Component project activity design document form

(Version 08.1)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the CPA	Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 17
Scale of the CPA	☐ Large-scale ☑ Small-scale
Version number of the CPA-DD	3.0
Completion date of the CPA-DD	03/02/2019
Title and UNFCCC reference number of the registered CDM PoA	Title: Impact Carbon Global Safe Water Programme of Activities (PoA) UNFCCC Reference Number: 9948
Title and reference number of the corresponding generic CPA	CPA Type 2: Technologies for institutional water consumption, no project emissions
Coordinating/managing entity	Impact Carbon
Host Party	Uganda
Applied methodologies and standardized baselines	AMS-III.AV (Version 4.0): Low greenhouse gas emitting safe drinking water production systems
Sectoral scopes linked to the applied methodologies	3. Energy Demand
Estimated amount of annual average GHG emission reductions	59,586 tCO_2-equivalent

SECTION A. Description of component project activity (CPA)

A.1. General description of CPA

>>
CPA Type 2: Technologies for institutional water consumption, no project emissions
Version Number: 3.0

Title: Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 17
UNFCCC Reference Number: 9948

While many people in Uganda do not treat their water at all, due to insufficient resources or lack of knowledge about the need, 39.8% of the population nationwide rely on boiling to purify water[1,2]. With this practice pervasive throughout the country, the health and environmental impacts are widespread and severe: it results in significant greenhouse gas (GHG) emissions through the use of non-renewable fuelwood, causes deforestation, threatens biodiversity, and can create an economic hardship for families to access clean drinking water. Families that purify water through boiling are left vulnerable to the negative effects of poor indoor air quality while those that do not boil, or only boil occasionally, suffer from waterborne diseases. Together, exposure to the harmful pollutants generated from traditional stoves and diseases induced from drinking non-treated water are responsible for over 5 million deaths globally, 1.5 million and 3.5 million respectively (WHO 2005;WHO 2008). In Uganda indoor air pollution contributed to 19,700 annual deaths and another 16,700 are caused by diarrheal diseases each year[3].

The purpose of this CPA is to provide access to clean water technologies that achieve water quality levels equivalent to boiled water. There are no laws, policies, or mandatory requirements in Uganda stipulating the adoption of water purification systems for institutions. Therefore, it is assumed that the baseline scenario will be the continuation of the current scenario.

The project boundary includes the physical and geographical sites of low GHG emitting technologies for water purification installed by the project activity and the institutional buildings where the consumers of safe water provided by the systems are located.

The CPA follows *AMS-III.AV low greenhouse gas emitting safe drinking water production systems Version 4*. As this is a small-scale methodology, each CPA under the PoA will achieve emission reductions below 60,000 tCO_2e per annum. Low greenhouse gas emitting water purification systems (WPS) reduce fossil fuel and non-renewable biomass use, relative to the baseline scenario, thereby achieving emission reductions.

The CPA Implementer, CME, and various local partners work together to distribute the following specific technologies to institutions (day schools, boarding schools, and prisons) within the CPA boundary (Uganda):

- Chemical disinfection

The CME provides CPA implementers and local partners with access to clean water purification technologies. CPA implementers and partners leverage or create local distribution channels of direct distribution to end-users via a Sales Representative to reach institutions to distribute water purification technologies. Sales Representatives collect user information via a Sales Receipt and explain how to use the system correctly.

[1] Uganda Education Statistical Abstract 2010

[2] Uganda Demographic Health Survey 2011

[3] WHO: Country Profile of Environmental Burden of Disease 2009: Uganda

Since water purification systems are neither direct renewable energy (Type I) nor energy efficiency (Type II) application, under small scale methodologies these systems can be covered within Type III definition: “Type III: Other project activities that result in emission reductions of less than or equal to 60 Kt CO_2 equivalent per year”.
As per Ex ante estimates, the CPA will adhere to the limits imposed on a Small-Scale CPA type. The project activity is expected to generate 59,586 ERs annually, and 417,102 ERs in the 7-year crediting period.

The CPA Implementer adheres to the CME management system (section C of the PoA-DD) and provides the CME with information required to include the project activity under the PoA and perform monitoring and verification of the activity.

A.2. Location of CPA

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The CPA covers the boundaries of Uganda.
The CPA is located in the rural and urban areas of Uganda, which can be verified through the life of the project through sales receipts with location information for each technology distributed. Uganda is located on the East African Plateau, lying mostly between latitudes 4°N and 2°S, and longitudes 29° and 35°E. The city of Kampala is the largest city in Uganda, being the key business centre in the country. Lake Victoria down South is the key feature of the geography, shaping the economic development throughout the nearby regions.

The map of Uganda, for reference purpose, is as follows:

A.3. Technologies/measures

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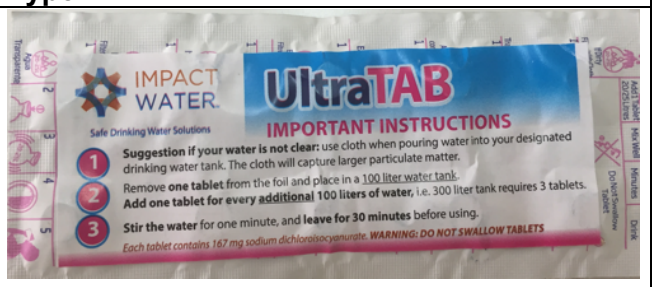
The application of technologies distributed under the CPA achieve compliance with “Interim or higher” performance target as per “Evaluating household water treatment options: Health based targets and microbiological performance specifications” (WHO 2011) or a comparable national

standard or guideline, per the methodology AMS-III.AV Version 4. All technologies[4] that are going to be distributed under this CPA, will be lab tested to ensure they adhere to these guidelines.

Chemical disinfection devices use chemical(s) to disinfect water, such as chlorine. An example of a specific brand that would be included in the CPA based on Chlorination disinfection, besides others, is Ultra Flo & Ultra Tab.

Chemical disinfection (e.g. chlorination) CPA Type 2	
	
Ultra Flo	**Ultra Tab**

Chlorination technologies under this CPA will have following characteristics (design features):

Description	Performance Criteria	Ultra Flo	Ultra Tab
Type	--	Chemical Disinfection	
Minimum flow rate	2 L/hr or 1 dose treating 5 L	20L/min	1 tablet treats 100 L
Minimum capacity/lifespan	8000 L or 1 year	340,000 L / 5-year expiry	10000L / 5-year expiry
Fixed or Portable	Portable or Fixed	Fixed	Portable
Removal of E.Coli	99(2-log)	99 (2-log)	99 (2-log)
Minimum Watts/Voltage	N/A	--	--

As per table A.2.4, page 52, of the “Evaluating household water treatment options: Health based targets and microbiological performance specifications” (WHO 2011), free chlorine disinfection by default performs better than the interim level specified on page 7.

Other Chlorination technology(ies) that will be included in the CPA will be suitable within the context of local water consumption practices, and ensure that potable water is always available for institutional consumption.

CPA may include any new technology/brand in the future until unless it meets the technical requirements or performance criterion as mentioned above.

A.4. Coordinating/managing entity

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Impact Carbon is the Coordinating/Managing Entity (CME) of the PoA, while the CPA Implementer is Impact Water.

The CME will also work with partner organizations to distribute the project technology. Distribution will be done directly by the partner organization as well as through local partnerships with retailers and other community groups.

[4] CPA may include new technology(ies)/brand(s) in the future if it meets the technical requirements or performance criterion as mentioned above.

A.5. Parties and CPA implementers

Parties involved	CPA implementers	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
Uganda (host Party)	Impact Water (CPA Implementer) Private entity	No

A.6. Public funding of CPA

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There is no public funding for the CPA from Parties included in Annex I to the Convention (See Appendix 2 for CME confirmation).

A.7. History of CPA

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The CME has confirmed that the project activity described is a CPA under the PoA 'Impact Carbon Global Safe Water Programme of Activities'.

The CME confirms the following:

- The proposed CPA is neither registered as a CDM project activity nor included in another registered CDM PoA.
- The proposed CPA is not a project activity that has been deregistered.

The CME declares the following:

- The proposed CPA was not a CPA that has been excluded from a registered CDM PoA.
- A registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) does not exist in the same geographical location as the proposed CPA.

A.8. Debundling

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Following Annex 13 of EB 54: Guidelines on Assessment of Debundling for SSC Project Activities, under paragraph 10, if each independent subsystem/measure included in the CPA is no larger than 1% of the small-scale threshold defined by the methodology applied, then the CPA is exempted from performing a de-bundling check, i.e. deemed as not being a de-bundled component of a large scale activity.

The small-scale threshold for the CPA is 60,000 tCO_2 per year. If each sub-system under the CPA is below 1% of the threshold, i.e. 600 tCO_2 per year, the CPA is deemed exempt from a de-bundling check.

As demonstrated in the ER calculations, each unit in this CPA is expected to generate an estimated emission reduction of less than 600 tCO_2e/year, thus, each sub-system under the CPA is exempt from performing a de-bundling check.

In order to ensure this cap is met, one unit of any technology type shall not purify more than 2,796,767 L/year. This is the maximum value for QPWy, to ensure that ERs per unit do not exceed 600 tCO_2equivalent/year. For this CPA, where Ry,i is 2 L/person/day (for day schools) and 3.5L/person/day(for boarding schools and prisons), the maximum value for Ny,i is 3,475 persons/institution[5].

[5] The number of persons per unit in a school shall not exceed 3,475. In case a school has more than 3,475 students (+ staff), then more units must be installed in that school such that average number of persons per unit remains below 3,475.

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

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The CPA operates under the applied small-scale methodology AMS-III.AV low greenhouse gas emitting safe drinking water production systems (Version 4)[6]. The calculation of leakage refers to guidance from AMS-I.E. Switch from non-renewable biomass for thermal applications by the user (Version 5.0)[7].

