

SMALL-SCALE CDM PROGRAMME ACTIVITY DESIGN DOCUMENT FORM
(CDM-SSC-CPA-DD) - Version 01



NAME /TITLE OF THE PoA: International water purification programme



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CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
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NOTE:

- (i) This form is for submission of CPAs that apply a small scale approved methodology using the provision of the proposed small scale CDM PoA.
- (ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)^{1,2} that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

¹ The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

² At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).



SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

Title: Gravity Driven Membrane Filters in Uganda - CPA 1

Version number: 06

Date: 02/10/2012

A.2. Description of the small-scale CPA:

The proposed small-scale CDM Programme Activity (hereafter referred as CPA) is developed under the Small-Scale Programme of Activities (PoA) titles “International water purification Programme”. It consists of the distribution and installation of Gravity-Driven ultrafiltration Membranes (GDM) in Buikwe District, Uganda.

Inadequate access to microbiologically safe drinking water continuously threatens the health and well-being of more than a billion people, primarily in developing countries. In many areas worldwide the central water infrastructure is not available at all, or not reliable, leading to unsafe water at the tap. In such cases, decentralized water treatment can be used.



Figure 1. Buikwe district, Uganda.

1) Children collecting water

2) Non-functional borehole

3) Boiling water on three stone stove

In Uganda, around 40% of the rural population don't have access to safe drinking water³, and this varies dramatically from one region to another. Buikwe District is located in the eastern part of the Central

³ WHO / UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation Database
<http://www.wssinfo.org/data-estimates/table/>



Region of Uganda. The sources of water in the district include Lake Victoria, streams, springs, shallow wells, and boreholes (majority of which are non-functional). The majority of the population boils its water using the conventional “three-stone” cook stoves. The combustion of the non-renewable biomass generates a variety of gases included carbon dioxide (CO₂). Therefore there is a great damage on the environment as wood is the main source of fuel.

The CPA seeks to further the access of households and communities to clean and safe drinking water, using a low greenhouse gas emitting water purification technology, the Gravity-Driven ultrafiltration Membranes.

Ultrafiltration is an effective technology to treat water and in principle can be applied on a decentralized scale. Most ultrafiltration membranes have pores which are smaller than the size of bacteria and viruses. Thus, water filtered through these membranes is microbiologically safe. This GDM technology has been developed by a Swiss research institute, EAWAG⁴.

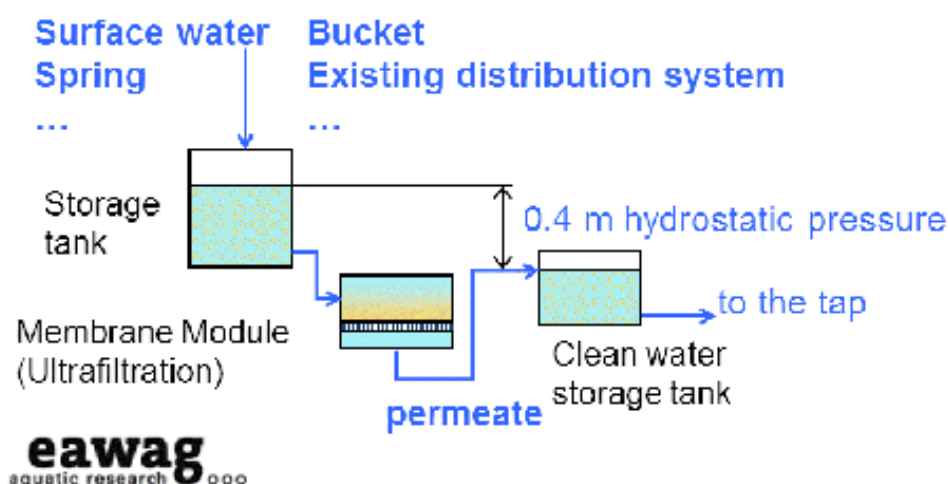


Figure 2. EAWAG Household water filter based on Gravity Driven Membrane technology
Source EAWAG

During dead-end ultrafiltration all macro- and microorganisms, particles and colloids accumulate on the membrane surface and a fouling layer is formed. Backflushing or chemical cleaning is usually used during conventional ultrafiltration to remove fouling layer. This prevents the membrane from clogging, which is expected to occur during filtration on a long term. However, backflushing or cleaning result in complex and maintenance-intensive systems, which are difficult to operate on a long term in developing countries.

In GDM filtration no pumps are required. A water column of 40-60cm is enough to operate the system using 0.5 m² of membrane, to produce at least 20 litres of safe drinking water per day.

⁴ http://www.eawag.ch/forschung/sandec/gruppen/ws/projects/membrane_disinfection/index_EN



No chemical cleaning or back-flushing is used in GDM filtration, and thus no maintenance is required for a long-term operation. This is possible due to the phenomenon of flux stabilization. GDM filtration therefore is a highly effective, maintenance-free and low-cost system for household water treatment. The principle of the technology is illustrated in the picture below.

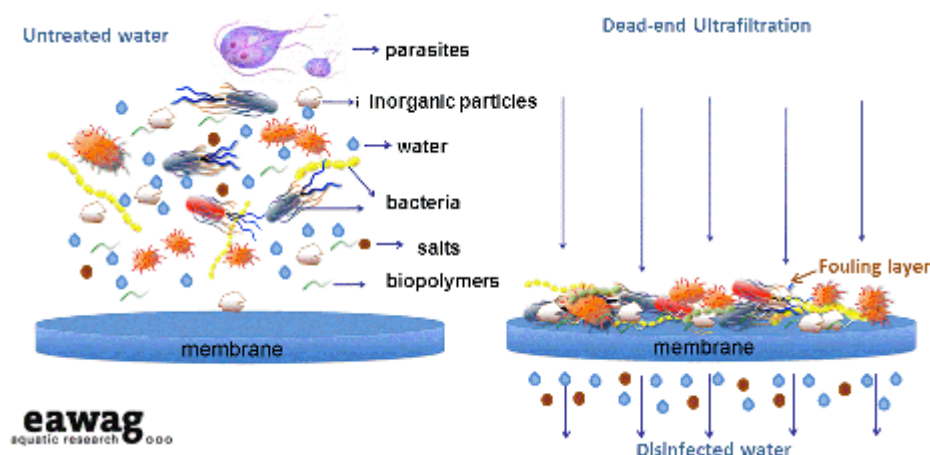


Figure 3. EAWAG Gravity Driven Membrane technology principle

Specifications of the GDM filter

Membrane	<ul style="list-style-type: none"> • Ultrafiltration • Component: organic polymer polyethersulfonate (PES) • Hydrophilic and chemically resistant • 150 kDa cut-off (20- 40 nm pore size) • 0.5 m² surface area
Capacity	10 Liters in 2 hours
Effectiveness	Remove parasites, bacteria and viruses
Simple application	No backflushing, very low operation requirements, no power needed
Lifetime	5 – 8 years

The GDM technology will be used by households and communities in the areas of Uganda where there is low access to drinking water. This CPA is thus primarily designed for the long-term improvement of the living conditions of the local people of this rural part of Uganda.

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The CPA reduces the use and demand of non-renewable biomass that would have been used to boil the water as a mean of water purification in the absence of the CPA. This directly leads to reduced greenhouse gas emissions.

The CPA is a voluntary initiative taken by the coordinating/managing entity (CME) of the PoA, Pure Water, and implemented on a voluntary basis by The Water School Uganda.

This water purification project is implemented by The Water School Uganda, a non-profit organization. The Water School Uganda will be responsible to disseminate the GDM filters in Buikwe district by setting up the distribution and supply chain and use proceeds realized to expand work in the whole project area. Filters will be sold to the end-users at a subsidized price which will be determined during the first phase of the project. The price will take into consideration the income level of the community and their willingness to pay the filter.

The following timeline will be followed:

Date	Event
July 2011	MoU between EAWAG and Water School Uganda: outlines the intention of the two partners for the dissemination of Gravity Driven Membrane Filters through a Carbon Credit offset Project. Stakeholder consultations organized.
February 2012	Contractual agreement between Pure Water (the CME) and Water School Uganda: Such agreement guides the transfer of the emission reduction rights to the CME and defines the roles and responsibilities of the two parties.
December 2012	Registration of the PoA
January to December 2012	Phase 1: 1) Determination of the not for profit price and payment scheme for filters feasible for low income households. 2) Evaluation of the most suitable non-profit oriented distribution mechanisms for filters taking into account the sustainability of the supply chain to assure replacement of filters and spare parts. 3) Set up the distribution and supply chain and use proceeds realized to expand work in the project area.
January to October 2013	1) Conduct preliminary field-tests with selected households using the GDM Filter 2) Set up distribution and supply chain 3) Produce filters for first project phase and transport them to project area
November 2013 to November 2020	Phase 2: Implementation : distribution of 6,000 GDM filters 1) Identification of suitable promoters: training in household water treatment and improved hygiene as well as suitable adult education and promotion strategies. 2) Training workshops in the project area on the importance of treating drinking water and improved hygiene practices.



	Distribution of GDM filters according to the following schedule:	
	Year	Nb of functional devices
	1	1,000
	2	2,000
	3	4,000
	4	6,000
	5	6,000
	6	6,000
	7	6,000

It is expected that the emission reductions will be 6,254 tCO₂ for 6,000 devices operating, thus meeting the small-scale eligibility criteria for Type III projects of a maximum of 60,000 tCO₂ emission reductions per year.

Contribution to Sustainable Development in Uganda

The proposed CPA contributes to the sustainable development of the Ugandan economy in a number of various ways:

Environmental benefits

- The CPA will help significantly reduce Uganda’s greenhouse gas emissions over its lifetime
- The CPA will help reduce the use of non-renewable biomass from Ugandan forests, assisting the maintenance of existing forest stock, protecting natural forest eco-systems and wildlife habitats.
- The protection of standing forests will ensure the maintenance of watersheds that regulate water table levels and prevent flash flooding.

Social benefits

- Purchasing or collecting firewood or fossil fuels to boil the water constitute a significant expense for the very poorest households and communities. The CPA will provide access to clean drinking water, which will reduce cost for families and thereby reduce child and adult morbidity and mortality, improve attendance at school, increase productivity, and more generally give a sense of hope and opportunity.
- Micro-entrepreneurs: low greenhouse gas emitting water purification technologies offer scope for micro-entrepreneurs, thereby creating jobs and supporting families.
- There is a direct incentive to ensure that the projects have a successful long term operation as the carbon revenues will flow ex-post and condition to a successful monitoring phase.



