



**Monitoring report form for CDM programme of activities**  
(version 01.0)

*Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form for CDM programme of activities" at the end of this form.*

**MONITORING REPORT**

<b>Title of the programme of activities (PoA)</b>	International Water Purification Programme
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<b>UNFCCC reference number of the PoA</b>	5962
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<b>Version number(s) of the PoA-DD(s) applicable to this monitoring report</b>	07
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<b>Coordinating/managing entity (CME)</b>	Pure Water Ltd.
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<b>Version number of this monitoring report</b>	01
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<b>Completion date of this monitoring report</b>	06/07/2017
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<b>Monitoring period number and dates covered by this monitoring report</b>	4 <sup>th</sup> monitoring period 01/06/2016- 30/04/2017
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<b>Monitoring report number for this monitoring period</b>	03
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<b>Host Party(ies)</b>	<b>Host Party(ies) of the PoA</b>	<b>Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no)</b>
	Uganda	No
	Ethiopia	No
	Gambia	No
	Kenya	No
	Madagascar	No
	South Africa	No
	Egypt	No
	El Salvador	No
	Mexico	No
	Nicaragua	No
	Chile	No
	Iran	No
	Vietnam	No
Cambodia	No	

	Malawi	Yes
<b>Sectoral scope(s)</b>	Sectoral scope 3 : Energy demand	
<b>Selected methodology(ies)</b>	AMS-III.AV. “Low greenhouse gas emitting safe drinking water production systems (version 03)”	
<b>Selected standardized baseline(s)</b>	N/A	
<b>Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case-case CPAs in the PoA covered in this monitoring report</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0 tCO <sub>2</sub> e	92,317 tCO <sub>2</sub> e

## PART I - Programme of activities

### SECTION A. Description of PoA

#### A.1. Brief description of the PoA

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This PoA seeks to further the access of households and communities to clean and safe drinking water, by promoting low greenhouse gas emitting water purification technologies. This PoA is thus primarily designed for the long-term improvement of the living conditions of local people. The targeted users of such technologies will be households and/or communities. Examples of technologies include, but are not limited to, water filters (e.g. membrane, activated carbon, ceramic filters), solar technologies (Ultra violet disinfection devices, solar water disinfection SODIS), photocatalytic disinfection equipment, pasteurization appliances, chemical disinfection methods (e.g. chlorination), combined treatment approaches (e.g. Flocculation plus disinfection), etc.

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

#### A.1.1. Generic CPA(s)

Title, identification/reference number and/or version number of the generic CPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	Sectoral scope 3 : Energy demand	AMS-III.AV. Low greenhouse gas emitting safe drinking water production systems (version 03)  This methodology refers to the following methodology and tools: •AMS-I.E. Switch from Non-Renewable biomass for thermal applications by the user (version 05) <sup>1</sup> •Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion (version 02) <sup>2</sup> •Tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 01) <sup>3</sup>

#### A.1.2. Specific-case CPA(s) covered in this monitoring report

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring	Title, identification/reference number and version number of the generic CPA to which the specific-	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
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<sup>1</sup> [http://cdm.unfccc.int/filestorage/5/e/HSVPWKBG6X7Q8YEFMOT214IA3R0ZDL.pdf/EB%2068\\_repan22\\_Rev\\_AMS-I.E\\_ver05.0.pdf?t=Ykh8b2NnY2l4fDCp1ObgpFSWKljWx5gqydnj](http://cdm.unfccc.int/filestorage/5/e/HSVPWKBG6X7Q8YEFMOT214IA3R0ZDL.pdf/EB%2068_repan22_Rev_AMS-I.E_ver05.0.pdf?t=Ykh8b2NnY2l4fDCp1ObgpFSWKljWx5gqydnj)

<sup>2</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

<sup>3</sup> [https://cdm.unfccc.int/Reference/tools/l/meth\\_tool05\\_v01.pdf](https://cdm.unfccc.int/Reference/tools/l/meth_tool05_v01.pdf)

period	case CPA applies		
5962-0001 (CPA-1)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/11/2013 – 30/10/2020	No
5962-0002 (CPA-2)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	17/07/2014 – 16/07/2021	No
5962-0003 (CPA-3)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	15/04/2015 – 14/04/2022	No
5962-0004 (CPA-5)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	19/11/2015 - 18/11/2022	Yes
5962-0005 (CPA-6)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	21/01/2016 – 20/01/2023	No
5962-0006 (CPA-7)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	21/01/2016 – 20/01/2023	No
5962-0007 (CPA-8)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	21/01/2016- 20/01/2023	Yes
5962-0008 (CPA-9)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	No
5962-0009 (CPA-10)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic	13/09/2016 – 12/09/2023	No