B.2. Project boundary, sources and greenhouse gases (GHGs)

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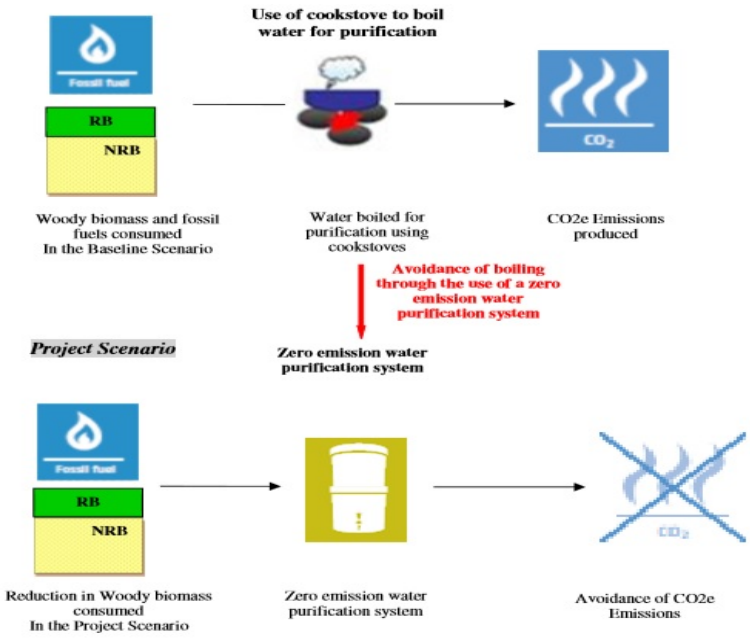
The project boundary includes the physical, geographical sites of the low greenhouse gas emitting technologies for water purification installed by the project activity and the institutional buildings where the consumers of safe water provided by the systems are located. The CPA is located in the Rural and Urban areas of Uganda, which can be verified through the life of the project through sales receipts with location information for each unit distributed.

	Source	GHG	Included?	Justification/Explanation
Baseline	Combustion of non-renewable biomass	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available. This is conservative.
		N_2O	No	Minor source of emissions and limited data available. This is conservative.
Project	Emissions from electricity usage for water purification technologies	CO_2	No	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available
		N_2O	No	Minor source of emissions and limited data available

Flow Diagram: For CPA Type 2; *Technologies for institutional water consumption, no project emissions*

[6] https://cdm.unfccc.int/methodologies/DB/FK5MAJTER13DG3ZPI76S1RE1QQ6GOB

[7] https://cdm.unfccc.int/methodologies/DB/9LFOR81TCT5FLI1AJYP46CQY8O2J79



B.3. Establishment and description of baseline scenario

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Following AMS-III.AV low greenhouse gas emitting safe drinking water production systems paragraph 2, the CPA shows that prior to the implementation of the project activity, a public distribution network of safe drinking water does not exist within the total project boundary and safe drinking water, if any, is produced by consumers by only using point-of-use or point-of-entry water purifiers.

As required under paragraph 3 of the methodology, the CPA provides survey results as evidence (Option – III: Using survey methods) to determine if the CPA falls under Case 1 or Case 2. This CPA falls under Case 1[8]. The CPA also shows that people within the CPA boundary (Rural and Urban areas of Uganda) purify water through boiling, using a variety of fuels including wood, charcoal and to a lesser extent, fossil fuels like LPG and kerosene. The combustion of fossil fuels and biomass result in the emission of GHGs, primarily carbon dioxide. The baseline water boiling system for Uganda people in project boundary is boiling water through Cookstove (fossil fuel burning). The access to improved water sources in Uganda is very limited, with <60% (34.5% for the case, as per Uganda national water quality standards[9]) of the country's population (specifically project boundary – rural and urban Institutions) getting water from improved sources. Kindly refer to the result values obtained from the survey. The criteria requires that no sample must contain greater than or equal to 0 MPN (Most Probable Number) for TC (Thermotolerant Coliform, E. Coli strain).

Here, 188 out of 287 samples failed the water quality standards (as prescribed by WHO), which is 65.5%[10] of the total (rural and urban population). Also, this means that only 34.5% of the project baseline has access to Safe Drinking Water (improved drinking water sources). The detailed analysis can be checked in the Baseline Water Quality Survey Report's result values (provided as Supporting Document).

The simplified and standardized approach under the paragraph 12 of the latest version of methodology assumed that fossil fuel or non-renewable biomass (NRB) is used to boil water as a means of water purification. The fNRB value as per Information Note: Default Values Of Fraction Of Non-Renewable Biomass For Least Developed Countries And Small Island Developing States

[8] (Please refer to Baseline Water Quality Survey Report (for identification of Case I or Case II), provided as supporting document)

[9] Please refer to S. No. (ii), Table 5, Pg. 9, EAS 12:2014 (East African Standards for water quality, Potable water – Specification. Documentation provided as Annex 16.

[10] 270 was the sample size, but it was taken as 287.

(Version 01.0) (EB 67 Annex 22 for calculation of fNRB for LDCs (Uganda is an LDC, which is Least Developing Country) is based on the formula provided below.

fNRB = NRB / (DRB + NRB)

Where:
fNRB = Fraction of non-renewable biomass (fraction or %)
NRB = Non-renewable biomass (t/yr)
DRB = Demonstrably renewable biomass (t/yr)

The excel sheet providing details on calculation is added as supporting document. The calculated value of fNRB comes out to be 0.7867.

B.4. Estimation of emission reductions

B.4.1. Explanation of methodological choices

>>

The following equations and methodological choices shall be applied for calculating baseline emissions, project emissions, leakage emissions, and emission reductions to each generic CPA as per the methodology AMS-III.AV, Version 04:

Baseline emissions shall be calculated as follows:

$$BE_y = QPW_y \times SEC \times f_{NRB,y} \times EF_{projected\_fossilfuel} \times 10^{-9}$$ Equation (1)

Where:

BE_y	Baseline emissions during the year *y* in (tCO_2e)
QPW_y	Quantity of purified water in year *y* (Liters/yr). Calculation of QPW_y is demonstrated in Equations (1.a) and (1.b) below.
SEC	Specific energy consumption required to boil one litre of water (kJ/L) Calculation of SEC is demonstrated in Equation (2) below.
$f_{NRB,y}$	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable. fNRB value has come out to be 0.7867, on the basis of Information Note: Default Values Of Fraction Of Non-Renewable Biomass For Least Developed Countries And Small Island Developing States (Version 01.0)[11] (EB 67 Annex 22) formula, to calculate fNRB for LDCs, as evidenced in the fNRB calculations sheet.
$EF_{projected\_fossilfuel}$	Emission factor when NRB is displaced or the emission factor of the fossil fuel substituted Default emission factors from AMS-I.E as referenced in AMS-III.AV version 4 and IPCC (2005) shall be used. A survey, national, or regional data is conducted to determine the mix of fuels (% of biomass, % of other fuels) used in the baseline. If a mixture of woody biomass and fossil fuels are used in the absence of the project activity a weighted average value shall be applied, as described in parameter box in section B.5.1

[11] Provided as Annex 14.

The quantity of purified water in year y (QPWy) shall be calculated using Equation (1.a) as the CPA is Case 1. These equations follow paragraph 11 of the methodology that allows project participants to determine the amount of purified water and the amount of drinking water per person per day based on:

(a) the population serviced by the project equipment, estimated using surveys and (b) an average volume of drinking water per person per day estimated using surveys or official data or peer reviewed literature or local expert opinion (a value of 5.5 litres per person per day shall not be exceeded). For Case 2, total project population needs to be adjusted for the fraction of the population serviced by the project equipment at institutional buildings for which it can be demonstrated through documentation or survey that the practice of water purification would have been water boiling. (AMS-III.AV, version 4, para.11)

Case 1:

$QPW_y = \Sigma(T_{y,i} \times N_{y,I} \times R_{y,I} \times 365 \times Water\ Quality_i \times Operational\ Units_i)$

Equation (1.a)

QPW_y is the sum of the quantity of purified water for drinking for all technologies type *i*.

Where:

$T_{y,i}$	Total distributed water purification systems (no unit). The product of $T_{y,i}$ and $N_{y,i}$ represents "(a) the population serviced by the project equipment"
$N_{y,i}$	The average population serviced by water purification systems (person/equipment) The product of $T_{y,i}$ and $N_{y,i}$ represents "(a) the population serviced by the project equipment"
$R_{y,i}$	Average volume of drinking water per person per day (Liters/person/day) $R_{y,i}$ represents "(b) an average volume of drinking water per person per day."
Water Quality$_i$	Percent of units that meet water quality requirements *Water Quality*$_i$ parameter is used to modify $T_{y,i}$ such that only the proportion of units that meet required water quality standards out of the total sampled units shall be applied in calculation of QPW_y.
Operational Units$_i$	Percent of the monitoring period in which the units are in use *Operational Units*$_i$ parameter is used to modify $T_{y,i}$, such that only such that only the mean proportion of the monitoring period that the units are in use shall be applied in calculation of QPW_y. If multiple technology types are included, monitoring would measure parameter for each type of technology separately, as explained in monitored parameters section B.5.1.

The specific energy consumption [SEC] required to boil one litre of water shall be calculated as follows:

$SEC = [WH \times (T_f - T_i) + 0.01 \times WHE]/n_{wb}$ Equation (2)

Where:

WH	Specific heat of water (kJ/L ^oC)
T_f	Final temperature (^oC)
T_i	Initial temperature of water (^oC)
WHE	Latent heat of water evaporation (kJ/L)
η_{wb}	Efficiency of water boiling system being replaced (fraction)

	The CPA Implementer will provide information on the baseline technology (i.e. system being replaced) to determine the value for η_{wb}, the efficiency value of the water boiling system. The type of baseline water boiling system used by target population will be determined via survey or national data. The efficiency value for the system being replaced will be determined using the following default values from the methodology: **Baseline Water Boiling System** / **Default Efficiency Value** Unimproved biomass burning stove / 0.1 Other biomass burning stove / 0.2 Fossil fuel stove / 0.5 If more than one system is encountered, a weighted average of values will be applied.

Emissions Reductions shall be calculated using Equation (3) below. This equation is in line with methodology with incorporation of leakage as adjustment to baseline emissions and the application of PEy, as explained below.

$$ER_y = (BE_y \times L - PE_y)$$

Where

ER_y	Emissions reductions during the year *y* in tCO_2e
BE_y	Baseline emissions from the use of non-renewable biomass (NRB) to boil water as a means of water purification, calculated in Equation (1) above.
L	Leakage factor to account for non-renewable woody biomass (fraction). Leakage relating to the non-renewable woody biomass is assessed as per the relevant procedures of AMS-I.E, as allowed by AMS-III.AV. The default value of 0.95 is applied to account for leakage.
PE_y	Project emissions from onsite consumption of fossils or electricity due to the project activity. As CPA type involves no consumption of electricity , PE_y =0 for type 2 CPA.

B.4.2. Data and parameters fixed ex ante

(Copy this table for each piece of data or parameter.)