- Polluted indoor air due to open and uncontrolled combustion is a huge health concern in Uganda. Low greenhouse gas emitting water disinfection technologies tackle this problem by reducing the combustion of wood/fossil fuels.
- The CPA will alleviate the work burden of women and children as they have to spend less time to collect firewood for boiling water.

Economic benefits

- The CPA will help develop a section of Ugandan rural economy; in the installation of the filters, maintenance and monitoring.

The proposed CPA will deliver a long-term, secure and simple contribution to sustainable development in Uganda that without carbon finance would not exist.

A.3. Entity/individual responsible for the small-scale CPA:

The small-scale CPA is implemented and operated by the Water School Uganda.**A.4. Technical description of the small-scale CPA:**

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

Uganda

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The physical boundary of the CPA is the households and communities that will receive ultrafiltration membranes and the households/institutional buildings where the consumers of safe water provided by the systems are located.

This CPA will take place in the Najja sub-county of Buikwe District, in the South East of the Republic of Uganda.

Buikwe District was formerly part of the bigger Mukono District. The District is bordered by Kayunga District to the north, Jinja District to the east, Lake Victoria to the south and Mukono District to the west. The district headquarters at Buikwe are located approximately 60km, by road, east of Kampala, the capital of Uganda and the country's largest city.

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The coordinates of the district⁵ are:

Longitude: 0.36384 Latitude: 33.06573

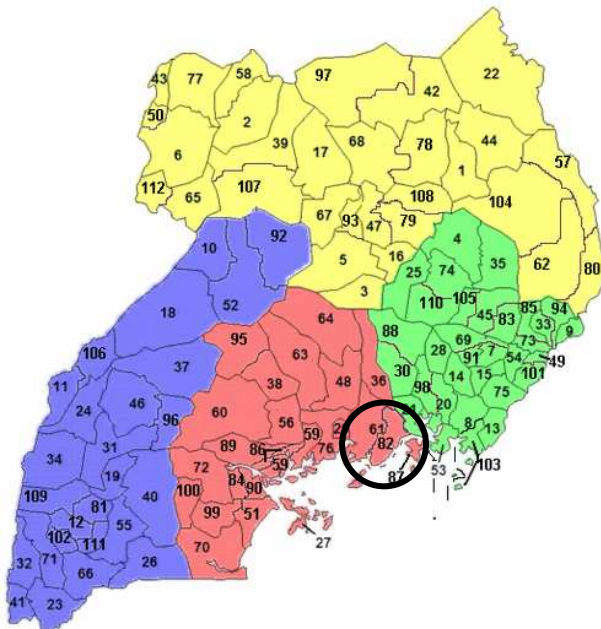


Figure 4: Districts in Uganda. Number 82 is Buikwe District.



Figure 5: Najja sub-county of Buikwe District

⁵ These coordinates correspond to those of the city of Buikwe



A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

01/11/2013⁶

A.4.2.2. Expected operational lifetime of the small-scale CPA:

21 years, 0 months

The lifetime of the filter depends mainly on the lifetime of the membrane. Membrane producers guarantee at least 5 to 8 years of use under harsh conditions (high pressure and regular chemical treatments). However, the technology supplier, EAWAG, expects that the lifetime of the polymeric membrane will exceed 8 years, since the pressure is low and no aggressive chemicals will be used. In any cases, whenever any component of the filter is not functional, it will be replaced in order to assure an operating lifetime of 21 years, spanning the CDM crediting period.

A.4.3. Choice of the crediting period and related information:

Renewable crediting period; 7 years

A.4.3.1. Starting date of the crediting period:

01/11/2013 or the date of inclusion of the CPA in the registered PoA, whichever is later.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

7 years

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Year	Annual estimation of emissions reductions (ERs) in tCO ₂ e
1	1,412
2	2,824

⁶ This date corresponds to the expected date when the implementation of the activities will start. It is expected that the first filters will be sold/distributed beginning of November 2013.



3	5,649
4	8,474
5	8,474
6	8,474
7	8,474
Total estimated ERs in tCO₂e	43,781
Total number years of crediting years	7
Average ERs per year	6,254

Over the 7-year crediting period, the CPA will reduce 43,781 tCO₂.

A.4.5. Public funding of the CPA:

The proposed CPA will not involve any public funding.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

1. For the purposes of registration of a Programme of Activities (PoA)⁷ a proposed small-scale CPA of a PoA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity⁸, which:
 - (a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same sectoral scope, and;
 - (b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

2. If a proposed small-scale CPA of a PoA is deemed to be a debundled component in accordance with paragraph 2 above, but the total size of such a CPA combined with a registered small-scale CPA of a PoA or a registered CDM project activity does not exceed the limits for small-scale CDM and small-scale A/R project activities as set out in Annex II of the decision 4/CMP.1 and 5/CMP.1 respectively, the CPA of a PoA can qualify to use simplified modalities and procedures for small-scale CDM and small-scale A/R CDM project activities.

⁷ Only those POAs need to be considered in determining de-bundling that are: (i) in the same geographical area; and (ii) use the same methodology; as the POA to which proposed CPA is being added

⁸ Which may be a (i) registered small-scale CPA of a PoA, (ii) an application to register another small-scale CPA of a PoA or (iii) another registered CDM project activity



According to the “Guidelines on assessment of debundling for SSC project activities, v03 (EB 54, Annex 13, par. 10) for determining the occurrence of debundling under a Programme of Activities (PoA)”, if each of the independent subsystem/measures included in the CPA of a PoA is not larger than 1% of the small scale threshold defined by the methodology applied, than that CPA of PoA is exempted from performing de-bundling check, i.e. considered as being not a de-bundled component of a large scale activity.

The small-scale threshold defined by the methodology applied, AMS-III.AV version 03, is the annual emissions reductions 60,000 tCO₂e/y. Thus, 1% corresponds to annual emissions reductions of 600 tCO₂e/y.

For this CPA, it is assumed that each appliance treats 17.5 liters of water per day⁹.

According to the calculation, as per section B.5.2,

the emissions reductions per appliance are equal to 1.41tCO₂/yr. Since this value is much below the threshold of 600 tCO₂e/y, this CPA is therefore exempted from the de-bundling check.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

The proposed CPA is neither registered as an individual CDM project nor is part of another registered PoA.

There is only one registered PoA in Uganda, which is a Municipal Waste Compost Programme¹⁰.

The CPA implementer has warranted that:

- The CPA has not been and will not be registered as a single CDM project activity or as a CPA under another PoA or as a carbon project under a voluntary scheme.
- The CPA Implementer is aware that the CPA will be subscribed to this present PoA.
- The CPA Implementer cedes its rights to claim and own emission reductions under the Clean Development Mechanism of the UNFCCC or any voluntary scheme to the managing entity of this present PoA.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

International water purification programme, version 06, dated 02/10/2012.

⁹ This is a conservative assumption. The filters are able to treat 10 liters of water in 2 hours. The limiting factor is the ability of the users to bring water to their home. A cap of 17.5 liters per water per day is calculated based on the average volume of drinking water per person per day (3.5 liters) and the average family size in Uganda (5).

¹⁰ http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/JL4B8R2DKF90NE6YXCVOQ3MWSGT5UA/view

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B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA

:

The proposed SSC-CPA is deemed to be eligible for inclusion in the PoA when the criteria set out in section A.4.2.2 of the SSC-PoA-DD are met.

No	Eligibility criteria		Means of proof	Confirmation
	Description	Conditions to be met		
1	Technology requirements	<p>The water purification technologies include either:</p> <p>1. Water filters (membrane, activated carbon, ceramic filters), solar energy powered UV disinfection devices, other solar disinfection techniques (SODIS), photocatalytic disinfection equipment, pasteurization appliances, chemical disinfection methods (chlorination), combined treatment approaches flocculation plus disinfection)</p> <p>2. A low greenhouse gas emitting technology: related ex-ante project emissions are less than 10% of the ex-ante baseline emissions calculated as per section B.5.2 of the CPA DD.</p>	<p>Specification of water purification device:</p> <p><u>Membrane</u></p> <ul style="list-style-type: none"> •Ultrafiltration •Component: organic polymer polyethersulfonate (PES) •Hydrophilic and chemically resistant •150 kDa cut-off (20- 40 nm pore size) •0.5 m2 surface area <p><u>Capacity</u></p> <p>10 Liters in 2 hours</p> <p><u>Effectiveness</u></p> <p>Remove parasites, bacteria and viruses</p> <p><u>Simple application</u></p> <p>No backflushing, very low operation requirements, no power needed</p> <p><u>Lifetime</u></p> <p>5 – 8 years</p>	Yes, the CPA involves gravity-driven membranes.
2		Water purification technologies involve point-of use (POU) or point-of-entry	<p>Specification of water purification device, CPA implementation plan</p>	

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		treatment systems for residential or institutional applications such as systems installed at a school or a community centre	mentioning the target users and the locations of the project: Project will be implemented in Najja sub-county in Buikwe province and will involve household point-of-use POU filters.	communities.
3		The application of the project technology/equipment achieves compliance either with: (i) at a minimum the “interim” performance target as per “Evaluating household water treatment options: Health based targets and microbiological performance specifications” (WHO, 2011); or (ii) an applicable national standard or guideline.	Laboratory testing or official notification (for example notifications from the national authority on health): Statement of compliance of water treated by GDM filter with Uganda Drinking (Potable) Water Standard US 201:2008 from the Swiss Federal Institute of Aquatic Science and Technology and to the refereed paper “Gravity-driven membrane disinfection for household drinking water treatment” containing laboratory testing of the GDM filter.	Yes , the technology achieves compliance with drinking water quality specified in national standards.
4	Applicability of the methodology	Prior to the implementation of the project activity, a public distribution network supplying safe drinking water (SDW) to the project boundary does not exist..	Interviews with officials, end-users, NGOs, or local experts or published reports, maps, pictures, official documents: Interviews with officials and end-users.	Yes , there is no public distribution network of safe drinking water within the project boundary.
5		In cases where the life span of the water treatment technologies is shorter than the crediting period of the project activity, there shall be documented measures in place to ensure that end users have access to replacement purification systems of comparable quality.	Documented measures, database with all replacement records and equipment retirement or dropout	Yes , measures are in place to ensure that end users have access to replacement purification systems of comparable quality, as per the implementation plan.

