuelwood/day	811.57 tonnes-equivalent fuelwood/day

Electric Pressure Cooker

VPA 1

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	Emission Reductions	0 tCO_2e	117 tCO_2e	117 tCO_2e
1	Percentage of users reporting money savings due to reduction in purchased fuel consumption in project	0%	90 %	90 %
3	Percentage of users reporting reduction in smoke/PM after shifting to ICS in project	0%	90 %	90 %
5	Percentage of users reporting time saving due to reduction in collected fuel consumption/cooking time	0%	90 %	90 %
7	Number of households with operational stoves	0	18	18
8	Total number of jobs created	0	72	72
12	Average percentage fuel savings reported by users in the project	5.8	2.25	61.30 %

15	Fuelwood eq savings reported by users in the project	0.0159 tonnes-equivalent fuelwood/day	0.00616 tonnes-equivalent fuelwood/day	0.18 tonnes-equivalent fuelwood/day

VPA 2 - Water Purification system

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	Emission Reductions	0	9,064 tCO_2e	9,064 tCO_2e
1	Percentage of users reporting money savings due to reduction in purchased fuel consumption in project	0%	100%	100%
3	Percentage of users reporting reduction in smoke/PM after shifting to ICS in project	0%	100%	100%
5	Percentage of users reporting time saving due to reduction in collected fuel consumption/cooking time	0%	98%	98%
7	No. of users reporting access to safe water	0	43,283	43,283
8	Total number of jobs created	0	72	72
12	Average percentage fuel savings reported by users in the project	0%	98%	98%

15	Fuelwood eq savings reported by users in the project	0%	98%	98%

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

Cookstoves

VPA 1

SDG	Values estimated in *ex-ante* calculation of approved PDD for this monitoring period	Actual values[20] achieved during this monitoring period
13	1,007,227	ICS: 612,951 EPC: 117
1	100%	ICS: 89.40 % EPC: 90%
3	100%	ICS: 89.40 % EPC: 90%
5	95%	ICS: 89.40 % EPC: 90%
7	201,050	ICS: 137,738 EPC: 18
8	70	ICS: 72 EPC: 72

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

12	55%	ICS: 48.44% EPC: 61.30%
15	875	ICS: 1061.57 EPC: 0.18

VPA 16

SDG	Values estimated in *ex-ante* calculation of approved PDD for this monitoring period	Actual values[21] achieved during this monitoring period
13	632,931	ICS: 163,503
1	100%	ICS: 90%
3	100%	ICS: 90%
5	95%	ICS: 90%
7	130,000	ICS: 107,200
8	70	ICS: 72
12	55%	ICS: 47.6%
15	435	ICS: 811.57

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

Water Purification Systems

SDG	Values estimated in *ex-ante* calculation of approved PDD for this monitoring period	Actual values[22] achieved during this monitoring period
13	49,981	9,064
1	100%	100%
3	100%	100%
5	95%	98 %
6	96,350	10,563
8	70	72
12	100%	98 %
15	100%	98 %

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

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Based on *ex-ante* tables in the PDD

VPA 1:

Baseline Emissions

$BE_{b,y} = B_{b,y} * ((f_{NRB,y} * EF_{b,fuel,CO2}) + EF_{b,fuel,nonCO2}) * NCV_{b,fuel}$

Where:

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

$BE_{b,y}$	Emissions for baseline scenario b during the year y in tCO_2e
$B_{b,y}$	Quantity of fuel consumed in baseline scenario b during year y, in tons
$f_{NRB,y}$	Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass
$NCV_{b,fuel}$	Net calorific value of the fuel that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/ton)
$EF_{b,fuel,CO2}$	CO_2 emission factor of the fuel that is substituted or reduced. 112 tCO_2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel
$EF_{b,fuel,nonCO2}$	Non-CO_2 emission factor of the fuel that is reduced

$$B_{b,y} = N_{p,y} * P_{b,y}$$

Where:

$B_{b,y}$	Quantity of fuel consumed in baseline scenario b during year y, in tons
$P_{b,y}$	Specific fuel consumption for an individual technology in baseline scenario b during year y converted to tons/day
$N_{p,y}$	Project technology-days in the project database for project scenario p through year y