Data/Parameter	Case1 or Case 2
Data unit	-
Description	Case 1 or Case 2: Project activities implemented in rural or urban areas of countries with proportion of rural or urban population using an improved drinking-water source equal to or less than 60 % (Case1) or above 60% (Case2).
Source of data	Option – III: Using survey methods (For survey sampling, refer to the sampling section of the monitoring plan under B.5.2)
Value(s) applied	[Case 1] Test results show that only 34.5%[12] of the people in the project boundary (institutions in Uganda) have access to safe drinking water. The table below shows the result values.
Choice of data or measurement methods and procedures	Case 1 and Case 2 will be determined using one of the three options below: (i) Proportion of populations using an improved drinking-water source for the most recent year for which data is available from WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation shall be used (<http://www.wssinfo.org/data-estimates/table/>) for this purpose. Definition of improved and unimproved drinking water source shall be as per the information provided by JMP; (ii) Using official data such as publicly available statistical data from a government agency or an independently commissioned study by an international organization or a university; (iii) Using survey methods (use 90/10 confidence/precision for sampling).

[12] 'Evidence: Baseline Water Quality Survey Report' provided as supporting document.

Purpose of data	Determination of Case 1 or Case 2 for baseline and opting for appropriate emission reductions calculations methods
Additional comment	The test for water quality gives result that only 34.5% of the Institutional Population (As the project's Population of interest is Institutions within rural and urban areas of Uganda) has access to Safe Drinking Water (which is less than 60%), and this makes project eligible to be considered as a Case I project activity.

Data/Parameter	WH
Data unit	Kj/L.^{o}C
Description	Specific Heat of Water
Source of data	Default Value from AMS-III.AV Version 4
Value(s) applied	4.186
Choice of data or measurement methods and procedures	Methodology AMS.III.AV - Version 4
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	T_f
Data unit	^{o}C
Description	Final Temperature
Source of data	Default Value from AMS-III.AV Version 4
Value(s) applied	100
Choice of data or measurement methods and procedures	Methodology AMS.III.AV - Version 4
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	T_i
Data unit	^{o}C
Description	Initial Temperature
Source of data	Default Value from AMS-III.AV Version 4
Value(s) applied	20
Choice of data or measurement methods and procedures	Methodology AMS.III.AV - Version 4
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	WHE
Data unit	Kj/L
Description	Latent Heat of Water Evaporation
Source of data	Default Value from AMS-III.AV Version 4
Value(s) applied	2,260
Choice of data or measurement methods and procedures	Methodology AMS.III.AV - Version 4
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	L
Data unit	-
Description	Leakage
Source of data	Default Value from AMS-I.E Version 5
Value(s) applied	0.95
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of leakage emissions
Additional comment	-

Data/Parameter	$R_{y,i}$
Data unit	Liters/person/day
Description	Average volume of drinking water per person per day
Source of data	WHO Minimum water quantity needed for domestic use in emergencies.
Value(s) applied	2.45 Based on 3.5 (for boarding schools, prisons) 2 (for day schools)
Choice of data or measurement methods and procedures	WHO data on the minimum 'survival' allocation for drinking water per a person and water per pupil.[13]
Purpose of data	Calculation of QPW_y For Case 1: $QPW_y = \sum_0^i (T_{y,i} \times N_{y,i} \times R_{y,i} \times 365 \times Water\ Quality_i \times Operational\ Units_i)$ For Case 2: $QPW_y = \sum_0^i (X_{boil} \times T_{y,i} \times N_{y,i} \times R_{y,i} \times 365 \times Water\ Quality_i \times Operational\ Units_i)$
Additional comment	For CPAs the value of QPW_y is subject to a cap derived from the number of total project population for which it can be demonstrated through documentation that the common practice of water purification is or would have been water boiling multiplied by the maximum volume of drinking water per person per day, set at 5.5 litres per person per day. Whilst the cap in the methodology is 5.5 L/person/day, the PoA applies an effective cap of 3.5 l/person/day for boarding schools or prions and 2 l/person/day for day schools, which is more conservative, and a more realistic figure of the quantity of water that would be used for drinking purposes. $N_{y,i}$ multiplied by $R_{y,i}$ shall not exceed the maximum output of the technology [per unit].

B.4.3. Ex ante calculation of emission reductions

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Ex ante calculation of emission reductions expected during the crediting period for the CPA is summarized in this section. Here, example calculations are made for year 1 solely in order to provide

[13] http://www.who.int/water_sanitation_health/publications/2011/WHO_TN_09_How_much_water_is_needed.pdf?ua=1

a sample calculation for each equation used, substituting the values used in the equations. The formulas used below are listed in section B.4.1 of this CPA-DD.

Step 1: Calculate the quantity of purified water in year y (QPWy)

Equation (1.a)

QPW_{y1}	*QPW_y = Σ($T_{y,i}$ x $N_{y,I}$ x $R_{y,I}$ x 365 x Water Quality$_i$ x Operational Units$_i$)*
$QPW_{y1,}$	= 575 X 600 X 2.45 X 365 X 1.0 X 90% = 277,664,625 Liters.

Step 2: Calculate the specific energy consumption [SEC] required to boil one litre of water.

Equation (2)

SEC	$= \left[WH \times \left(T_f - T_i\right) + 0.01 \times WHE\right]/n_{wb}$
SEC	= [4.186x(100-20)+0.01x2260]/0.1
SEC	= 3,574.8 KJ/L

Step 3: Calculate baseline emissions.

Equation (1)

BE_y	$= QPW_y \times SEC \times f_{NRB,y} \times EF_{projected\ \_\ fossilfuel} \times 10^{-9}$
BE_y	= 277,664,625 x 3,574.8 x 0.7867 x 80.33 x 10^{-9}
BE_y	= 62,723 tCO_2e.

Step 4: Calculate emissions reductions.

Equation (3)

ER_y	$= (BE_y \times L - PE_y)$
ER_y	= 62,723 * 0.95 – 0
ER_y	= 59,586 tCO_2e.

B.4.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	62,723	0	3,137	59,586
Year 2	62,723	0	3,137	59,586
Year 3	62,723	0	3,137	59,586
Year 4	62,723	0	3,137	59,586
Year 5	62,723	0	3,137	59,586
Year 6	62,723	0	3,137	59,586
Year 7	62,723	0	3,137	59,586
Total	62,723	0	3,137	59,586
Total number of crediting years	7			
Annual average over the crediting period	439,061	0	21,959	417,102

B.5. Monitoring plan

B.5.1. Data and parameters to be monitored

(Copy this table for each piece of data or parameter.)

Data/Parameter	QPW_y
Data unit	Liters/yr
Description	Quantity of purified water in year *y* (litres)
Source of data	Calculation
Value(s) applied	277,664,625
Measurement methods and procedures	Calculated through Equation (1.a For Case 1: $QPW_y = \Sigma(T_{y,i} \times N_{y,I} \times R_{y,I} \times 365 \times Water\ Quality_I \times Operational\ Units_I)$
Monitoring frequency	Annual or at least biennial as per the monitoring requirements in the methodology
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	η_{wb}
Data unit	Fraction
Description	Efficiency of water boiling system being replaced
Source of data	Default values as per AMS-III.AV combined with survey, national, or regional data to determine the percent of users using different types of water boiling systems in the baseline scenario.
Value(s) applied	0.1
Measurement methods and procedures	The type of baseline water boiling systems used by target population will be determined via survey, national, or regional data. Parameter will be determined using the following default values from AMS-III.AV:

Baseline Water Boiling System	**Default Efficiency Value**
Unimproved biomass burning stove (UBBS)	0.1
Other biomass burning stove (OBBS)	0.2
Fossil fuel stove (FFS)	0.5

If more than one system is encountered, a weighted average value shall be applied, calculated through formula below:

η_{wb} = [Default efficiency of UBBS] * [% of UBBS users] +
[Default efficiency of OBBS] * [% of OBBS users] +
[Default efficiency of FFS] * [% of FFS users]

For ex-ante ER calculation, data from the assumption has been used, where unimproved baseline stovesare taken as the source for boiling water in the rural areas of Uganda:

Stove Type	**Percent**
Unimproved	100
Improved	0.0
Fossil fuel	0.0

As more than one system is encountered, a weighted average of values is applied, per calculation below:
ηwb = (0.1*1) + (0.2*0.0) + (0.5*0.0) = 0.1.

Monitoring frequency	Continuously or at least biennial as per the monitoring requirements in the methodology.
QA/QC procedures	Enumerators will be trained as to proper procedures to assess the baseline stove that is being or would have been used to boil water
Purpose of data	Calculation of baseline emissions
Additional comment	As data specific to Country, regional government was not available, it is assumed that the total population of country is using unimproved source for boiling.

Data/Parameter	$T_{y,i}$
Data unit	Number
Description	Total distributed water purification systems
Source of data	Sales invoices database
Value(s) applied	575
Measurement methods and procedures	The total number of units by technology type and date deployed in each specific CPA is tracked in the in the Project Database, using Sales Receipts. All units distributed will be recorded. Any unit not recorded in the Project Database will not be credited for emission reductions.
Monitoring frequency	Continuous
QA/QC procedures	Sales Database is cross-checked with paper records to ensure transparent and robust data. Replacement technologies will be captured in monitoring the number of *Operational Units*$_i$.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$N_{y,i}$
Data unit	Persons/equipment
Description	The average population serviced by water purification systems
Source of data	Surveys
Value(s) applied	600 Number of persons/equipment is not expected to change by year.
Measurement methods and procedures	At the time of sale, the number of people using the unit will be recorded in the sales receipt.
Monitoring frequency	Continuously
QA/QC procedures	Sales Database is cross-checked with paper records to ensure transparent and robust data when applicable. $N_{y,i}$ multiplied by $R_{y,i}$ shall not exceed the maximum output of the unit [per unit].
Purpose of data	Calculation of QPW_y and capping the treated water consumed at 5.5 litres per person per day per paragraph 6 of the methodology For Case 1: $QPW_y = \Sigma(T_{y,i} \times N_{y,I} \times R_{y,I} \times 365 \times \text{Water Quality}_i \times \text{Operational Units}_i)$
Additional comment	The value of $N_{y,i}$ is effectively the number of people in the institution.