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6	<p>Applicability of the methodology is foreseen in the following types of situations that shall be reassessed at the beginning of each crediting period:</p> <p>(a) Case 1: Project activities implemented in rural or urban areas¹¹ of countries with proportion of rural or urban population using an improved drinking-water source equal to or less than 60% confirmed by one of the three options below:</p> <p>(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/dataestimates/table/>) for this purpose. Definition of improved and unimproved drinking water source shall be as per the information provided by JMP;</p> <p>(ii) Using official data such as publicly available statistical data from a government agency or an independently commissioned study by an international organization or an university;</p>	<p>Official data from the Directorate of Water Development, Ministry of Water and Environment that within Najja sub-county the access to improved drinking water sources is equal to only 51%.</p> <p>Yes, the project activity falls into Case 1, since access to improved water sources is below 60%</p>
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¹¹ As per the WHO/UNICEF Joint Monitoring Programme for water supply and sanitation.

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		(iii) Using survey methods (use 90/10 confidence/precision for sampling); (b) Case 2: Project activities implemented in areas not included in case 1.		
7	Boundary and location of the CPA	CPA is located within one of the host countries listed in section A.4.1.1 of the PoA DD. CPA involves only one host country.	Location and boundary is specified in the specific CPA-DD stating that the location is limited to one host country; CPA implementation plan confirm that all CPA boundary including all physical application of the equipment are still inside the host country boundary	Yes , the CPA is located in Uganda which is listed in section A.4.1.1 of the PoA-DD.
8	Avoidance of double counting	The CPA is exclusively bound to the PoA. Confirmation that the PoA has not been and will not be registered either as a single CDM project activity or as a CPA under another POA.	A statement is included in the CPA-DD that the specific CPA will not be part of another single CDM project activity or CPA under another PoA. Evidence: Check on UNFCCC website on 02/10/2012 and statement including warranties from CPA Implementer that CPA will not be part of another PoA in section A.4.7.	Yes , The CPA is not part of another single CDM project activity or CPA under another PoA
9		A unique numbering or identification system for the water purification devices disseminated is applied.	Unique identification of product and end-users locations. Implementation plan mentions unique identification number of products and end-users locations.	Yes , each distributed filters will have a unique identification number, which is part of the CPA Installation Record.
10	Start date	The CPA start date shall be after the PoA validation start date (webhosting date, i.e.	The start date of the CPA will be specified in each CPA-DD and is after	Yes , the CPA start date is 01/11/2013 , which is after the PoA validation start

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		<p>29/07/2011). In case any deployed water purification device are found not in line with CPA start date requirement, those devices will not be counted for emission reduction calculation. The CPA crediting period shall be limited by the PoA crediting period.</p>	<p>29/07/2011. Document: Statement that no water purification device under the CPA were sold before 29/07/2011. It is confirmed that the end of the crediting period is before the end of the PoA crediting period: CPA crediting period is 7 years, starting from 01/11/2013, ie. until 01/11/2020. The PoA crediting period is 28 years starting 19/11/2012, ie. until 19/11/2040.</p>	<p>date and the CPA crediting period will expire before the end of the PoA crediting period.</p>
11	<p>Additionality of CPAs</p>	<p>The CPA shall satisfy the following additionality test based on the GUIDELINES ON THE DEMONSTRATION OF ADDITIONALITY OF SMALL-SCALE PROJECT ACTIVITIES (Version 09.0):: The CPA shall solely be composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size¹² of each unit is no larger than 5% of the small-scale CDM thresholds;</p>	<p>Calculation showing that the CPA remains below 60ktCO₂e per year. Evidence showing that each of the device achieves an annual emission reduction equal to or less than 3,000 tCO₂e per year. Evidence that the users shall be households or communities or Small and Medium Enterprises (SMEs), based on CPA implementation plan mentioning the target users. Document: excel sheet calculation, technology specification, CPA implementation plan mentioning the target</p>	<p>Yes, the CPA is solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size¹³ of each unit is no larger than 5% of the small-scale CDM thresholds</p>

¹² That is the size of each unit under 750 kW installed capacity or under 3000 MWh of energy savings per year or 3000 tonnes of emission reductions per year.

¹³ That is the size of each unit under 750 kW installed capacity or under 3000 MWh of energy savings per year or 3000 tonnes of emission reductions per year.

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			users.	
12	SSC Limit for CPAs	The annual emissions reductions of each CPA shall not go beyond the limits of 60 ktCO ₂ e/y over the entire crediting period.	The maximum number of water purification appliances will be determined ex-ante in each CPA-DD depending on the technology used based on its capacity. As per the calculation, the maximum number of operating device per year is 34,786. It is planned to distribute only 6,000 units as part of this CPA.	Yes , the ex-ante annual emissions reductions of the CPA does not go beyond the limits of 60 ktCO ₂ e/y over the entire crediting period.
13	Sampling requirements	The conditions related to sampling requirements for the PoA are in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys (Standard for sampling and surveys for CDM project activities and programme of activities, Version 03.0 and Guidelines for sampling and survey for CDM project activities and programme of activities Version 02.0) and are in line with the requirements of the applied methodology AMS.III.AV, version 3	As specified in the sampling plan in the CPA-DD and according to the sampling requirements specified at PoA level	Yes , sampling requirements are in line with the applied methodology and standards for sampling.

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14	De-bundling	Each water purification device reduces less than 600 tCO ₂ e/y ¹⁴ .	Each water purification device reduces less than 600 tCO ₂ e/y, based on manufacturer specifications. See excel sheet.	Yes , each water purification device reduces less than 600 tCO ₂ e/y.
15	Contractual agreement	The CPA implementer has signed a contractual agreement with the CME to participate in the PoA. Such agreement guides the transfer of the emission reduction rights to the CME.	Contract between the CPA implementer and the CME	Yes , the Water School has signed an agreement with Pure Water Ltd. to participate in the PoA.
16	Local Stakeholder Consultation	A local stakeholder consultation has been conducted for CPA.	Local Stakeholder Consultation Report	Yes , a local stakeholder consultation was conducted and a stakeholder consultation report is available.
17	Environmental Analysis	CPA is in line with the environmental host Party laws/regulations.	EIA exemption or EIA report: EIA exemption from the Ministry of Environment of Uganda	Yes , the CPA is in line with the environmental regulations from Uganda.
18	Diversion of official development assistance	CPA should not result into the diversion of official development assistance	Declaration from CPA implementer Water School Uganda.	Yes , no public funding will be made available for the proposed CPA.
19	Target group	CPA shall target households or communities or Small and Medium Enterprises (SMEs)	Evidence that the users shall be households or communities or Small and Medium Enterprises (SMEs), based on CPA implementation plan mentioning the target users	Yes , the target application for this CPA shall be households and communities.

¹⁴ According to the “Guidelines on assessment of debundling for SSC project activities, v03 (EB 54, Annex 13, par. 10) for determining the occurrence of debundling under a Programme of Activities (PoA)”, if each of the independent subsystem/measures included in the CPA of a PoA is not larger than 1% of the small scale threshold defined by the methodology applied, than that CPA of PoA is exempted from performing de-bundling check, i.e. considered as being not a de-bundled component of a large scale activity.



The CPA meets all these criteria, as evidenced by this CPA-DD which may be reviewed by DOE during validation.

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

As per section E.5.1 of the PoA-DD, the project proponent uses test a to demonstrate additionality.

This additionality test is based on Annex 27 of EB 68 according to which small scale projects are deemed additional if they are solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size¹⁵ of each unit is no larger than 5% of the small-scale CDM thresholds.

This EB guidance recognizes the specific barriers faced by projects targeting households, communities or Small and Medium Enterprises (SMEs).

The SSC-CPA size is below 60 ktCO₂e per year, therefore Test a is used.

Test a		Yes/No
1	Are the users of the technology/measure households or communities or Small and Medium Enterprises (SMEs)	Yes
2	Is the size of each unit no larger than 5% of the small-scale CDM threshold, ie. No larger than 3,000 tCO ₂ e per year	Yes

The CPA fulfils all the conditions from Test a. **The CPA is thus additional.**

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

As defined in the methodology, the project boundary includes the physical, geographical sites of the low greenhouse gas emitting technologies for water purification installed by the project activity.

The sources and gases included in the SSC-CPA boundary are shown in the table below:

¹⁵ That is the size of each unit under 750 kW installed capacity or under 3000 MWh of energy savings per year or 3000 tonnes of emission reductions per year.

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	Source	Gas	Included?	Justification / Explanation
Baseline	CO ₂ emissions from fossil fuels/ Non Renewable biomass utilized for obtaining safe drinking water by boiling displace due to project activity.	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
Project Activity	CO ₂ emissions from consumption of fossil fuels and/or electricity for the operation of the project activity.	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Data and parameters not monitored

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 used:	AMS-I.E for NRB displacement, IPCC for other fossil fuel displaced
Value applied:	81.6
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per AMS-I.E, this value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis.
Any comment:	

Data / Parameter:	WH
Data unit:	kJ/L °C
Description:	Specific heat of water
Source of data used:	AMS-III.AV version 03
Value applied:	4.186
Justification of the choice of data or description of measurement methods	Default value.

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and procedures actually applied :	
Any comment:	For the calculation of the Specific Energy consumption (SEC)

Data / Parameter:	T_f
Data unit:	°C
Description:	Final temperature
Source of data used:	AMS-III.AV version 03
Value applied:	100
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value. Boiling point of water at standard conditions.
Any comment:	For the calculation of the Specific Energy consumption (SEC)

Data / Parameter:	T_i
Data unit:	°C
Description:	Initial temperature
Source of data used:	AMS-III.AV version 03
Value applied:	20
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value.
Any comment:	For the calculation of the Specific Energy consumption (SEC)

Data / Parameter:	WHE
Data unit:	kJ/L
Description:	Latent heat of water evaporation
Source of data used:	AMS-III.AV version 03
Value applied:	2260
Justification of the choice of data or description of measurement methods	Default value. The latent heat required to boil one litre of water for five minutes is assumed to be equivalent to latent heat for the evaporation of 1% of the water volume (WHO recommends a minimum duration of five minutes of water boiling) ¹⁶

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and procedures actually applied :	
Any comment:	For the calculation of the Specific Energy consumption (SEC)

Data / Parameter:	η_{wb}
Data unit:	-
Description:	Efficiency of the water boiling system being replaced
Source of data used:	AMS-III.AV Version 03 / referenced literature / survey
Value applied:	10.68%
Justification of the choice of data or description of measurement methods and procedures actually applied :	<p>One of the options below is used:</p> <p>1) The efficiency of the water boiling system will be established using representative sampling methods or based on referenced literature values (fraction), using weighted average values if more than one type of systems are encountered.</p> <p>2) 0.10 default value is used if the replaced system or the system that would have been used is a three stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system i.e. without a grate as well as a chimney; for the rest of the systems using woody biomass 0.2 default value will optionally be used. 0.5 default value will be used if the replaced system or the system that would have been used is a fossil fuel combusting system. Use weighted average values if more than one type of systems are encountered.</p> <p>This CPA used option 1 to determine the efficiency of the water boiling system being replaced.</p>
Any comment:	The types of stoves and the fuel used in the baseline have been established ex-ante via a baseline survey.