	component project activity (CPA)		
5962-0010 (CPA-11)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016-12/09/2023	Yes
5962-0011 (CPA-12)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	No
5962-0012 (CPA-13)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	No
5962-0013 (CPA-14)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	No
5962-0014 (CPA-4)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/01/2017 – 31/12/2023	No
5962-0015 (CPA-15)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/02/2017 – 31/01/2024	No
5962-0016 (CPA-20)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/02/2017 – 31/01/2024	No
5962-0017 (CPA-21)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/02/2017 – 31/01/2024	No
5962-0018 (CPA-22)	<b>International water purification programme</b> The approved PoA-DD (version 07, 13/04/2015):	01/02/2017 – 31/01/2024	No

	PART II. Generic component project activity (CPA)		
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## A.2. Contact information of the coordinating/managing entity (CME) and/or responsible persons(s)/entity(ies)

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Jessie Zhang, Pure Water Ltd. (CME), [j.zhang@thesouthpolegroup.com](mailto:j.zhang@thesouthpolegroup.com)

The detailed contact information of CME are provided in Appendix 1.

## SECTION B. Implementation of PoA

### B.1. Implementation of the management system of the PoA

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The management system has been implemented as described in the validated PoA-DD ('Operational and management plan') and in accordance with applicable provisions on the implementation of the management system in the Project Standard. The PoA is managed by the CME (Pure Water Ltd.) with CPA Managers responsible for the coordination with the CPA Implementer (Evidence Action). Detailed roles and responsibilities of CME and CPA Implementer are described in the PoA-DD.