Data/Parameter	Water Quality$_i$
Data unit	Proportion
Description	Water quality measurement
Source of data	Sampling surveys
Value(s) applied	1.0

Measurement methods and procedures	Water Quality testing will be done on sample of units per each technology type. After samples are chosen, a dedicated water container will be taken to the location where the system is installed to take a sample of the cleaned water for testing using the appropriate testing technology. Water quality is defined in a relevant national standard or guidelines for drinking water quality. An indicator may be monitored to assess whether samples meet these requirements. In case a national standard / guideline for drinking water quality is not available, the "Interim or higher" performance targets as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications[14] (WHO, 2011) will be used. Each unit is deemed to meet relevant standards or not. The parameter is a proportion of units of the specific technology type that meet standards out of the total units sampled.
Monitoring frequency	Annual or at least biennial as per the monitoring requirements in the methodology.
QA/QC procedures	As per the World Health Organizations Guidelines[15] it is more cost-effective and feasible to monitor indicator organisms such as E.coli. Monitoring of proxies such as E. Coli, faecal coliform counts, chlorine levels may be used to assess water quality. CPA implementer shall be responsible for conducting testing. Enumerators will be trained on proper testing procedures and the appropriate testing technology will be used. CPA implementer shall be responsible for conducting testing.
Purpose of data	Eligibility criteria and Emission Reduction calculations in Equation (1.a). For Case 1: $QPW_y = \Sigma(T_{y,i} \times N_{y,I} \times R_{y,I} \times 365 \times Water\ Quality_i \times Operational\ Units_i)$
Additional comment	-

Data/Parameter	Operational Units$_i$
Data unit	Percentage
Description	Percent of the monitoring period in which the units are in use
Source of data	Sampling surveys
Value(s) applied	90
Measurement methods and procedures	Surveys will be conducted on sample of units per each technology type. The survey will then determine what percentage of days of the monitoring period the unit is in use by the end user. The mean of the percentage of operational days of the monitoring period of the samples will be applied for the parameter for each technology type.
Monitoring frequency	At least once per verification or biennially as per the monitoring requirements in the methodology.
QA/QC procedures	Enumerators will ensure that the unit present in the institutions is the same one as in the sales database by checking the unique serial number. In the case that the unique serial number is no longer visible enumerators will inquire as to the date of purchase of the unit to ensure that the unit is not a replacement. If the specific unit selected for monitoring has been replaced it will be marked as out of use from the beginning of the monitoring period, and be deemed to be operational for 0% of the relevant monitoring period. Enumerators will be trained as to proper procedures to assess the percentage of the year which the unit is used.

[14] http://www.who.int/water_sanitation_health/publications/2011/evaluating_water_treatment.pdf

[15] WHO 'Guidelines for Drinking-water Quality, Fourth Edition www.who.int/**water**_sanitation_health/publications/.../dwq_**guidelines**/ Page 41

Purpose of data	Emission reductions calculations used in Equation (1.a) For Case 1: $QPW_y = \Sigma(T_{y,i} \times N_{y,l} \times R_{y,l} \times 365 \times Water\ Quality_i \times Operational\ Units_i)$
Additional comment	-

Data/Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of woody biomass saved by the project activity in year, y, that can be established as non-renewable biomass using national or local statistics, survey results, studies, maps or other sources of information, such as remote-sensing data.
Source of data	
Value(s) applied	0.7867
Measurement methods and procedures	Calculated. The fNRB value as per AMS-I.E. Information Note: Default Values Of Fraction Of Non-Renewable Biomass For Least Developed Countries And Small Island Developing States (Version 01.0) (EB 67 Annex 22 for calculation of fNRB for LDCs (Uganda is an LDC, which is Least Developing Country) is based on the formula provided below. fNRB = NRB / (DRB + NRB) Where: fNRB = Fraction of non-renewable biomass (fraction or %) NRB = Non-renewable biomass (t/yr) DRB = Demonstrably renewable biomass (t/yr) Data for calculations[16] was taken from various international sources. Biomass growth rate taken from Table 14: Distribution of total forest area by ecological zone, Global Forest Resources Assessment 2000 Extent of forest taken from FAO - Global Forests Resource Assessment (2015): Table no.2, pg. no. 14 Annual change in living forest biomass taken from FAO- Global Forests Resource Assessment (2015): Table no.21, pg. no. 111
Monitoring frequency	Continuously or at least biennial as per the monitoring requirements in the methodology.
QA/QC procedures	If survey is conducted, enumerators will be trained as to proper procedures to assess the baseline stove and fuel that is being or would have been used to boil water
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$EF_{projected\_fossilfuel}$
Data unit	tCO_2/TJ
Description	Emission factor as per AMS-I.E procedures when NRB is displaced or the emission factor of the fossil fuel substituted
Source of data	AMS-I.E as referenced by AMS-III.AV Version 4 for f_{NRB} and IPCC default values for fossil fuels, combined with survey, national, or regional data to determine the percent of users using woody biomass and fossil fuel(s) in the baseline scenario.

[16] Please refer sheet “Annex_20 Uganda_fnrb_assessment”.

<table>
<tr><td>Value(s) applied</td><td>80.33</td></tr>
<tr><td>Measurement methods and procedures</td><td>The type of baseline fuel used by target population will be determined via survey, national, or regional data.
Parameter will be determined using the following default values from AMS-I.E as referenced by AMS-III.AV Version 4 and IPCC:
<table>
<tr><th>Emission Factor for Baseline Fuels</th><th>Emissions Factor</th><th>Source</th></tr>
<tr><td>EF_{NRB}</td><td>81.6 tCO_2/TJ</td><td>AMS-I.E</td></tr>
<tr><td>$EF_{NaturalGas}$</td><td>56.1 tCO_2/TJ</td><td>IPCC</td></tr>
<tr><td>$EF_{Kerosene}$</td><td>71.9 tCO_2/TJ</td><td>IPCC</td></tr>
<tr><td>EF_{LPG}</td><td>63.1 tCO_2/TJ</td><td>IPCC</td></tr>
</table>
If a mixture of woody biomass and fossil fuels is used in the absence of the project activity a weighted average value shall be applied, calculated through the following formula:
$EF_{projected\_fossilfuel}$ = [EF_{NRB}]*[% of users using NRB] +
[$EF_{Natural\ Gas}$]*[% of users using Natural Gas] +
[$EF_{Kerosene}$]*[% of users using Kerosene] +
[EF_{LPG}]*[% of users using LPG]
For ex-ante ER calculation, data taken is based on assumption that 95% of households using fraction of non-renewable biomass, are using unimproved stoves, while 3% are using fossil fuel-based stoves, and 2% are using improved sources:
<table>
<tr><th>Stove Type</th><th>Percent</th></tr>
<tr><td>Unimproved</td><td>95</td></tr>
<tr><td>Improved</td><td>2</td></tr>
<tr><td>Fossil fuel</td><td>3</td></tr>
</table>
To apply a conservative estimate of CERs, all fossil fuel used is assumed to be Natural Gas, as this fuel has the lowest emission factor. As more than one system is encountered, a weighted average of values is applied, per calculation below:
EFprojected_fossil_fuel = [81.6]*[0.95] + [56.1*[0.02] + [56.1*[0.03]
= 77.52 + 1.122 + 1.683
=80.33.</td></tr>
<tr><td>Monitoring frequency</td><td>Continuously or at least biennial as per the monitoring requirements in the methodology.</td></tr>
<tr><td>QA/QC procedures</td><td>Enumerators will be trained as to proper procedures to assess baseline fuel usage.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>As data specific to Country, regional government was not available, data from reputable international sources has been used.</td></tr>
</table>

Data/Parameter	Existence of public distribution network of safe drinking water
Data unit	-
Description	Existence of public distribution network of safe drinking water in year *y*
Source of data	Surveys and or updated credible national/local reports/letters/announcements in relation to the existence of water networks in the region
Value(s) applied	For ex-ante calculations, it is assumed that there is no public distribution network available for safe drinking water.
Measurement methods and procedures	Review of surveys or credible national/local reports/letters/announcements
Monitoring frequency	Annual or at least biennial as per the monitoring requirements in the methodology
QA/QC procedures	-
Purpose of data	Eligibility criteria

Additional comment	-

B.5.2. Sampling plan

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The monitoring procedures and sampling plan for the PoA is in-line with *AMS-III.AV low greenhouse gas emitting safe drinking water production systems Version 4* and the procedures outlined in paragraph 18 of the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69, Annex 4), which refers to the *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 69, Annex 5):

- *a) Sampling design*
  - *(i) Objectives and Reliability Requirements*
  - *(ii) Target population*
  - *(iii) Sampling method*
  - *(iv) Sample size*
  - *(v) Sampling frame*
- *b) Data to be collected*
  - *(i) Field measurements*
  - *(ii) Quality Assurance/Quality control*
  - *(iii) Analysis*
- *c) Implementation plan*
- *d) Data Storage*
- *e) Monitoring management*

The above criteria are elaborated in the forthcoming paragraphs.

a) Sampling Design

Flexibility to apply cross-CPA sampling is critical for the feasibility of the proposed PoA due to the large number of CPAs envisaged. Cross-CPA sampling may only be conducted for CPAs of the same type to ensure homogeneity. The CME will define a sampling frame for each CPA type such that the homogeneity of the group can be expected to be sufficient to allow for cross-CPA sampling. The criteria for homogeneity across CPAs per EB 75 Annex 8 are listed in section *(v) Sampling Frame* below. A sampling approach may be set in a CPA, but as additional CPAs are included the sampling approach may change to enable cross-CPA sampling.

As a rule, the most appropriate confidence/precision levels required by the methodology AMS-III.AV (Version 4) and the Sampling Standard will be applied whenever sampling is undertaken. According to the Sampling Standard, 95/10 reliability is to be applied whenever sampling across a group of CPAs, which will typically be the case for this PoA. In the case of conducting CPA-specific sampling, the methodology AMS-III.AV (Version 4) requires 90/10 confidence/precision if annual sampling is applied, or 95/10 confidence/precision if biennial (every two years) sampling is applied.

(i) Objectives and Reliability Requirements

The objective of the sampling effort will be to meet the monitoring requirements set forth in the methodology AMS-III.AV (Version 4), as detailed in B.5.1 above. Monitoring will be carried out on an annual basis (or biennial for specific parameters when allowed by the methodology, see B.5.1.). As the PoA progresses and the number of CPAs increases, the sampling plan can apply to a group of CPAs as referred to in EB 75, Annex 8. This will be applicable to CPA types as long as homogeneity can be demonstrated. When homogeneity cannot be demonstrated the CME shall monitor CPAs individually. All monitoring shall be coordinated by the CME, Impact Carbon.

The parameters obtained by means of sampling are listed below:

Parameter	Estimated Parameter Value*
Water Quality$_i$	1.0
Operational Units$_i$	90%
η_{wb}	0.1
$f_{NRB,y}$	0.7867
$EF_{projected\_fossilfuel}$	80.33

Note that parameters $f_{NRB,y}$, η_{wb}, and $EF_{projected\_fossilfuel}$ shall be determined through default values combined with survey, national, or regional data. In case survey is chosen, the sampling plan described below shall apply.

(ii) Target Population

The target population for the application of monitoring procedure will be the institutions in which water purification systems have been installed, as identified through the centralised record-keeping Project Database managed by the CME. The database will include a unique identification number of the unit and end-user information including the location of the institutions. CPAs will be grouped by CPA type, and only CPAs of the same type and located in the same country may be sampled together.