Data / Parameter:	f_{NRB}
Data unit:	
Description:	Non Renewable Biomass factor
Source of data used:	AMS-I.E
Value applied:	0.81
Justification of the choice of data or description of measurement methods and procedures actually applied :	<p>Fraction of woody biomass used in the absence of the project activity in year y that can be established as non renewable as per the relevant provisions of AMS-I.E “Switch from Non-Renewable Biomass for Thermal Applications by the User” Version 5.0 as described in section B.5.2.</p> <p>If the displaced fuel is fossil fuel use a default value of 1.0.</p> <p>Refer to Annex 3 for detailed calculation.</p>
Any comment:	

Data / Parameter:	L_p
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Data unit:	Liters/appliance/day
Description:	Capacity of the water purification equipment
Source of data used:	Manufacturer's specifications
Value applied	20
Justification of the choice of data or description of measurement methods and procedures actually applied :	Manufacturer's specifications shall be used to determine the capacity of the water purification equipment per day
Any comment:	Used to monitor the quantity of purified drinking water together with the number of functional project appliances in case where direct monitoring of the quantity of purified water is not possible.

Data / Parameter:	DW_{POP}
Data unit:	Liters/person/day
Description:	Average volume of drinking water per person per day
Source of data used:	official data, WHO, Minimum water quantity needed
Value applied	3.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official data on average volumes of drinking water per person per day published by WHO used
Any comment:	Used to calculate the cap of purified drinking water consumed for drinking purposes only according to paragraph 6.

Data / Parameter:	POP_{Boiling}
Data unit:	-
Description:	Proportion of total population attended by the project that is serviced at households/buildings where water boiling would have been the purification practice
Source of data used:	Not applicable, since only relevant for projects falling under Case 2
Value applied	Not applicable, since only relevant for projects falling under Case 2
Justification of the choice of data or description of measurement methods and procedures actually applied :	An ex-ante survey to determine the proportion of total population attended by the project that is serviced at households/buildings where water boiling would have been the purification practice is required to estimate the extent of suppressed demand in situations where more than 60% of the households have access to an improved water source.
Any comment:	Only relevant for Case 2

Data / Parameter:	POP_P
Data unit:	-
Description:	Number of persons supplied with purified water from each of the functional

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	project appliances
Source of data used:	Official data, Uganda National Household Survey 2009/2010
Value applied	5
Justification of the choice of data or description of measurement methods and procedures actually applied :	For project activities falling under Case 1 per paragraph 3 (a), the number of persons supplied with purified water from each of the functional project appliances will be determined ex-ante.
Any comment:	The project activity falls under Case 1 per paragraph 3(b), therefore it will be fixed ex-ante. Used to calculate the cap of purified drinking water consumed for drinking purposes only according to paragraph 6.

Data / Parameter:	Ex-ante determined parameters for the project emissions from fossil fuel combustion
Data unit:	-
Description:	Parameters to be determined ex ante for the calculation of project emissions from fossil fuel combustion as per the tool
Source of data used:	As per the Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” version 02
Value applied:	Not applicable to this CPA, which does not involve fossil fuel combustion.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Not applicable to this CPA, which does not involve fossil fuel combustion.
Any comment:	To be considered only in the case the water purification device consumes fossil fuel.

Data / Parameter:	Ex-ante determined parameters for the project emissions from electricity consumption
Data unit:	-
Description:	Parameters to be determined ex ante for the calculation of project emissions from electricity consumption as per the tool
Source of data used:	As per the Tool to calculate baseline, project and/or leakage emissions from electricity consumption version 01.
Value applied:	Not applicable to this CPA, which does not involve electricity consumption.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Not applicable to this CPA, which does not involve electricity consumption.
Any comment:	To be considered only in the case the water purification device consumes electricity

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Data / Parameter:	Leakage
Data unit:	-
Description:	Fractional increase in NRB usage by households outside the project boundary
Source of data used:	AMS-I.E Version 5
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.95
Justification of the choice of data or description of measurement methods and procedures actually applied :	Leakage related to the non-renewable woody biomass saved by the project activity will be assessed based on a net to gross adjustment factor of 0.95 to account for leakages. In this case surveys are not required. This is in line with the provisions in AMS-I.E Version 05.0.
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

Baseline emissions

The baseline emissions shall be calculated as follows, according to AMS.III-AV version 03:

$$BE_y = QPW_y * SEC * f_{NRB,y} * EF_{projected_fossilfuel} * 10^{-9} \quad (1)$$

Where:

BE_y Baseline emissions during the year y in (tCO₂e)

QPW_y Quantity of purified water in year y (litres)

The quantity of purified water is the total amount of water treated by the project activity in year y. It is 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 day¹⁷ shall not be exceeded).

SEC Specific energy consumption required to boil one litre of water (kJ/L)

$f_{NRB,y}$ Fraction of woody biomass used in the absence of the project activity in year y

¹⁷ Based on WHO recommendations (Domestic Water Quantity, Service Level and Health, Table 2: Volumes of water required for hydration, WHO 2003).



that can be established as non renewable as per the relevant provisions of AMS-I.E “Switch from Non-Renewable Biomass for Thermal Applications by the User”.

$EF_{projected_fossilfuel}$

Emission factor as per AMS-I.E procedures when NRB is displaced or the emission factor of the fossil fuel substituted (tCO₂/TJ). A default value of 81.6 tCO₂/TJ is used.

Quantity of purified water, QPW_y

This CPA falls into Case 1; the quantity of purified water is estimated based on the number of filters, which will be functional during the crediting period and the estimated amount of liters that can be purified by the filter (20 liters per appliance) and the total amount is subject to a cap derived from the population serviced by the project equipment POP_p multiplied by the average volume of drinking water per person per day based on official data, set at 3.5 litres per person per day¹⁸.

Year	Number of functional devices, N _v	Water purified (liters/year), QPW _y
1	1,000	6,387,500
2	2,000	12,775,000
3	4,000	25,550,000
4	6,000	38,325,000
5	6,000	38,325,000
6	6,000	38,325,000
7	6,000	38,325,000

It is assumed that the average number of persons per household is 5.0, in line with the average household size in Uganda as established in the Uganda National Household Survey 2009/2010¹⁹. One device will be distributed per household. The average volume of drinking water per person per day is 3.5l/pers/d, below the cap of 5.5l/per/d, and the quantity of purified water used for drinking purposes only per household per day is therefore equal to 17.5 liter.

Specific energy consumption, SEC

¹⁸ See WHO Minimum water quantity needed for domestic uses,

¹⁹ Uganda National Household Survey 2009/2010, Socio-Economic Module, Abridged Report, November 2010, Table 2.6.



Specific energy consumption required to boil one litre of water is to be calculated as follows:

$$SEC = \left[WH * (T_f - T_i) + 0.01 * WHE \right] / \eta_{wb} \quad (2)$$

Where:

WH Specific heat of water (kJ/L °C). Default value of 4.186 kJ/L °C is used.

T_f Final temperature (°C). Default value of 100 °C²⁰ is used.

T_i Initial temperature of water (°C). Default value of 20 °C is used.

WHE Latent heat of water evaporation (kJ/L)

Use a default value of 2260 kJ/L

The latent heat required to boil one litre of water for five minutes is assumed to be equivalent to latent heat for the evaporation of 1% of the water volume (WHO recommends a minimum duration of five minutes of water boiling)²¹

η_{wb} Efficiency of the water boiling systems being replaced

Use one of the options below:

1. The efficiency of the water boiling system shall be established using representative sampling methods or based on referenced literature values (fraction), use weighted average values if more than one type of systems are encountered;
2. 0.10 default value may be optionally used if the replaced system or the system that would have been used is a three stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system i.e. without a grate as well as a chimney; for the rest of the systems using woody biomass 0.2 default value may be optionally used. 0.5 default value may be used if the replaced system or the system that would have been used is a fossil fuel combusting system.

Option 1 is chosen.

²⁰ Boiling point of water at standard conditions.

²¹ WHO guidelines for Emergency Treatment of drinking water at point of the use
<http://www.searo.who.int/LinkFiles/List_of_Guidelines_for_Health_Emergency_Emergency_treatment_of_drinking_water.pdf>.



According to the ex-ante survey conducted, the water boiling systems that are replaced are mostly three stone fire systems and the biomass used is wood.

Therefore, an efficiency of 10.68% is used. Please refer to Annex 3.

Therefore SEC = 3,347 kJ/L.

Establishment of the Non Renewable Biomass factor, $f_{NRB,y}$

Project participants may use applicable default values, detailed formulas or approved tools provided by the UNFCCC to establish f_{NRB} , if available at the time of CPA inclusion.

Differentiation between non-renewable and renewable woody biomass

Project participants shall determine the shares of renewable and non-renewable woody biomass in B_y (the quantity of woody biomass used in the absence of the project activity) the total biomass consumption using nationally approved methods (e.g. surveys or government data if available) and then determine $f_{NRB,y}$ as described below.

The fraction of woody biomass saved by the project activity in year y that can be established as non-renewable, is:

$$f_{NRB,y} = \frac{NRB}{NRB + DRB}$$

Where:

$f_{NRB,y}$ Fraction of woody biomass used in the absence of the project activity in year y that can be established as non renewable biomass using survey methods

NRB Non- renewable woody biomass

DRB Demonstrably renewable woody biomass

Where $NRB = B_y - DRB$

In compliance with the most recent version of methodology AMS-I.E, project proponents may use surveys in order to determine f_{NRB} or may apply the following approach:

Determination of B_y

B_y is the biomass used in tonnes dry matter in year y in the absence of the project activity in the area for which the f_{NRB} is calculated. This can be either a whole country or a region within it.