Project Emissions

$$PE_{p,y} = B_{p,y} * ((f_{NRB,y} * EF_{p,fuel,CO2}) + EF_{p,fuel,nonCO2}) * NCV_{p,fuel}$$

$$B_{p,y} = N_{p,y} * ((P_{p,y} * U_{p,y}) + (P_{b,y} * (1 - U_{p,y})))$$

Where:

$PE_{p,y}$	Emissions for project scenario p during the year y in tCO_2e
$B_{p,y}$	Quantity of fuel consumed in project scenario p during year y, in tons
$f_{NRB,y}$	Fraction of biomass used in year y that can be established as non-renewable biomass
$NCV_{p,fuel}$	Net calorific value of the project fuel that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/ton)
$EF_{p,fuel,CO2}$	CO_2 emission factor of the fuel that is substituted or reduced. 112 tCO_2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel
$EF_{p,fuel,nonCO2}$	Non-CO_2 emission factor of the fuel that is reduced
$N_{p,y}$	Project technology-days in the project database for project scenario p through year y
$P_{p,y}$	Specific fuel consumption for an individual technology in project scenario p during year y converted to tons/day
$U_{p,y}$	Cumulative usage rate for technologies in project scenario j during year y, based on cumulative installation rate and drop-off rate

$P_{b,y}$	Specific fuel consumption for an individual technology in baseline scenario b during year y converted to tons/day

Emission Reductions

The overall GHG reductions achieved by the project activity are then calculated as follows:

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

Where:

ER_y	Emission reduction for total project activity in year y (tCO_2e/yr)
$PE_{p,y}$	Emissions for project scenario p during the year y in tCO_2e
$BE_{p,y}$	Baseline emissions for baseline scenario b in year y (tCO_2e/yr)
$LE_{p,y}$	Leakage for project scenario p in year y (tCO_2e/yr)

VPA 1

Year	Total	*Ex-ante* ER (pro rated)
Year-1 & 2	612,951	1,007,110

VPA 16

Year	Total	*Ex-ante* ER (pro-rated)
Year-1	163,503	632,931

VPA 2:

Emission Reductions

$ER_y = BE_y – PE_y - LE_y$

Where:

ER_y	Emission reductions in year y (t CO_2e/yr)
PE_y	Project emissions in year y (tCO_2)
BE_y	Baseline emissions in year y (t CO_2e/yr)
LE_y	Leakage emissions in year y (t CO_2e/yr)

Baseline Emission Reduction

The baseline emission factor shall be calculated as

$EF_b = SE_{w,b,y} * (\sum x_f * (EF_{b,f,CO2} * f_{NRB,f,y} + EF_{b,f,nonCO2})) \div 10^9$

$SE_{w,b,y} = 360.83/\eta_{wb}$

The quantity of safe drinking water provided by the project Qy is determined as follows:
$QPW_{hh,p,y} = \min((q_i \times t_{p,y} \times DN_{p,y}), (QPW_p \times HN_{p,y}))$

$Q_y = \sum_p N_{p,y} \times U_{p,y} \times QPW_{hh,p,y} \times DP_{p,y}$

The baseline emission shall be calculated as
$BE_y = EF_b * (1 - C_b - X_{cleanboil,y}) \times Q_y \times M_{q,y}$

Project Scenario Fuel Consumption Calculation
Project emissions shall be calculated as
$PE_y = PE_{ff,p,y} + PE_{ec,p,y}$
$PE_y = 0\ tCO_2e/yr$

In case the CME introduces safe water technology which uses electricity in future, project emissions shall be calculated according to the methodology.

Leakage

Leakage due to non-renewable biomass can be excluded as all the households supplied with safe water systems do not use lower-emitting energy sources and project activity doesn't increase NRB fraction.

$LE_y = 0$

Year	Total	*Ex-ante* ER (pro-rated)
Year-1	9,064	49,981

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

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Not applicable; there is decrease in achieved SDG Impacts from estimated value in approved VPA DD, mainly due to lesser number of distributed devices.

SECTION F. SAFEGUARDS REPORTING

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Not Applicable

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

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

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No inputs and grievances received during the monitoring period.

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

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Not applicable

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

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No legal contest during the monitoring period.

Revision History

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

1.0	10 July 2017	Initial adoption