(iii) Sampling method

Simple random, stratified random, or multi-stage sampling will be applied in the PoA in line with the Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities (EB 75, Annex 8). The CME will apply the multi-stage sampling if it is too costly to sample all smaller units within clusters. Simple random sampling and multi-stage sampling may only be applied for *Water Quality*$_i$ and *Operational Units*$_i$ parameters if at the time of the monitoring period only one technology type has been distributed to date. As soon as multiple technology types have been distributed, stratified random sampling shall be conducted for these parameters. Stratified random sampling shall not be applied for parameters η_{wb}, $f_{NRB,y}$ and $EF_{projected\_fossilfuel}$ as parameter refers to baseline scenario.

(iv) Sample size

The sampling method, either simple random, stratified random sampling, or multi-stage sampling will be determined separately for each CPA. The sample will be representative so that if multiple CPAs are grouped in the monitoring process the proportion of technologies sampled from each CPA will equal the proportion of total technologies in operation in the various CPAs, and 95/10 will be achieved for cross-CPA monitoring. If monitoring occurs on an annual basis for an individual CPA then any representative sampling will satisfy the 90/10 confidence/precision requirement. If monitoring occurs every two years for an individual CPA then any representative sampling will satisfy the 95/10 confidence/precision requirement. If the required level of accuracy (confidence/precision) is not achieved, the sample size can be expanded.

1. Simple random sampling may be used for monitoring all of the sampled parameters when the following conditions exist (as outlined in the table below). As noted above, this sampling approach is only possible for *Water Quality*$_i$ and *Operational Units*$_i$ parameters if at the time of the monitoring period, only one technology type has been distributed to date. Justification for the use of this approach for each parameter is provided in table below:

Parameter	Justification/Assumptions for Simple Random Sampling
Water Quality$_i$	One technology type; not widely dispersed geographically
Operational Units$_i$	One technology type; not widely dispersed geographically
η_{wb}	Technologies not widely dispersed geographically (technology type not applicable as parameter refers to baseline scenario)
$f_{NRB,y}$	Same as η_{wb}
$EF_{projected\_fossilfuel}$	Same as η_{wb}

Sample size is determined for Proportional Values under simple random sampling using:

$$n \geq \frac{1.645^2 N \times p(1-p)}{(N-1)\times 0.1^2 \times p^2 + 1.645^2 p(1-p)}$$

Where:

n = Sample Size
N = Total Number of technologies
p = Expected proportion
1.645 = Represents the 90% confidence interval (1.96 represents the 95% confidence interval)
0.1 = Represents the 10% relative precision

Sample size is determined for a Mean Value under simple random sampling using:

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

Where:

$$V = \left(\frac{SD}{mean}\right)^2$$

Where:

n = Sample Size
N = Total Number of Households
mean = Mean
SD = Standard deviation
1.645 = Represents the 90% confidence interval (1.96 represents the 95% confidence interval)
0.1 = Represents the 10% relative precision

2. Stratified random sampling may be used for monitoring *Water Quality*$_i$ and *Operational Units*$_i$ parameters when the following conditions exist (as outlined in the table below). Stratified sampling is used to account for differences in technologies within one CPA. The strata shall be the technology type.

Parameter	Justification/Assumptions for Simple Random Sampling
Water Quality$_i$	Multiple technology types
Operational Units$_i$	Multiple technology types
η_{wb}	n/a – stratification by technology type is not applicable as parameter refers to baseline scenario
$f_{NRB,y}$	Same as η_{wb}
$EF_{projected\_fossilfuel}$	Same as η_{wb}

Sample size is determined for Proportional Values under stratified random sampling using:

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

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

Where:

n = Total sample size

1.645 = Represents the 90% confidence interval (1.96 represents the 95% confidence interval)

0.1 = Represents the 10% relative precision

Where:

$$n_i = \frac{g_i}{N} \times n$$

Where:

n_i = Sample size of the i^{th} group, where i=1,..,k

g_i = Size of the i^{th} group, where i=1,..,k

N = Population total

Where:

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

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

Where:

p_i = Proportion for the i^{th} group, where i = 1,…,k

Using above equations, the total sample size (n) is calculated. The total sample size must be divided into the sample size for each group, i.e. each technology type. This division of the total sample size is calculated through the following equation:

$$n_i = \frac{g_i}{N} \times n$$

No Mean Value shall be determined for stratified random sampling, therefore equations are not provided.

3. Multi-stage sampling may also be used when the following conditions exist (as outlined in the table below). Multi-stage sampling consists of selecting primary clusters units and sampling from the secondary sampling units. The primary sampling units shall be administrative clusters, i.e. district, region, county, or village. The secondary sampling unit shall be the technology type.

Parameter	Justification/Assumptions for Simple Random Sampling
Water Quality	Technologies widely dispersed geographically
Operational Units$_i$	Technologies widely dispersed geographically types
η_{wb}	Technologies widely dispersed geographically – use same location for baseline
$f_{NRB,y}$	Same as η_{wb}
$EF_{projected\_fossilfuel}$	Same as η_{wb}

Sample size is determined for proportional values under multi-stage sampling using:

$$c \geq \frac{\frac{SD_B^2}{\overline{p}^2} \times \frac{M}{M-1} + \frac{1}{\overline{u}} \times \frac{SD_w^2}{\overline{p}^2} \times \frac{(\overline{N}-\overline{u})}{(\overline{N}-1)}}{\frac{0.1^2}{1.645^2} + \frac{1}{M-1} \times \frac{SD_B^2}{\overline{p}^2}}$$

Where:

c	Number of groups that should be sampled
M	Total number of groups in the population
$\overline{u}$	Number of units to be sampled within each group
$\overline{N}$	Average units per group
SD_B^2	Unit variance
SD_W^2	Average of the group variances
$\overline{p}$	Overall proportion
1.645	Represents the 90% confidence interval (1.96 represents the 95% confidence interval)
0.1	Represents the 10% relative precision

Sample size is determined for mean values under multi-stage sampling using:

$$c \geq \frac{\left(\frac{SD_B}{Clustermean}\right)^2 \times \left(\frac{M}{M-1}\right) + \left(\frac{1}{u}\right) \times \left(\frac{SD_W}{Overallmean}\right)^2 \left(\frac{\overline{N}-u}{\overline{N}-1}\right)}{\left(\frac{0.1}{1.645}\right)^2 + \frac{1}{M-1}\left(\frac{SD_B}{Clustermean}\right)^2}$$

Where:

c	= Number of groups that should be sampled
M	= Total number of groups in the population
$\overline{u}$	= Number of units to be sampled within each group
$\overline{N}$	= Average units per group
SD_B	= Standard deviation between groups

SD_W = Average within group standard deviation
Cluster mean = The cluster or group mean
Overall mean = The average across all households
1.645 = Represents the 90% confidence required (1.96 for 95% confidence)
0.1 = Represents the 10% relative precision

The precision and expected variance is established in accordance with the recommended values by UNFCCC[17], namely 95% precision and 10% expected variance, for cross-CPA sampling.

In order to establish the sample size (the number of groups to be sampled) using the above formulas, the following parameters must be known:
- the total number of groups in the population
- the average units per group
- an estimate of the proportion/mean
- an estimate of the variance between and within groups

Sample size calculations for sampling approaches are laid out in below table. The sample size calculation is automated in an Excel spreadsheet so that different scenarios may be estimated, submitted to DOE.

Parameter	*Sample Size*		
	Simple Random	**Stratified Random**	**Multi Stage (# of villages w/ 10 samples/village)**
Water Quality$_i$	23	28.24	5
Operational Units$_i$	23	28.24	5
η_{wb}	59	N/A	5
$f_{NRB,y}$	59	N/A	5
$EF_{projected\_fossilfuel}$	59	N/A	5

If the sample size calculation returns a value of less than 30 samples, a minimum of 30 samples will be conducted.

(v) Sampling frame

The sampling frame will be all units within a CPA, which will be derived from the sales database.
In the case of cross-CPA sampling, the sampling frame shall include all technologies distributed across multiple CPAs of the same CPA type if CPAs are considered homogenous. Samples will be selected from each sampling frame according to the estimates from using the sample size equations in EB 75 Annex 8. One or more criteria from the list below may be used to demonstrate homogeneity across CPAs, as per EB 75 Annex 8:

(a) Project technology/equipment have comparable input/output characteristics, including efficiency, and provide comparable service, e.g. water flow rates and filtration or disinfection mechanism are comparable;
(b) End users of the project technology/equipment have comparable socioeconomic conditions;
(c) The geographic locations of project equipment do not have a significant influence on the parameter of interest, e.g. water filtration or disinfection systems installed in colder climates have different output rates than those in warm climates, in which case stratification of technologies by geographical area is desirable;

[17] Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities (EB 74, Annex 6).

(d) Installation dates of the CPAs are not significantly different to considerably impact on the parameter of interest; for example, the range of installation dates does not exceed the life span of the device.

b) Data to be collected

(i) Field measurements

Field measurement objectives and data to be collected are listed in section B.5.1.

For this CPA, which is confirmed to be Case 1, the following parameters are determined through sampling:

a) *Water Quality*
b) *Operational Units*$_i$
c) η_{wb}
d) $f_{NRB,y}$
e) $EF_{projected\_fossilfuel}$

Parameters will be obtained using sampling and will meet 90/10 confidence precision when sampled as a single CPA and 95/10 confidence and precision when sampled across CPAs or if monitoring is conducted on a biennial (every two years) basis.

The CPA monitoring draws on information from the electronic data management system. The CME will operate and manage an electronic data management system that will store information on and track all technologies under the PoA. The system will contain the following information:

- Volume of Units disseminated under the PoA
- Technology type for each Unit
- Unique Identification Number for each Unit
- Name, address, and contact information of the end-user (where possible)
- Date of installation (where possible)
- CPA assignment

The date of installation for each unit is used to determine the portion of the monitoring period during which the unit was active. Products deployed under the project activity are assumed be in operation as of the start of the next month following the date of sale, i.e. if the date of sale is April 1st, the start of operation is May 1st.

Monitoring will ensure the water quality of the water treated by the products employed under each CPA, as required under AMS-III.AV (Version 4). It shall be demonstrated that the application of the project technology/equipment achieves compliance with “protective”[18] or interim WHO performance targets as per “Evaluating households water treatment options: Health based targets and microbiological performance specifications” (WHO, 2011) or a comparable national standard or guideline. As per the World Health Organizations Guidelines[19] it is more cost-effective and feasible to monitor indicator organisms such as E.coli. Monitoring of proxies such as E. Coli, faecal coliform counts, chlorine levels may be used to assess water quality. Enumerators will be trained on proper testing procedures and the appropriate testing technology will be used.

Upon installation of the water purification units, and associated accessories, the user will sign a Sales Receipt. For units that are not self-installed, a Sales Receipt will be signed upon commissioning. The sales and installation persons shall be responsible for ensuring that all data are complete and accurate within respective documents. Hard copies of both documents will be kept at the office of the CME, and all data entered into a central record keeping database.