However, if there is a lack of data availability to determine the f_{NRB} on a project-specific basis, from the shares of renewable (DRB) and non-renewable woody biomass (NRB) in the total biomass consumption



(i.e. B_y - the quantity of woody biomass used in the absence of the project activity), in order to have the comparable proportion value of f_{NRB} , a national-level or regional-level default value for f_{NRB} will be derived by calculating Total Annual Biomass Removals (R_y) from each country as a proxy for B_y and estimating the proportion of R_y that is demonstrably renewable (DRB) and non-renewable (NRB), which can cover all CPAs in that specific region or country.

B_y is calculated using the two following approaches, of which the more conservative result shall be applied.

1. B_y is calculated based on volumetric wood harvest data and converted to tonnes using the appropriate Biomass Conversion and Expansion Factor for wood removal as:

$$B_y = H_y * BCEF_R$$

Where:

H_y Volumetric wood harvest in m^3/yr in year y . National and regional data from literature or published reports can be used. FAO data can also be used.²²

$BCEF_R$ Biomass Conversion and Expansion Factor for conversion to wood removals²³ in ton/m^3 . IPCC values can be used.

2. Total Annual Biomass Removals (R_y) from each country is used as a proxy for B_y . FAO and IPCC data may be used to determine this. R_y is calculated as follows:

$$R_y = MAI_y - \Delta BM_y \tag{3}$$

Where:

R_y Total annual biomass removals in t/yr in year y

MAI_y Mean Annual Increment of biomass growth in t/yr in year y

ΔBM_y Annual change in living forest biomass in t/yr in year y

Mean Annual Increment of biomass growth in year y (MAI_y) is calculated in as the product of the Extent of Forest in year y (F_y) in hectares and the country-specific growth rate $r_{G,y}$ of the Mean Annual Increment:

$$MAI_y = F_y * r_{G,y} \tag{4}$$

Where:

MAI_y Mean Annual Increment of biomass growth in t/yr in year y

F_y Extent of forest in ha in year y

²² <http://www.fao.org/forestry/fra/>

²³ IPCC Chapter 4. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.5.



$r_{G,y}$ Growth rate of biomass, calculated as calculated as a weighted average based on FAO reporting on distribution of total forest area by ecological zone and IPCC above-ground biomass growth rates for different ecological zones in t/ha/yr in year y.

Determination of DRB Demonstrably renewable woody biomass²⁴

Woody²⁵ biomass is “renewable” if one of the following two conditions is satisfied:

1. The woody biomass is originating from land areas that are forests²⁶ where:
 - (a) The land area remains a forest;
 - (b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
 - (c) Any national or regional forestry and nature conservation regulations are complied with.
2. The biomass is woody biomass and originates from non-forest areas (e.g. croplands, grasslands) where:
 - (a) The land area remains cropland and/or grasslands or is reverted to forest;
 - (b) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
 - (c) Any national or regional forestry, agriculture and nature conservation regulations are complied with.

DRB is calculated as:

1. Estimating the sum of all demonstrably sustainable managed forests in the area in hectare. Published reports, surveys or literature can be used.
2. Calculating the product of the growth rate of biomass in tonnes dry matter per hectare in the area and the demonstrably sustainable managed forest area.

$$DRB_y = r_{G,y} * F_{protected,y}$$

Where:

²⁴ This is inline with the calculation of the fNRB in methodology AMS I.E.

²⁵ In cases of charcoal produced from woody biomass, the demonstration of renewability shall be done for the areas where the woody biomass is sourced.

²⁶ The forest definitions as established by the country in accordance with the decisions 11/CP.7 and 19/CP.9 should apply.



- $r_{G,y}$ Growth rate of biomass in tonnes dry matter per hectare in year y . Appropriate IPCC default values may be used²⁷.
- $F_{protected,y}$ Demonstrably protected forest extent in hectare in year y . FAO data may be used to determine this²⁸. Where no indication of the protected forest area is available, 15% of the total forest extent or a more conservative values approved by the EB, shall be conservatively assumed to be protected.

It shall be noted that if national values are used to calculate B_y and R_y , then national values shall be used to calculate $F_{protected,y}$. Similarly, if regional values are used to calculate B_y and R_y , then regional values shall be used to calculate $F_{protected,y}$.

Determination of Non-renewable biomass²⁹

Non-renewable woody biomass (*NRB*) is the quantity of woody biomass used in the absence of the project activity (B_y) minus the *DRB* component, as long as at least two of the following supporting indicators are shown to exist:

- A trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area;
- Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area;
- Increasing trends in fuel wood prices indicating a scarcity of fuel-wood;
- Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass.

A value of 81% is used for this CPA. Please refer to the calculation in Annex 3.

Project emissions

If the operation of the project water purification system involves consumption of fossil fuels and/or electricity, project emissions include:

²⁷ IPCC chapter 4. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf
Table 4.9 and table 4.10

²⁸ <http://www.fao.org/forestry/fra/>

²⁹ This is inline with the calculation of the fNRB in methodology AMS I.E.



- CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the tool “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”;
- CO₂ emissions from electricity consumption by the project activity using the latest version of the tool “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”.

The operation of the water filters does not involve the consumption of fossil fuels or electricity. Therefore, the project emissions are zero.

Leakage emissions

Leakage relating to the non-renewable woody biomass is assessed as per the relevant procedures of AMS-IE version 5 explained below:

B_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

B.5.3. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO₂ e)	Estimation of baseline emissions (tonnes of CO₂ e)	Estimation of leakage (tonnes of CO₂ e)	Estimation of overall emission reductions (tonnes of CO₂ e)
1	0	1,412	0	1,412
2	0	2,824	0	2,824
3	0	5,649	0	5,649
4	0	8,474	0	8,474
5	0	8,474	0	8,474
6	0	8,474	0	8,474
7	0	8,474	0	8,474
Total (tonnes of CO₂ e)	0	43,781	0	43,781

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

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It is responsibility of the Water School Uganda to monitor and record all parameters included in section E.7.1, under the guidance of the CME.

The monitoring is done as per the requirement of AMS-III.AV Version 3 and the Standard for sampling and surveys for CDM project activities and programme of activities Version 03.0 and is described below:

1) Parameters to be monitored for this CPA:

The following table gives an overview of the parameters to be monitored for this CPA:

Parameter	Means of monitoring	Monitoring frequency	Comments
Existence of public distribution network of supplying safe drinking water	The monitoring will be done based on interviews with the Ministry of water and environment. In case a public distribution network becomes available within the project boundary, field measures will be undertaken to determine the households/buildings supplied by the public system.	Annually	

2) Parameters to be sampled for this CPA individually, or for the group of CPAs to which this CPA belongs

The following table gives an overview of the parameters to be sampled for this CPA individually, or for the group of CPAs to which this CPA belongs:

Parameter	Means of monitoring	Monitoring frequency	Type of parameter	Confidence/precision level (frequency of sampling)	Comments
N _y	Visit to premises, visual inspection and interview with owner of household water purification devices if required	Annual or biennial	proportion value	90/10 (annual sampling, single CPA) or 95/10 (biennial sampling or if sample plan for a group of CPAs)	In case of any failure, the users can contact local technicians (called “Peers”) trained by the Water School Uganda who distributed the filters. The Peers visit the site to assess the cause of failure and possibly fix it if it can be fixed or arrange for

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Parameter	Means of monitoring	Monitoring frequency	Type of parameter	Confidence/precision level (frequency of sampling)	Comments
					<p>an exchange. The Peers communicate with the Water School Uganda supervisors to update of the performance of the installations they made.</p> <p>If any events of failure and/or replacement occur, they will be recorded. The date when the device was nonoperational and when it has been fixed or exchanged will be recorded in the CPA installation record. The number of days when the device is not functioning will be deducted from the ER calculation.</p>
Water quality	Water quality samples, using a presence / absence test for E. coli colony forming units (CFU) in 10 ml of water or an equivalent quantitative test for E. coli CFU. A presence of up to 10 E. coli CFU/100 ml	Annual or biennial	Proportion value	90/10 (annual sampling, single CPA) or 95/10 (biennial sampling or if sample plan for a group of CPAs)	

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Parameter	Means of monitoring	Monitoring frequency	Type of parameter	Confidence/precision level (frequency of sampling)	Comments
	shall be acceptable ³⁰ .				

(a) Sampling Design:

Due to the large number of the household water purification devices envisaged to be distributed as part of this CPA, it is not economically feasible to monitor each individual unit distributed. Therefore, representative sampling will be undertaken as part of a Sampling Plan that is designed in line with the requirements of AMS-III.AV v3 and the “Standard for sampling and surveys for CDM project activities and programme of activities” Version 03.0 (the Sampling standard).

(i) Objectives and Reliability Requirements:

The objective is to obtain a reliable estimate of the variables listed in the table above over the course of the crediting period and meeting the indicated confidence/precision levels. The frequency of sampling will always comply with the requirements of the methodology and the Sampling Standard.

(ii) Target Population:

The overall target population are the household water purification devices distributed as a result of the CPAs implemented under the PoA. Each device will be identified by a unique identification number for each CPA. In addition, each device is linked to a cluster, defined as the lowest level of administrative unit existing within the project boundary (e.g. villages). Each device is assigned to a CPA and linked to an end user whose premises can be visited during monitoring. The information is collected by the Water school uganda, and is stored on the shared drive maintained by the CME in the CPA specific folder.

(iii) Sampling Method:

Grouping of CPAs will be performed according to the following two criteria:

- Technology
- Host-country

This means that this CPA will only be grouped with other, future CPAs involving the distribution of GDM filters in Uganda.

Within each group, clustered sampling will be undertaken, to account for the fact that the users of the household water purification devices will be grouped geographically (e.g. in villages).. The clusters to be sampled will be drawn from the list of all the clusters within the project boundary, and during sampling all the devices (identified through their individual unique ID numbers) linked to that said cluster will be visited. In case not all the devices could be visited during monitoring within one cluster, the sampled

³⁰ WHO classifies a contamination of up to 10 E. coli CFU/100 ml as low risk. An absence of E. coli CFU in 10ml can therefore be used as an indication that the drinking water is safe. See: Table 5.2 on page 78 of Guidelines for drinking-water quality, second edition, Volume 3 Surveillance and control of community supplies

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values from the cluster will be retained if i) a maximum two observations were missing per cluster³¹ or if ii) the estimates for that said cluster reach the required reliability (e.g. 95% or 90% confidence, 10% precision) of the sampling campaign.