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[18] “Interim” default performance target is defined by

‘achievement of “protective” target for two classes of pathogens, resulting in health gains’ (“Interim”). The reference pathogens shall be C. Jejuni, Cryptosporidium, and rotavirus.

[19] WHO 'Guidelines for Drinking-water Quality, Fourth Edition www.who.int/**water**_sanitation_health/publications/.../dwq_**guidelines**/ Page 41

The record keeping database will be used to record the results of all monitoring, thereby avoiding double counting, with all data stored to be kept for at least two years after the crediting period or the last issuance of CERs for the project activity. The data will be stored electronically in the database, with original hard copies of all collected monitoring data also kept.
Monitoring shall also ensure that institutions connected to the Energy Water and Sanitation Authority (EWSA) shall be excluded from the CPA and not credited. Prior to distribution to each institution, monitoring will confirm whether the institution is connected to EWSA.

(ii) Quality Assurance/Quality Control

Training will be given to sales staff of the CME or CPA implementer (if not the CME) responsible for the data collection system on the management system to be put in place as part of the overall PoA. This will include:

- Data to be recorded in the database (as per the Partner Operation Manual) and how to complete the Sales Receipt record correctly;
- How to identify the serial number on a water purification unit;
- How to fill out and where to submit copies of the sales contract, installation records and invoice and any associated documentation.

On completion of training, the name, company, and contact details of all attendees will be recorded. This will be used to confirm that the training has been completed and that staff is qualified to carry out the data collection as required under the PoA.
In order to minimise errors, a quality control and assurance strategy plan will be established. This strategy includes a planning phase in which there is a clear definition of the target population, of the issues and variables to be investigated, of the sampling frame and sample size, and the design of a questionnaire that reflects the objectives of the survey and facilitates field operations and information processing. The team who will carry out the sampling survey will be appropriately selected to have previous field experience in performing similar surveys.
In order to minimise errors, all personnel conducting field measurements, both for the collection of baseline data and annual monitoring of CPAs, on behalf of the programme will receive training on the procedures to be used for data collection, including the format in which data should be collected, project background, basic functioning of the water purification units, their application and any other relevant project background. Enumerators will also be trained as to best practices of survey implementation to ensure that all bias is removed. Response rates will be maximised by contacting randomly-selected water purification units' users beforehand to arrange a practical site visit date and sampling over the minimum required number to compensate for any non-responses. In cases where participants refuse to participate in the monitoring, the reason shall be documented in the CME's programme database. Receipts will explain that project participants may be selected for monitoring and sales representatives will be encouraged to explain this to end users, in order to maximize responsiveness. The CME will explain that monitoring is part of the requirements of the programme and try to arrange an alternative date for a site visit, or carry out monitoring with another member of the institution. The programme database will have a provision for recording any monitoring carried out in reference to the serial number of the installed system.
Outliers will be defined as datapoints that are more than 1.5 times the inner quartile range. Outliers will be dealt with by applying the CDM materiality principles outlined in CMP7. That is, the outliers will be disregarded provided that doing so does not lead to an overestimation of the emissions reductions of a group of CPAs of higher than:

- 5% in the case of SSC-CPAs (CMP 7, Paragraph 4(d))

(iii) Analysis

Data will be used for the preparation of monitoring reports for each CPA or a group of similar CPAs. The results of all monitoring will be entered into the CME's management database. Where it is found that an installed water purification system is no longer in use, the installation will be removed from inclusion in the CPA.

B.5.3. Other elements of monitoring plan

>>

(a) Implementation Plan

Impact Carbon is responsible for the production of annual monitoring reports, following the criteria outlined in section B.5 and B.5.1. Sampling will be carried out following the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 74, Annex 6) in accordance with CDM requirements. A precision/confidence of 95/10 will be applied for cross-CPA sampling, in accordance with the requirements of the methodologies above.

All sampling efforts will be conducted by qualified personnel who have undergone training as part of the programme. They will be issued with a certificate confirming their attendance at any training and their qualification to complete the monitoring. A paper copy of the certificate will also be kept by the CME. Any samplers will be required to speak the native language(s) in which water purification systems have been implemented, allowing for full understanding of any responses given by users, and any questions therein.

If sampling is to be carried out for a group of CPAs, monitoring may be carried out any time before the annual deadline for each CPA to be included in the sampling effort, and should be conducted annually thereafter. The date of all monitoring shall be recorded in the CPA database.

(b) Data storage

All monitored data will be entered into the CME database. In case an error is made in data entry, original copies of all monitoring documents will be kept and filed per. The name, date, and contact details of the surveyor will be detailed on all completed monitoring surveys, therefore allowing for the follow-up of all incomplete/unclear data.

Hard copies of all documents will be kept at the office of Impact Carbon, or an alternative address nominated by them, and all data entered into a central record keeping database. The record keeping database will be used to record the results of all monitoring, with all data stored to be kept for at least two years after the crediting period or the last issuance of CERs for the project activity.

(c) Monitoring Management

The responsibility for monitoring and reporting lies with the CME. Trained staff will be assigned to carry out the monitoring process including data recording, reporting, archiving and management. The training will take place just before each CPA becomes operational. This is in order to ensure that the monitoring activity will take place exactly in accordance with the methodology and monitoring plan requirements and to guaranty a smooth verification and issuance process thereafter.

Entities responsible for conducting monitoring

Role	Responsibility
Project Development Director	- Receive escalated monitoring issues and questions from Water Programme Manager, clarify uncertainties in methodology, provide additional support from Project Development team if needed. Advises on monitoring issues.
Programme Manager	- Enlist and manage work of Third party monitoring – supply protocols, ensure timeframe is met, address issues, compile final reports, etc - Manages the Project Database, in which the results of monitoring shall be summarised. - Oversees and drafts the production of annual monitoring reports. - Coordinates communication with the verifier and the UNFCCC Secretariat
CPA Implementer	- Collecting data to be monitored accurately, or training Field Measurement Personnel to do so. - Sharing monitoring data with the Water Programme Manager (CME). - Maintains proper and continuous records of project activities and disseminated WPS, including technology identification - Oversees maintenance of installed systems
Programme Associate	- Assist with the completion of monitoring reports with input from the Water Programme Manager.
Field measurement personnel	- Conduct on the ground monitoring of end users
External QAQC	- Verify the monitoring work done to ensure accuracy before submission; review protocols, interview enumerators, spot check data

SECTION C. Start date, crediting period type and duration

C.1. Start date of CPA

>>
The project hasn't started yet. It is expected to start on 30/11/2017. This is the earliest date at which real action of the program activity is to be taken, on which the CME commits expenditures related to implementation with the purchase of the first units for the project activity.

C.2. Expected operational lifetime of CPA

>>
The CPA operates for a lifetime of 21 years.

C.3. Crediting period of CPA

C.3.1. Type of crediting period

>>
A crediting period of 7 years, renewable twice, will be applied.

C.3.2. Start date of crediting period

>>
The crediting period start date is 15/12/2017 or date of inclusion in the registered PoA, whichever is later.

C.3.3. Duration of crediting period

>>
7 years, renewable twice.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The technologies to be distributed by each SSC-CPA are the same or similar and present similar positive environmental impacts wherever they are applied and they have no major anticipated negative impacts. Technologies in the CPA do not have any major detrimental environmental impact that would justify an individual assessment.

D.2. Environmental impact assessment

>>
Not Applicable. The CME has received a letter from the National Environmental Management Authority (NEMA)[20] granting the PoA an exemption of an Environment Impact Assessment.
However, the CME is requested to ensure end-users (or responsible individual for institution or community center) are trained as to proper usage of the technologies and to mitigate any unforeseen undesirable environmental impacts. The CME conducts in-person training and provides user manuals with each unit disbursed. When the CME is not responsible for distribution, the CME will make sure that all distribution partners (for institutions) are trained such that all customers will be provided with appropriate training upon receipt of the unit. Further, the CME has signed a statement declaring their intent to mitigate any unforeseen undesirable environmental impacts caused by the project.

[20] Please refer Annex 21.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>

The stakeholder meeting was undertaken at CPA level. Access to public drinking water varies highly across the PoA boundary. Conducting the stakeholder meeting at the CPA level allows for region project specific comments to be incorporated.

Advertisements in local dailies, invitation letters (in the form of mails, emails, etc.) to different local bodies (public as well as private), members of institutional bodies, etc., public notices at different places, and radio announcements in local radio was done to disseminate the news of Local Stakeholder Consultation Meeting.

The Local Stakeholder Consultation meeting was held on March 14, 2013 at 9:30 A.M. at the Speke Hotel, located in Kampala, Uganda. The purpose of the meeting was to gather comments from stakeholders, including individuals, groups or communities affected (or likely to be affected) by the proposed project activity. The meeting was attended by 33 stakeholders, including those from the NGO community, government, and private sector. The meeting was addressed by Impact Carbon Executive, in the form of a verbal address, aided by a PowerPoint presentation for further clarity on the subject. In addition, a Non-Technical Summary and examples of technologies to be included in the project were made available for participants to review during the event.

E.2. Summary of comments received

>>

Comments from participants were generally positive in nature. Many commented that the presentation itself was very informative and provided a good overview of the program. Participants were very enthusiastic about the wide array of benefits associated with clean water technologies. A few attendees were critical of the duration and detail of the meeting, noting that it took too much time and involved too many irrelevant indicators. In addition to providing the evaluation forms, the meeting facilitators stayed after the meeting to address any additional questions or concerns with the stakeholders. Continuous feedback mechanisms were also established so that all participants can provide on-going communication.

Further, no complaints from the local stakeholders have been received during and since the local stakeholder consultation.

A summary report of comments received from local stakeholders on the CPA during (and after, as applicable) the consultation has been provided in Appendix-5

E.3. Consideration of comments received

>>

All comments received were captured in a local stakeholder consultation report where comments were recorded and the Impact Carbon representative addressed each point of feedback during the meeting.

Contact details for continuous feedback were publicized to all attendees and are publicly available going forward.

A summary report of comments received from local stakeholders on the CPA during (and after, as applicable) the consultation has been provided in Appendix-5.