Alternatively if information on the clusters is not available or the required precision cannot be achieved through clustered sampling, simple random sampling may also be performed, in which case the sampling will be applied based on the serial numbers of the devices.

The sampling will be done using an excel spread sheet, which will be programmed to randomly select numbers corresponding to the unique ID numbers of the clusters (for clustered sampling) or the devices (for simple random sampling).

Whenever possible, the sampled parameters will be monitored jointly, i.e. for each sampled household all the applicable parameters will be sampled. However, the CME may allow the Water School Uganda to stop monitoring a particular parameter once the required level of confidence/precision has been reached. More clusters/devices will be selected for sampling than is required by the sample size, to ensure that if there are any household water purification devices that are unable to be reached and/or households not willing to provide responses the required accuracy is still achieved.

(iv) Sample Size:

The size of the sample for each sampling frame is determined by the requirement to achieve 95/10 confidence/precision in case of biennial or grouped verification, or 90/10 confidence/precision in case of annual verification, for the estimation of the proportion or mean value of the parameter investigated.

In order to calculate the required sample sizes, estimates for the proportions or the mean values and their standard deviations shall be used. For the subsequent monitoring periods, the estimates shall be adjusted taken the results of the previous monitoring period(s) into account.

The following estimates shall be used for the first monitoring period of this CPA:

Parameter	Estimated value	Justification
Average % of functioning project appliances	90%	Based on results from a pilot project in Kenya where 22 out of 24 GDM filters are still operating
Standard deviation of functioning appliances	0.092	Calculated, based on the assumption that villages either have 0% or 100% usage rates, and that all 42 villages in Najja sub-county are targeted by this CPA.
Average % of clean water	90%	Based on results from a pilot project in Kenya where 5 out of 68 water tests showed

³¹ This is in line with the “Guidelines for sampling and surveys for CDM project activities and programme of activities”, Version 02.0

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		higher E.coli contamination than 10CFU/100ml.
Standard deviation of clean water	0.092	Calculated, based on the assumption that villages either have 0% or 100% usage rates, and that all 42 villages in Najja sub-county are targeted by this CPA.

If clustered sampling is applied, the following equation³² for estimating the cluster size is applied:

$$c \geq \frac{conf^2 \times M \times V}{(M - 1) \times precision^2 + conf^2 \times V}$$

Where:

$$V = \frac{SD_B^2}{\bar{p}^2}$$

Parameter	Description	Value applied
c	Number of clusters to be sampled (villages)	
M	Total number of clusters (villages) – this must encompass the entire population	42
p	Average proportion or cluster mean	0.9
conf	Constant referring to the level of confidence (1.645 for 90 % confidence, 1.96 for 95% confidence)	1.645 or 1.96
precision	Required precision (i.e. 10% = 0.1)	0.1
SD ²	Variance between clusters (villages)	0.092

Using the above assumptions, we receive the following minimum cluster size:

Parameter	Minimum cluster size (90% confidence)	Minimum cluster size (95% confidence)
Number of functional project appliances in year y	18.02	21.68
Water quality	18.02	21.68

Therefore it is expected that a minimum of 22 villages need to be sampled (in case of 95% confidence) or a minimum of 19 villages (in case of 90% confidence) for both parameters in order to get estimates of the required precision. Prior to the first sampling campaign the latest available estimates on the mean values

³² Equation according to the Guidelines for sampling and surveys for CDM project activities and programme of activities (EB 69, Annex 5)

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and standard deviations for both parameters will be used, so the actual cluster size might differ from the above calculated value.

(v) Sampling Frame

Generally, the above mentioned parameters are sampled among all distributed household water purification devices for groups of CPAs as indicated above. In case a CPA cuts across these groups, it will be monitored individually. Hence, the overall sampling frame consists of all installed household water purification devices, represented by their unique identification numbers stored on the shared drive maintained by the CME in the CPA specific folder.

3) Data management:

(i) Field Measurements:

The following parameters will be measured as indicated below:

Parameter	Frequency	Methods to be applied	Comments on seasonal fluctuation
Number of functional project appliances in year y N_y	Annual or biennial	Visit to premises, visual inspection and interview with owner of household water purification devices if required	Unlikely to fluctuate seasonally
Water quality	Annual or biennial	Water quality samples, using a presence / absence test for E. coli colony forming units (CFU) in 10 ml of water or an equivalent quantitative test for E. coli CFU. A presence of up to 10 E. coli CFU/100 ml shall be acceptable ³³ .	Unlikely to fluctuate seasonally
Existence of public distribution network supplying safe drinking water	Annual	The monitoring will be done based on interviews with the Ministry of water and environment. In case a public distribution network becomes available within the project boundary, field measures will be undertaken to determine the households/buildings supplied by the public system.	Unlikely to fluctuate seasonally

(ii) Quality Assurance/Quality Control:

³³ WHO classifies a contamination of up to 10 E. coli CFU/100 ml as low risk. An absence of E. coli CFU in 10ml can therefore be used as an indication that the drinking water is safe. See: Table 5.2 on page 78 of Guidelines for drinking-water quality, second edition, Volume 3 Surveillance and control of community supplies



The potential for non-responses, refusals and related issues will be considered during sample selection. If the sampling results are insufficient to achieve the target reliability levels, the CME may request the Water School Uganda to remedy this situation in a number of ways (see below). Selecting a larger than necessary sample size before commencing monitoring can help ensure that an adequate number of responses are obtained during sampling. If it is necessary to engage third parties for carrying out field measurements, the CME will ensure that any such third parties are credible, experienced adequately trained for the tasks they are contracted for (e.g. carrying out water tests) in line with a methodology. Training will be provided to the parties carrying out the actual field measurements on how to deal with non-responses etc if necessary.

The calculation of the sample size will be carried out using estimates for proportions, mean of values and standard deviations as the actual characteristics of the population/sampling frame are unknown. In order to ensure the quality of the sampling results, the CME can draw on the provisions for reliability calculations as provided by the *Guidelines for Sampling and Surveys for CDM project activities and programme of activities Version 02.0 (EB 69, Annex 5)*. In the event that the sampling results do not fulfil the required level of confidence and precision, the CME will request that the Water School Uganda sample additional clusters. If the reliability is still not sufficient after additional samples, the sampling will be repeated with an increased sample size.

The data contained in each individual CPA Monitoring Record and collected during field measurements will be transferred to the CME by the Water School Uganda. The CME will be responsible to ensure that such data is stored on the shared drive maintained by the CME in the CPA specific folder.

(iii) Analysis:

The data obtained from sampling of each CPA will be used to estimate values for the parameters described above for use in GHG ER calculations.

(c) Implementation:

(i) Implementation Plan

It is envisaged that the Water School Uganda will implement the Sampling Plan over the course of the PoA, including contracting all necessary third parties who would be responsible for actual field measurements, under the guidance of the CME. The actual timing will depend on the speed of CPA inclusion and household water purification device distribution. The Water School Uganda will be trained by the CME to ensure that field measurements are undertaken in line with the standards required of the Sampling Plan.

The skills and experience required for the data collection activities under the Sampling Plan may include:

- Experiences with field water quality testing;
- Experience conducting door-to-door surveys;
- Local language skills and English language skills;
- Cultural awareness;
- Numerical proficiency;
- Data entry skills

The following parameters will be monitored:

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Data and parameters as per AMS-III.AV version 03

Based on AMS-III.AV version 03, the following data will be monitored during the project crediting period:

Data / Parameter:	QPW_y																
Data unit:	Quantity of purified water in year y																
Description:	litres																
Source of data to be used:	Device specification and monitored number of functional project appliances N _y																
Value of data applied for the purpose of calculating expected emission reductions in section B.5	<table border="1"> <thead> <tr> <th>Year</th> <th>water purified QPW_y</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>6,387,500</td> </tr> <tr> <td>2</td> <td>12,775,000</td> </tr> <tr> <td>3</td> <td>25,550,000</td> </tr> <tr> <td>4</td> <td>38,325,000</td> </tr> <tr> <td>5</td> <td>38,325,000</td> </tr> <tr> <td>6</td> <td>38,325,000</td> </tr> <tr> <td>7</td> <td>38,325,000</td> </tr> </tbody> </table>	Year	water purified QPW _y	1	6,387,500	2	12,775,000	3	25,550,000	4	38,325,000	5	38,325,000	6	38,325,000	7	38,325,000
Year	water purified QPW _y																
1	6,387,500																
2	12,775,000																
3	25,550,000																
4	38,325,000																
5	38,325,000																
6	38,325,000																
7	38,325,000																
Description of measurement methods and procedures to be applied:	The quantity of purified water in year y will be derived from the capacity of the equipment established by manufacturers' specifications and the number of functional project appliances N _y .																
QA/QC procedures to be applied:	The date of installation/distribution of a device shall be considered in the calculation of the emission reductions. In case a device is found to be non-functioning, it shall be deducted from the emission reductions for the whole monitoring period or from the date it broke down if this date is recorded.																
Any comment:	Not monitored directly, since CPA does not involved point-of-entry (POE) treatment systems for residential or institutional applications which are fitted with a water flow meter The quantity of purified water shall be subject to a cap calculated as the population serviced by the project equipment times an average volume of drinking water per person per day to account for the fact that only purified water consumed for drinking purposes can be used in the baseline calculation.																

Data / Parameter:	N_y
Data unit:	-
Description:	Number of functional project appliances in year y
Source of data to be used:	Sampling surveys for each group of CPAs

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Value of data applied for the purpose of calculating expected emission reductions in section B.5	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="background-color: #d3d3d3;">Year</th> <th style="background-color: #d3d3d3;">Nb of functional devices N_{v}</th> </tr> </thead> <tbody> <tr><td align="center">1</td><td align="center">1,000</td></tr> <tr><td align="center">2</td><td align="center">2,000</td></tr> <tr><td align="center">3</td><td align="center">4,000</td></tr> <tr><td align="center">4</td><td align="center">6,000</td></tr> <tr><td align="center">5</td><td align="center">6,000</td></tr> <tr><td align="center">6</td><td align="center">6,000</td></tr> <tr><td align="center">7</td><td align="center">6,000</td></tr> </tbody> </table>	Year	Nb of functional devices N_{v}	1	1,000	2	2,000	3	4,000	4	6,000	5	6,000	6	6,000	7	6,000
Year	Nb of functional devices N_{v}																
1	1,000																
2	2,000																
3	4,000																
4	6,000																
5	6,000																
6	6,000																
7	6,000																
Description of measurement methods and procedures to be applied:	<p>The number of functional appliances will be determined based on representative sample at least once every two years for each group of CPAs. It will be checked that the appliances are still operating or replaced by an equivalent service appliance.</p> <p>The sampling survey reaches 90/10 or 95/10 confidence/precision, in line with the requirements in AMS-I.E Version 05 and the STANDARD FOR SAMPLING AND SURVEYS FOR CDM PROJECT ACTIVITIES AND PROGRAMME OF ACTIVITIES, Version 03.</p>																
QA/QC procedures to be applied:	<p>In case a device is not operating and has not been replaced, it will be excluded from the emission reduction calculation for the whole monitoring period considered, unless evidence of the date it broke down can be provided.</p> <p>The start date of each device, i.e. date of installation/distribution, will be considered to calculate the total amount of water purified during the year. Data will be collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.</p>																
Any comment:	Parameter used to calculate the quantity of purified water QPW_v																

Data / Parameter:	Existence of public distribution network supplying safe drinking water
Data unit:	-
Description:	Existence of public distribution network supplying safe drinking water to the project boundary in year y
Source of data to be used:	Interview with the Ministry of water and environment
Value of data applied for the purpose of calculating expected emission reductions in section B.5	There is no public distribution network supplying safe drinking water to the project boundary.
Description of measurement methods	If during the crediting period SDW is made available through a public

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and procedures to be applied:	distribution network, the emission reductions pertaining to the households/buildings supplied by the public system can not be claimed from that point onwards. This condition should be checked annually during the crediting period;
QA/QC procedures to be applied:	In case a SDW network is found to be existing, households related to this SDW will be identified via map, surveys, pictures, and emission reductions related to those households will be discounted accordingly considering the number of households linked to the network and the date the network became operational. It will be checked annually if new households from the project boundary are being linked to the network.
Any comment:	

Data / Parameter:	POP_p
Data unit:	-
Description:	Number of persons supplied with purified water from each of the functional project appliances
Source of data to be used:	Sampling surveys
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable, since project Case 1
Description of measurement methods and procedures to be applied:	Sampling survey at least once every two years (biennial) to check the number of person supplied with purified water from each functional project device.
QA/QC procedures to be applied:	Data will be collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
Any comment:	For CPAs falling in case 2 only. For CPAs falling in case 1, ex-ante survey can be conducted. Not applicable, since this CPA is falling in Case 1. Used to calculate the cap of purified drinking water consumed for drinking purposes only according to paragraph 6.

Data / Parameter:	Water quality
Data unit:	-
Description:	water quality
Source of data to be used:	Sampling surveys
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Water quality meets the national standards.

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Description of measurement methods and procedures to be applied:	To ensure compliance of the water quality either with: (i) at a minimum the “interim” performance target as per “Evaluating household water treatment options: Health based targets and microbiological performance specifications” (WHO, 2011); or (ii) an applicable national standard or guideline, the water quality shall be monitored on sample basis for contamination with Escherichia coli (E. coli). A presence/absence test for E. coli colony forming units (CFU) in 10 ml of water or an equivalent quantitative test for E. coli CFU shall be used. A presence of up to 10 E. coli CFU/100 ml shall be acceptable ³⁴ .
QA/QC procedures to be applied:	The fraction of water quality measurements providing water of insufficient quality shall be excluded from the calculation of emission reductions.
Any comment:	

Data / Parameter:	Monitoring parameters for the project emissions from fossil fuel combustion
Data unit:	
Description:	Parameters to be monitored for the calculation of project emissions from fossil fuel combustion as per the tool
Source of data to be used:	As per the Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” version 02.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable to this CPA. There is no fossil fuel combustion by the water filters.
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	To be considered only in the case the water purification device consumes fossil fuel.

Data / Parameter:	Monitoring parameters for the project emissions from electricity consumption
Data unit:	
Description:	Parameters to be monitored for the calculation of project emissions from

³⁴ WHO classifies a contamination of up to 10 E. coli CFU/100 ml as low risk. An absence of E. coli CFU in 10ml can therefore be used as an indication that the drinking water is safe. See: Table 5.2 on page 78 of Guidelines for drinking-water quality, second edition, Volume 3 Surveillance and control of community supplies

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	electricity consumption as per the tool
Source of data to be used:	As per the Tool to calculate baseline, project and/or leakage emissions from electricity consumption version 01.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable, there is no electricity consumption by the water filter in this CPA.
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	To be considered only in the case the water purification device consumes electricity

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

- Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

Given that the PoA is international, each host party requirements is considered at CPA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The objective of the SSC-CPA is the installation/distribution water purifiers to households and/or communities who are boiling or would have boiled the water as purification mean. No negative environmentally impacts are expected during distribution and operation of the water purification systems.

The National Environment Management Authority (NEMA) decides on environmental impact assessments (EIA) requirements. This CPA does not require an EIA or any other assessment.

More information on the national EIA law and process is available here:
http://www.nemaug.org/environment_regulations.php

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:



No environmental impact assessment is required for this project activity according to the Host Party requirement. A letter of clearance from the National Environment Management Authority is provided to the DOE.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Local stakeholders were invited to participate in a consultation for the implementation of the CPA. The CPA implementer, Water School Uganda, has a network of persons in their areas of operations through which it conducts its activities. The Water School has a local representative in Buikwe District.

Several meetings with stakeholders were conducted. However, we point out the details of the meetings held:

- 1) On the 7th – 8th July 2011, a number of meetings were conducted with the following stakeholders:
 - The Ministry of Water and Environment of Uganda
 - WHO Uganda
 - Integrated Family Development Initiatives
 - GIZ
 - WWF
- 2) On the 15th July 2011, a meeting was held with the local representatives of the people within the CPA boundary

An invitation letter was sent out on July 5th, 2011 to invite the stakeholders at the meeting.

The consultation comprised of a meeting with the local community leaders and representatives whose views were taken to be representative of the beneficiaries. In the governance structure of Uganda, the local representatives are elected by the people and as such, they represent the views of the people who elect them into office.



The meeting was facilitated by Mr. John Ochieng and Mr. Joseph Tumushime, both from the CPA implementer, Water School Uganda Limited. The following local leaders attended the meeting:

- Mr Kabuye Derrick – Ag. Chairperson
- Mr. Painato Tabuza – Sub- county Chief
- Mrs Maragret Ojiambo – Community Leader
- Mr. Gitta Mohammed – Chairman NGO Forum

D.3. Summary of the comments received:

There were no negative stakeholder comments concerning the project. All comments received so far were very positive. Local organisations welcome this project and are looking forward to its implementation.

The meeting of 7th – 8th July 2011 was more to establish the baseline and cross check with the realities on ground. The participants called for involvement of all stakeholders such as the Uganda climate change unit, ministry of water and environment, NEMA, ministry of Health, and to engage them proactively so as to contribute to the success of the project.

The DNA representative provided the requirements for issuance of a letter of authorization and also noted that two LoAs had been previously issued for Ugandan PoAs (The Uganda Municipal Waste Compost Program and the Improved Cookstoves for East Africa).

Stakeholders who are involved in Biomass related work were contacted to establish the common practices for water boiling in Uganda and other related aspects.

The meeting of 16th July 2011 involving the local representatives was critical in introducing the project activities and the basic knowledge of carbon credits. The acting chairman informed the meeting about the sources of water and practices to make it safe for drinking, and on behalf of the people he represents, was very pleased with the project idea. The facilitators were given an opportunity to inform the local leaders about the different players behind the project, the technology involved and how it works, and the benefits thereof. The leaders were later given an opportunity to pose any questions that would clarify any issues they had. The leaders were concerned about how their people would access the filters, how long they serve, the cost, and whether each households needs more than one filter, and the kind of training required for one to use the filter. To which the facilitators responded accordingly to the raised concerns as follows: Filters will be sold to the end-users through a local distribution and supply chain at a subsidized price which will be determined during the first phase of the project. The price will take into consideration the income level of the community and their willingness to pay the filter. Local people, trained by the Water School Uganda, will be responsible of the distribution of the filters. The Water School added further that for an average household, one filter will be sufficient per household. In case of communities or schools, more than one filters will be distributed to meet the needs of the users. The lifetime of the filter is expected around 8 years without maintenance. New filters will be sold to replace the old ones. No particular training is needed to use the filter, which requires no maintenance.



D.4. Report on how due account was taken of any comments received:

There have been no environmental concerns raised during the stakeholder consultation process. The concerns raised by the leaders about the distribution of filters, the lifetime, the price and the training are considered in the project design.

As a whole the project is perceived to be positive in terms of the three categories of sustainability: environment, society and economy.

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Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	Water School Uganda
Street/P.O.Box:	Plot 2 Valley Rd, Ntinda, P.O. Box 5334
Building:	
City:	Kampala
State/Region:	
Postfix/ZIP:	
Country:	Uganda
Telephone:	+256 202407890
FAX:	
E-Mail:	
URL:	www.waterschool.com
Represented by:	
Title:	Executive Director
Salutation:	
Last Name:	Mukalere
Middle Name:	
First Name:	Zephaniah
Mobile:	+ 256 772403597
Direct FAX:	
Direct tel:	
Personal E-Mail:	zmukalere@thewaterschool.org



Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding will be made available for the proposed CPA.



Annex 3

BASELINE INFORMATION

Baseline survey

A baseline study was conducted on July 6th – 7th 2011 in order to determine the type of stoves and fuel used to boil water prior to the project implementation in the households of the Buikwe district.

Target Population:

The project area, the district Buikwe, comprises of several villages which can be considered as similar in terms of their living conditions, access to water and water treatment methods. The target population of the survey comprises of all rural households within the Buikwe district. The same target population will be considered for the water purification project implemented by the Water School Uganda.

Sampling Method:

Simple random sampling has been chosen as most suitable sampling methods as per “General Guidelines for Sampling and Survey of Small-Scale CDM Project Activities”, EB 50, Annex 30, paragraph 27. Initial discussions with local representatives gave a clear understanding of the situation in the survey area. Based on their information, population is expected to homogeneously apply three stone stoves fired by wood. Further, even-though households are defined as part of the village one usually cannot tell when entering a new village as houses are distributed evenly over the project area.