SECTION F. Eligibility for inclusion

The eligibility criteria are established in section B.5 of the PoA-DD. The eligibility criteria for inclusion of a CPA in the PoA are based on the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme Activities (version 03.0), Annex 05 of EB 74.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
1	Location	All water purification systems in each CPA are located within the geographical boundaries of Rwanda, Uganda and Nigeria.	Geographical reference points of borders in section A.7 of the CPA-DD.	All water purification systems in each CPA are located within the geographical boundary of Uganda. Supporting Evidence: Geographical reference points of borders in section A.2 (as the CPA-DD version has changed, the section has been revised to section A.2) of the CPA-DD.
2	Double Counting	Each water purification system has a unique serial number and programme logo engraved or permanently attached as a nameplate or sticker. The serial numbers are listed in the CPA Project database and recorded in the Sales Receipt. [and] The name of each end-user (or individual who purchased product for institution or community center) will be recorded as part of the Sales Receipt and CPA Project Database. The address will be recorded if possible, alternatively other means of locating the unit such as GPS can be used. [and] The CME has an agreement in place with owner of each individual water purification system in the CPA in which the owner transfers the rights to the emissions reductions exclusively to the CME as part of the Carbon Rights Waiver within the Sales Receipt. [and] The CME has an agreement in place with each technology supplier in which it is stated that the supplier transfers the rights to the emissions reductions of each water purification system exclusively to the CME.	Verifiable evidence: - Operations Manual, documented procedures. - Example of sales receipt/CRW - Agreement with technology supplier(s)	Each water purification system has a unique serial number and programme logo engraved or permanently attached as a nameplate or sticker. The serial numbers are listed in the CPA Project database and recorded in the Sales Receipt [and] The CME has an agreement in place with owner of each individual water purification system in the CPA in which the owner transfers the rights to the emissions reductions exclusively to the CME as part of the Carbon Rights Waiver within the Sales Receipt. [and] The CME has an agreement in place with each technology supplier in which it is stated that the supplier transfers the rights to the emissions reductions of each water purification system exclusively to the CME. Supporting Evidence: - Operations manual - Example of sales receipt/CRW - Agreement with technology supplier(s)

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
3	Technology	Each CPA will employ water purification systems that are point-of-use or point-of-entry treatment systems, and are in line with criterion 7). Technologies that use fossil fuels are not eligible. Each unit must achieve water quality defined in relevant national standards or international guidelines for drinking water quality. The technologies must meet minimum criteria for specific CPA type, as outlined below: *CPA type 2: Technologies for institutional water consumption, no project emissions* – Minimum flow rate: 2 L/hr or one dose treating 5 L. – Minimum capacity/lifespan: 8,000 L or 1 year – Fixed or portable: Portable or Fixed – Removal of E. coli: 99 (2-log) – Minimum Watts/Voltage: NA	Verifiable evidence: – Technological specifications of technology	This CPA will employ water purification systems that are point-of-use treatment system, & are in line with criterion 7. Each unit will achieve water quality defined in US EAS 12:2014 [21] (Uganda National Standard for enumeration of coliform in water, MPN method) for drinking water quality. The technologies will meet minimum criteria for specific CPA type, as outlined below: CPA Type 2: Flow rate: 2 L/hr or one dose treating 5L Lifespan – 8,000 L or 1 year Build Type (Fixed/portable) – Fixed E. Coli removal fraction – 99 (2-log) Max Load (Watts) – NA Supporting Evidence: – Technological specifications
4	Start Date	Each CPA will prove that the start date of the CPA is on or after the start date of the PoA, which is stated in section D.1 of the PoA-DD. The start date of the CPA is the date on which the first water purification systems to be included in the CPA are ordered from the manufacturer. This is documented in the purchase order or contract agreement with the technology supplier.	Verifiable evidence: – Purchase order to technology supplier – Contract with technology supplier	The start date of the CPA is the date on which the first water purification systems to be included in the CPA, are ordered from the manufacturer. The start date for this CPA is expected to be 30/11/2017. This will be documented in the purchase order/contract agreement with the technology supplier. Supporting Evidence: – Purchase order to technology supplier

[21] Please refer Page 9 of the Water Quality Standard Document for permissible value for E. Coli (biological strain, bacteria). It is provided as supporting document (Annex 16).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
5	Methodology	Each CPA will apply the baseline and monitoring methodology AMS-III.AV (Version 4). The CPA will introduce water purification systems to provide safe drinking water to households, institutions and/or communities.	Verifiable evidence: – Technological specifications document(s)	Each CPA will apply the baseline and monitoring methodology AMS-III.AV (Version 4). The CPA will introduce Ultra Flo / Ultra Tab" Chlorine Disinfection Devices to provide safe drinking water to institutions (day schools, boarding schools or prisons) in Uganda. Supporting Evidence: – Technological specifications document.
6	Methodology	Prior to the implementation of the project activity, a public distribution network of safe drinking water did not exist within the project boundary. If, during the crediting period, any users are provided with safe drinking water through a public distribution network, these users will be removed from the CPA. This will be monitored annually.	Verifiable evidence: – Feasibility study or – National reports or – Official publications (e.g. from WHO) or – Water quality Tests or – Interviews with public officials, NGOs, end-users	It is confirmed that prior to the implementation of the project activity, no public distribution network of safe drinking water existed within the project boundary. If, during the crediting period, any users are provided with safe drinking water through a public distribution network, these users will be removed from the CPA. This will be monitored annually. Supporting Evidence: – Official publications (e.g. from WHO)
7	Methodology	The water purification technology/equipment must achieve compliance with either: a) A relevant national standard or b) The interim performance targets as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO, 2011)	Verifiable evidence: – Laboratory test report and/or official notifications (e.g. from national authority on health). – Technical specifications document(s)	The water purification technology/equipment are in compliance with a) A relevant national standard Supporting Evidence: – Technical specifications document(s)

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
8	Methodology	In the case that the life span of water treatment technologies is less than the length of the crediting period, all users (or individual who purchased product for institution or community center) will be provided with the contact details (phone number, email address and name) of the CME/CPA Implementer from whom replacement systems can be obtained via the Sales Receipt. The contact information provided for the CME or CPA implementer is a mobile number which is registered to the company and should not change; however, if a change is made to the contact information, all users (or individual who purchased product for institution or community center) will be notified via SMS with updated information. At the time of sale, sales representative will explain that the user can contact the CME or CPA implementer at any time when they need to purchase a replacement system. With this information, users are ensured a means of accessing replacement purification systems of comparable quality.	Verifiable Evidence: – Sales receipt template	The contact details (phone number, email ID and address) of the CPA Implementer is shared with the sales receipt. The institution or community centre are advised to contact the CPA implementers for replacement systems. Supporting Evidence: – Sales Receipt Template.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
9	Additionality	Additionality of CPA shall be confirmed in line with the requirements of '*Guidelines on the Demonstration of Additionality of Small-Scale Project Activities'* (Attachment A to Appendix B) (version 09.0). In each CPA-DD it shall be demonstrated that: 1) The water purification system installed is operating as an isolated unit. --- 2) The users of the water purification systems are either households, institutions, or community. --- 3) The size of each unit is no larger than 5% of the small-scale CDM threshold or 3,000 tCO_2e reduced per year	Verifiable Evidence: 1) Sales receipt template specifying user group --- 2) Sales receipt template specifying user group --- 3) ER Calculations spreadsheet demonstrating ERs/unit.	The Additionality clause for the CPA is confirmed as per '*Guidelines on the Demonstration of Additionality of Small-Scale Project Activities'* (Attachment A to Appendix B) (version 09.0). It has been demonstrated that: 1) The project water purification system is operating as an isolated unit. 2) The users of water purification systems are institutions (day boarding schools, boarding schools and prisons). 3) The size of each unit is no larger than 5% of small scale CDM threshold or 3,000 tCO_2. As size of project technology is less than 600 tCO_2e, this condition is satisfied for Additionality check (since 600 tCO_2e < 3,000 tCO_2e). As the three conditions for Additionality are met, the CPA is considered to be additional. Supporting Evidence: – Sales receipt template – ER Calculations spreadsheet.
10	Local Stakeholder Consultation	A local stakeholder consultation has been carried out for the CPA.	Verifiable Evidence: Local stakeholder consultation report	A local Stakeholder Consultation has been carried out for the CPA. Kindly refer "Section E: Local Stakeholder Consultation", and Local Stakeholder Consultation report for further details. Supporting Evidence: – Local Stakeholder Consultation report.
11	Environmental Impact Assessment	An environmental impact analysis (EIA) has been carried out for the CPA, or evidence is provided that the programme activities are exempt from an EIA.	Verifiable Evidence: – EIA report or – EIA exemptions notice from the host country government	Evidence is provided that the programme activities are exempt from an EIA. The CME has received a letter from the National Environmental Management Authority (NEMA) granting the PoA an exemption of an Environment Impact Assessment.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
12	Public Funding	A written confirmation from the CPA Implementer has confirmed that no funding from Annex 1 parties has been used for this CPA [or] If used, a written confirmation from the donor confirms that this did not result in a diversion of official development assistance (ODA).	Verifiable evidence: – Written confirmation from CPA implementer – If funding from Annex I parties was used, written confirmation from donor that it did not result in a diversion of ODA	A written confirmation from the CPA Implementer has confirmed that no funding from Annex 1 parties has been used for this CPA Supporting Evidence: – Written confirmation from CPA implementer that no funding from Annex 1 parties has been used for this CPA
13	Target Group	The target group will be Households, institutions or communities, as defined by the CPA type: CPA type 3: Institutions Target group is recorded in the Sales Receipt, to be distributed across channels, including direct sales and sales through distribution partners.	Verifiable evidence: – Operations Manual – Contract with CPA Implementer or distribution partner – Technology type	The target group is the institutions (day boarding schools, boarding schools and prisons) within the boundaries of host country Uganda. Target group will be recorded in the Sales Receipt, to be distributed across channels, including direct sales and sales through distribution partners. Supporting Evidence: – Operations Manual
14	Sampling Requirements	The sampling method applied in the CPA (e.g. in the monitoring plan) follows the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 74, Annex 6). A minimum 90% confidence interval and a 10% margin of error requirement is achieved for the sampled parameters. When a single sampling plan covers a group of CPAs or when monitoring is conducted biennially (every two years), confidence/precision of 95/10 for the sample size calculation is applicable.	Verifiable evidence: – Sampling plan	The sampling method applied in the CPA (e.g. in the monitoring plan) follows the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities* (EB 74, Annex 6). A minimum 90% confidence interval and a 10% margin of error requirement is achieved for the sampled parameters. When a single sampling plan covers a group of CPAs or when monitoring is conducted biennially (every two years), confidence/precision of 95/10 for the sample size calculation is applicable. Supporting Evidence: – Sampling plan
15	Size Limit	The CPA's annual emissions reduction in aggregate remains below the small-scale limit of 60,000 tCO_2e reduced per annum throughout the crediting period.	Verifiable evidence: Emissions reduction calculation spreadsheet	The annual ERs in aggregate for the CPA remains below the small-scale threshold of 60,000 ERs/annum, at 59,586 ERs/annum. Supporting Evidence: – Emission Reduction calculation spreadsheet.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
16	De-bundling	The proposed CPA of the PoA is not a debundled component of a large scale activity because: Each of the independent subsystems/measures included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the applied methodology (i.e. not exceeding 600tCO_2e for SSC type III methodologies).	Verifiable evidence: Emissions reduction calculation spreadsheet	As per the ER Spreadsheet, the ERs/tech per annum is less than 600,, which is lower than 1% of the small-scale CPA threshold (i.e. 600tCO_2e type III methodologies). Supporting Evidence: – Emission Reduction calculation spreadsheet.