Sample Size:

Previous discussions with local representatives of Buikwe district³⁵ gave a clear indication on the expected outcome of the survey. Over the whole district, three stone stoves with wood as fuel is expected to be seen as dominating outcome. Hence, the sample size is determined by assuming a response distribution of 90%³⁶. In order to determine the sample size, Raosoft³⁷ has been applied using input parameters as listed in Table 1.

To achieve a 90% confidence interval and a 10% precision, a sample size of a minimum 25 households is needed. If the previously obtained information by the local representatives on response distribution is

³⁵ Jessica Lugonda Nankya, a community leader of Najja Sub.county, Buikwe District

³⁶ See: <http://www.raosoft.com/samplesize.html?nosurvey> for further explanation

³⁷ <http://www.raosoft.com/samplesize.html>



neglected and 50% instead of 90% is applied as a conservative measure, 68 sample households would be needed. To achieve a 5% instead of a 10% error margin, 98 samples would be needed and to have results within a 95% instead a 90% confidence interval, 35 samples would be needed.

To give the survey further credibility a sample size of 200 households are targeted. The final sample size is 219 households.

Table 1: Parameters to determine the a sample size achieving 90/10 confidence/precision

<i>Parameter</i>	<i>Value</i>	<i>Justification</i>
<i>Error Margin</i>	<i>10%</i>	<i>“General Guidelines for Sampling and Surveys for Small Scale CDM Project Activities” EB 50, Annex 30</i>
<i>Confidence Level</i>	<i>90%</i>	<i>“General Guidelines for Sampling and Surveys for Small Scale CDM Project Activities” EB 50, Annex 30</i>
<i>Population Size</i>	<i>59,818</i>	<i>Population in Buikwe: 329,900 (http://en.wikipedia.org/wiki/Buikwe_District) Number of persons per household: 5.5 (Mapping and Needs Assessment Report Uganda 2009, World Water Corps, Uganda Mapping and Assessment Team)</i>
<i>Response Distribution</i>	<i>90%</i>	<i>Based from discussions with local representatives</i>

Sampling Frame:

The district of Buikwe comprises Buikwe County which has three town councils and eight sub-counties, namely: Lugazi, Njeru, Nkokonjeru town councils and Buikwe, Ngogwe, Najja, Najjembe, Nyenga, kawolo, Ssi- Bukunja and Wakisi respectively. Najja sub-county consists of 42 villages. During each survey day, four groups have been built. Each group started surveying at random villages throughout the district. All households, where an adult person has been present at the time of conducting the survey, have been questioned within a village.

Results

The results of the survey are presented in the Table 2 below.

Table 2: Corrected stove and fuel type from sampling resulting in a weighted average stove efficiency

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Group No.	Sampling day	Picture No. Of Stove	Wood fuel and conventional stove	Wood fuel and improved stove	Charcoal and conventional stove	Charcoal and improved stove	Total
1	07.06.2011	7387-7411	20	0	2	0	22
2	07.06.2011	001-027	19	3	0	0	22
3	07.06.2011	2440-2461	20	0	0	0	20
4	07.06.2011	5153-5192	20	2	0	0	22
5	07.06.2011	1701-1723	22	0	0	0	22
1	07.07.2011	7413-7436	18	2	2	0	22
2	07.07.2011	028-049	18	4	0	0	22
3	07.07.2011	2462-2484	21	2	0	0	23
4	07.07.2011	5193-5223	22	0	0	0	22
5	07.07.2011	1726-1746	19	2	1	0	22
Total (no.):			199	15	5	0	219
Total (%):			90.87%	6.85%	2.28%	0.00%	100.00%
Default stove efficiency (%):			10.00%	20.00%	10.00%	20.00%	-
Weighted average stove efficiency		10.68%					

Wood is the predominant fuel in the Buikwe district, 97.72%. Charcoal is seen in very rare occasions. The few charcoal stoves have been seen in larger villages used by shop owners to be used to heat up meals over lunch. Families use wood as it is not bound to direct costs. Kids are sent out to collect fuel wood to cook lunch or dinner. The time spent to collect wood is however time that could have been spent with other activities such as studying or developing new businesses. Further, much of sexual harassment seen in the region are due to wood collecting in “wrong” areas.

93.15% of all stoves sampled are considered as conventional. The high number is directly bound to the fact of “free” fuel wood, which is currently still available. Families complain about longer time needed to collect wood in recent years. This is due to the extreme tension to the environment by the fast growing rural population in Uganda.

The weighted average stove efficiency in the Buikwe district is considered to be 10.68%.

Calculation of the Non Renewable Biomass Factor in Uganda

f_{NRB} is the fraction of woody biomass saved by a project activity in year y that can be established as Non-Renewable Biomass (NRB). It has a range from 0 to 1, where 1 equates to 100% of the woody biomass saved by the project being non-renewable.

According to the methodology and the PoA DD, this is calculated with the following equation:



$$f_{NRB} = NRB / (NRB + DRB) \quad (1)$$

Where,

DRB – Demonstrably Renewable Biomass, tonnes;

NRB – Non-Renewable Biomass, tonnes.

Non-Renewable Biomass is the quantity of woody biomass used in the absence of the project activity (By) minus the DRB component, and can be calculated using the following equation:

$$NRB = B_y - DRB \quad (2)$$

The methodology specifies the criteria for demonstrably renewable woody biomass as areas in which:

- (a) The land area remains a forest; and
- (b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
- (c) Any national or regional forestry and nature conservation regulations are complied with.

Non-renewable woody biomass is supported by at least 2 of the following indicators:

- *Trend showing increase in time spent or distance travelled by users (or fuel-wood suppliers) for gathering fuel wood or alternatively trend showing increase in transportation distances for the fuel wood transported into the project area;*
- *Survey results, national or local statistics, studies, maps or other sources of information such as remote sensing data that show that carbon stocks are depleting in the project area;*
- *Increasing trends in fuel wood price indicating scarcity;*
- *Trends in the type of cooking fuel collected by users, suggesting scarcity of woody biomass.*

Determination of B_y

As per the PoA DD, B_y is calculated using two approaches, of which the more conservative result is applied.

1. B_y is calculated based on volumetric fuelwood harvest data converted to tonnes using the appropriate Biomass Conversion and Expansion Factor.

$$B_y = H_y * BCEF_R$$



Where:

H_y Volumetric wood harvest in m^3/yr in year y . National and regional data from literature or published reports can be used. FAO data can also be used.³⁸

$BCEF_R$ Biomass Conversion and Expansion Factor for conversion to wood removals³⁹ in ton/m^3 . IPCC values can be used.

According to FAO data⁴⁰ $H_{p,y} = 42,310,000 m^3$.

$BCEF_R$ is determined based on IPCC data. Since, Uganda is located in a humid tropical zone and the growing stock level⁴¹ is equal to $44m^3/ha$, an average value of $2.28 ton/m^3$ has been chosen. The product is multiplied by 0.95 to account for leakage.

Therefore, $B_y = 91,643,460 ton/year$.

2. Total Annual Biomass Removals in year y (R_y) from each country is used as a proxy for B_y .

$$R_y = MAI_y - \Delta F_y \quad (5)$$

Where:

R_y Total annual biomass removals in t/yr in year y

MAI_y Mean Annual Increment of biomass growth in t/yr in year y

ΔF_y Annual change in living forest biomass in t/yr in year y

Mean Annual Increment of biomass growth in year y (MAI_y) is calculated in as the product of the Extent of Forest in year y (F_y) in hectares and the country-specific growth rate $r_{G,y}$ of the Mean Annual Increment:

$$MAI_y = F_y * r_{G,y} \quad (6)$$

Where:

MAI_y Mean Annual Increment of biomass growth in t/yr in year y

F_y Extent of forest in ha in year y

$r_{G,y}$ Growth rate of biomass in $t/ha/yr$ in year y .

³⁸ <http://www.fao.org/forestry/fra/>

³⁹ IPCC Chapter 4. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.5.

⁴⁰ <http://www.fao.org/forestry/fra/fra2010/en/> Global Table sheet 13

⁴¹ <http://www.fao.org/forestry/fra/fra2010/en/> Global Table sheet 13



According to FAO data⁴², $F_y = 2,988,000$ ha.

$r_{G,y}$ is determined based on IPCC data as $r_{G,y} = 5.65$ t/ha/yr.

Therefore, $MAI_y = 16,882,200$ t/yr.

According to FAO data⁴³, $\Delta F_y = -6,000,000$ t/yr.

Therefore, **$R_y = 21,738,090$ t/yr⁴⁴.**

As approach 2. leads to a more conservative result, we apply **$B_y = R_y = 21,738,090$ t/yr.**

Determination of DRB Demonstrably renewable woody biomass

DRB is calculated as follows:

$$DRB_y = r_{G,y} * F_{protected,y}$$

Where:

$r_{G,y}$ Growth rate of biomass in tonnes dry matter per hectare in year y.
Appropriate IPCC default values may be used⁴⁵.

$F_{protected,y}$ Demonstrably protected forest extent in hectare in year y. FAO data may be used to determine this⁴⁶. Where no indication of the protected forest area is available, 15% of the total forest extent shall be conservatively assumed to be protected.

According to FAO data⁴⁷, $F_{protected,y} = 731,000$ ha.

IPCC default value is used to determine the annual growth rate. $r_{g,y} = 5.65$ t/ha.

Therefore the total standing biomass (DRB) accessible as sustainable fuelwood is

$DRB_y = 4,130,150$ ton/year.

Calculation of fNRB

$$NRB_y = B_y - DRB_y$$

$$f_{NRB} = NRB_y / (NRB_y + DRB_y)$$

⁴² <http://www.fao.org/forestry/fra/fra2010/en/> Global Table sheet 2.

⁴³ <http://www.fao.org/forestry/fra/fra2010/en/> Global Table sheet 11

⁴⁴ The result has been multiplied by 0.95 to account for leakage.

⁴⁵ IPCC chapter 4. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf Table 4.9 and table 4.10

⁴⁶ <http://www.fao.org/forestry/fra/>

⁴⁷ <http://www.fao.org/forestry/fra/fra2010/en/> Global Table sheet 6

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Using the above equation the calculated f_{NRB} is **0.81**



Annex 4

MONITORING INFORMATION

Monitoring information is provided in section B.6.1 of the CPA-DD.