Appendix 1. Contact information of CPA implementers

Organization name	Impact Water
Country	United States
Address	582 Market Street, Suite 1204, San Francisco California, Post Code – 94104.
Telephone	+1 415 968 9087
Fax	-
E-mail	ehaigler@impactcarbon.org, info@impactwater.co
Website	www.impactcarbon.org
Contact person	Mr. Evan Haigler, Designation – Project Development Director.

Appendix 2. Affirmation regarding public funding

The CME, Impact Carbon, states that no public funding from any Annex 1 party was received for the implementation of the Impact Carbon Global Safe Water Programme of Activities or any activities within the bounds of the program.

Appendix 3. Further background information on ex ante calculation of emission reductions

The sampling plan for Ex-ante parameters is provided below, and can also be found in the baseline water quality survey report.

Sampling Requirements:

As a rule, the most appropriate confidence/precision levels required by the methodology AMS-III.AV (Version 4) and the Sampling Standard will be applied whenever sampling is undertaken. According to the Sampling Standard, 95/10 reliability is to be applied whenever sampling across a group of CPAs, which will typically be the case for this PoA. In the case of conducting CPA-specific sampling, the methodology AMS-III.AV (Version 4) requires 90/10 confidence/precision if annual sampling is applied, or 95/10 confidence/precision if biennial (every two years) sampling is applied.

a) Sampling design

(i) Objectives and Reliability Requirements:

The objective of the sampling effort will be to meet the baseline requirements as set in line with the Monitoring methodology. **Monitoring will be carried out at the time of renewal of Crediting period, since it is an Ex Ante Parameter.** As the PoA progresses and the number of CPAs increases, the sampling plan can apply to a group of CPAs as referred to in EB 75, Annex 8. This will be applicable to CPA types as long as homogeneity can be demonstrated. When homogeneity cannot be demonstrated the CME shall monitor CPAs individually. All monitoring shall be coordinated by the CME, Impact Carbon.

(ii) Target Population

The target population for the application of baseline monitoring procedure will be the institutions in which water purification systems is intended to be been installed. CPAs will be grouped by CPA type, and only CPAs of the same type and located in the same country may be sampled together.

(iii) Sampling method

Simple random sampling is in line with the Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities (EB 75, Annex 8). The CME will apply the multi-stage sampling if it is too costly to sample all smaller units within clusters. Simple random sampling and multi-stage sampling may only be applied for Water Quality$_i$ parameter, if at the time of the monitoring period only one technology type has been distributed to date.

(iv) Sample size

Sample size is determined for Proportional Values under simple random sampling using formula given below:

$$n \geq \frac{1.645^2 N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.645^2 p(1-p)}$$

Where:

n = Sample Size

N = Total population of Host Country

p = Expected proportion

1.645 = Represents the 90% confidence interval

0.1 = Represents the 10% relative precision

$$n > = \frac{(1.645^2 * 41{,}490{,}000 * 0.5(1 - 0.5))}{(41{,}490{,}000 - 1) * (0.1)^2 * 0.5^2 + 1.645^2 * 0.5 * 0.5}$$

$$= 269.9998 \sim 270.$$

So, for the sampling designed for a population mix of Rural and Urban population, using simple random sampling, the sample size (minimum) comes out to be 270. The sample size taken for the baseline surveys is 287, keeping in mind the number of outliers, if any.

(v) Sampling frame

The sampling frame will take care of the following:

1. All the Baseline technology/equipment that have either comparable or varying input/output characteristics, (e.g. water flow rates and filtration or disinfection mechanism, including efficiency), will be recorded;

2. End users of the project technology/equipment have comparable socioeconomic conditions;

3. The geographic locations of project equipment do not have a significant influence on the parameter of interest, e.g. water filtration or disinfection systems installed in colder climates have different output rates than those in warm climates, in which case stratification of technologies by geographical area is desirable;

(b) Data to be collected

(i) Field measurements

Since this case only required the measurement of water quality, a parameter (Thermotolerant Coliform) for water quality testing was selected. The Pathogen test was done for water quality testing of the samples selected at sampling sites. If the pathogen is above 0 MPN (Unit – Most Probable Number), the sample would be considered unfit for drinking and sanitation purposes. As per the survey, the CPA falls under Case I.

Appendix 4. Further background information on monitoring plan

The Monitoring Plan for Ex-post calculations and surveys has already been discussed in section B.5.2.

Appendix 5. Summary report of comments received from local stakeholders

Stakeholder comment	Explanation (Why? How?)
Are you ever recovering the initial subsidies that are used to start projects?	The carbon credits take a long time to certify the projects. A credit that is being produced today is usually not sold for 18-24 months. It is difficult for organizations to start carbon projects because of this delay, so an initial subsidy is necessary to help partners grow and be able to provide the necessary products and subsidies for end users. Impact

	Carbon is providing funding for initial subsidies and costs associated with developing a carbon project, and hopes to recover these costs when carbon credits have been generated from the project.
With the 18-24 month gap between projects being started and carbon credits, can Impact Carbon help scale up projects before the money arrives?	Yes, even with delays Impact Carbon is able to work with partners before the credits are even generated. The delay does have an impact on scaling, but Impact Carbon will still have some money to help start up projects.
Do you have a set of criteria you use to choose projects? How do you select partners for these projects?	We have a basic set of projects that we know we can generate credits on. We have worked with wood and charcoal stoves, and we know we can implement those projects. Mike, our business development director, has a set of guidelines to determine which organizations can provide what we need. Not only does a company have to be able to make stoves, but they have to have good business practices in place and the ability to conduct the record keeping we require. We are starting a new wave of evaluating manufactures. Each project and project has their own individual criteria. A similar set of criteria will be used for water projects using similar guidelines, measuring both manufacturers and distributors, but also potential institutional partners.
When you look at the technologies for water, are you going to look into water technology products that can be produced in Uganda?	Right now, we have not been able to find any products that have been manufactured in Uganda. We are working with Spouts of Water, located outside of Kumi, who are working to develop ceramic filters. Right now with water, there is no production in Uganda. We are currently importing products so we can evaluate the Ugandan markets and see what Ugandans actually want to use. However, we are definitely committed to locally produced products, and will continue to explore opportunities to develop in country production and design of water technologies.

Appendix 6. Summary of post-registration changes

The following changes to CPA design have been made to the CPA-DD:

1. CPA Type 2 i.e. “Technologies for institutional water consumption, with no project emission” replaces the existing CPA Type 3 “Technologies for institutional water consumption, with project emission”. Now the revised CPA-DD includes Chemical disinfection technology (CPA Type 2) for water purification instead of Ultraviolet disinfection technology (CPA Type 3).

2. The distribution of chemical disinfection units over the crediting period are updated based on sales projections / plans of PP.

The following corrections have been made to the CPA-DD:

1. Associated corrections in line with Type 2 generic CPA-DD requirements.

2. Typographic and format corrections

3. Typographical Correction of the formula for QPWy to make it consistent with registered PoA-DD and other sections of the CPA-DD

As per the para 244 of Standard: CDM project standard for programmes of activities (version 01.0), the impact of the proposed changes to the included CPA have been accessed and reported as follows:

S.No.	Eligibility Criteria	Assessment of Impacts
(a)	The applicability and application of the applied methodologies and, where applicable, the applied standardized baselines, with which the PoA or CPA has been registered or included;	The proposed changes do not impact any applicability criteria of the methodology. Chemical Chlorination's compliance with the methodology is already justified in the generic CPA-DD type 2 in the registered PoA-DD
(b)	The compliance of the monitoring plan with the applied methodologies and, where applicable, the applied standardized baselines;	The proposed changes do not require any change in the registered monitoring plan and comply with the monitoring methodology.
(c)	The level of accuracy and completeness in the monitoring of the PoA or the CPA compared with the requirements contained in the registered monitoring plan;	The proposed change maintains the same level of accuracy and completeness in the monitoring of the CPA as earlier. No change in the monitoring plan is being affected because of change in technology
(d)	The additionality of the PoA or CPA;	The proposed changes do not impact the additionality of the CPA. Each of the independent subsystems remain below the limit of 1% of methodology threshold as demonstrated in the ER calculator.
(e)	The scale of the CPA	The proposed change does not change the scale of the CPA. The CPA size is limited to 60k tCO_2e per annum of emission reductions as demonstrated in the ER calculator.
(f)	The eligibility criteria for inclusion of CPAs in the PoA	The proposed change in the project technology do not require change to any eligibility criteria for inclusion of CPAs in the PoA. Further Chemical chlorination meets all eligibility criteria as described in section F above.

Appendix 7. Entity responsible for completing the CDM-CPA-DD-FORM (Additional)

Organization name	Climate-Secure Services
Street/P.O. Box	Club Road
Building	Pragati Apartments
City	West Delhi
State/Region	Delhi
Postcode	110063
Country	India
E-mail	info@climate-secure.com
Website	www.climate-secure.com
Contact Person	Rohit Lohia

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Document information

Version	*Date*	*Description*
08.1	20 October 2017	Editorial revision to remove appendix “Applicability of methodologies and standardized baselines” from the main part of the form which had been mistakenly kept in the previous version.
08.0	28 June 2017	Revision to: • Remove appendix “Applicability of methodologies and standardized baselines” as the appendix is not relevant at the CPA level; • Make editorial improvement.
07.0	7 June 2017	Revision to: • Improve consistency with the “CDM project standard for programmes of activities” and with the PDD and PoA-DD forms; • Make editorial improvement.
06.0	24 May 2017	Revision to: • Ensure consistency with the “Standard: CDM project standard for programme of activities” (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the “Component project activity design document form for small-scale component project activities” (CDM-SSC-CPA-DD-FORM); • Make editorial improvement.
05.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
04.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
03.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the component project activity design document form for CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a CPA implementer and/or responsible person/ entity for completing the CDM-CPA-DD-FORM in A.13. and Appendix 1; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and Appendix 6;

Version	*Date*	*Description*
		• Change the reference number from F-CDM-CPA-DD to CDM-CPA-DD-FORM; • Make editorial improvement.
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project activity design document form" (EB 66, Annex 16).
01.0	27 July 2007	EB 33, Annex 42 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: component project activity, project design document