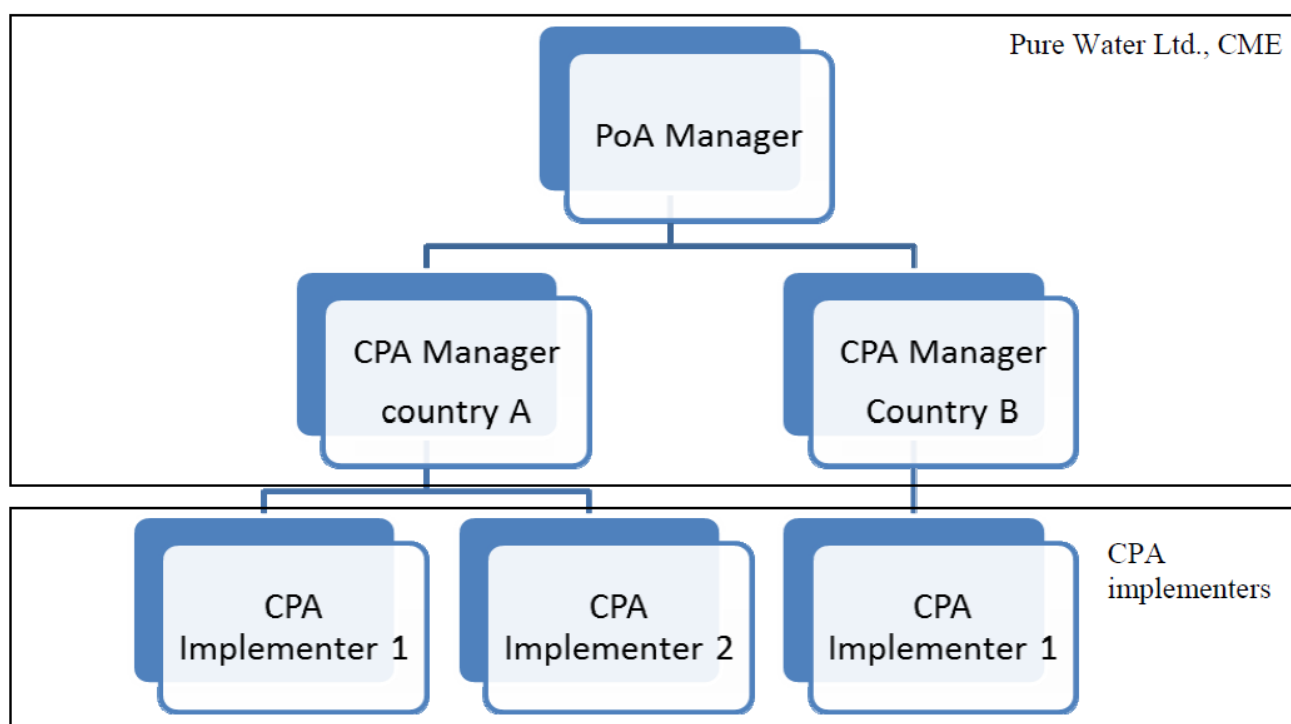


Figure: Overview of organizational structure

In order to ensure that CPAs comply with the double counting avoidance requirement stated in the PoA-DD, the CPA Manager checked every new CPA against the CPAs in the existing PoA database and the list of project activities that are under validation or registered at the UNFCCC.

All CPA-related data are stored electronically and/or in hard copy formats. The dispenser databases of CPA 5, CPA 8 and CAP 11 contain details about the unique waterpoint IDs, installation dates and administrative units in which the dispensers were installed.

**B.2. Implementation of single sampling plan(s)**

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In this monitoring period the single sampling plan was implemented combined for CPA 5, 8 and 11 as the same technology has been used in the same host-country (see section G.3 of Part II).

**SECTION C. Post-registration changes to the PoA (including the generic CPA(s))****C.1. Corrections**

&gt;&gt;

No corrections were made to the registered PoA-DD (including the generic CPAs).

**C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), if a monitoring plan was not included at the time of registration**

&gt;&gt;

No monitoring plan was included to the registered PoA-DD.

**C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline**

No permanent changes were made to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline.

**C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA**

&gt;&gt;

No changes were made to the programme design of the registered PoA-DD during the current monitoring period.

**C.5. Types of changes specific to afforestation and reforestation activities**

&gt;&gt;

N/A

**PART II - Specific-case component project activity(ies)****SECTION D. Description of specific-case CPA(s)****D.1. Brief description of implemented specific-case CPA(s)**

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The implementation of the project activities of CPA 5 Chlorine Dispensers in Malawi (CDM# 5962-0004), CPA 8 Chlorine Dispensers in Malawi (CDM# 5962-0007) and CPA 11 Chlorine Dispensers in Malawi (CDM# 5962-0010) were carried out in accordance with the registered CPA-DDs. Till 30/04/2017 a total of 1,208 chlorine dispensers were installed within the defined project boundary of CPA 5 (out of 1,300 dispensers indicated in the registered CPA-DD), 1,330 chlorine dispensers within the defined project boundary of CPA 8 (out of 1,500 dispensers indicated in the registered CPA-DD), and 1,012 chlorine dispensers within the defined project boundary of CPA 11 (out of 1,200 dispensers indicated in the registered CPA-DD).

In order to avoid double-counting each water source is given a unique ID. In addition, each dispenser casing is marked with a unique identification number on a scannable asset tag (barcode ID). The allocation of this barcode ID to the unique water point ID is recorded in a central database.

Also, the dispenser databases include GPS coordinates for all chlorine dispensers; waterpoint name, village name, and installation date (inscribed in the concrete foundation of the dispenser) provide additional information to uniquely identify each chlorine dispenser.

The CPA implementer is aware that the CPAs are subscribed to this present PoA and cedes the rights to claim and own emission reductions under the Clean Development Mechanism to the managing entity of this present PoA. The CPA implementer has warranted that the proposed CPAs are neither registered as individual CDM projects, nor are they part of another registered PoA, nor are they a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

#### Purpose of the project activity CPA 5 & 8& 11

The CPAs seek to further the access of households and communities to safe drinking water, using a low greenhouse gas emitting water purification technology, chlorine dispensers. 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.

#### Applicability of methodology

No events or situations occurred during the monitoring period that may have impacted the applicability of the applied methodology AMS-III.AV version 03.

#### Brief description of the installed technology and equipment

Chlorine dispensers have been installed in the project activity (CPA 5 & 8& 11).

Hardware specification	
Dispenser casing	Injection-molded HDPE tank produced in Kenya
Dispenser tank	Blow-molded HDPE tank produced in Kenya; capacity 3 liters
Dispenser tank valve	Imported from USA; delivers a precise 3 ml dose of chlorine
Marine padlock	Imported from China
Asset tag	Imported from USA
Chlorine	Sodium hypochlorite solution, 11.90 minimum pH, 1.2% $\pm$ 0.1 available chlorine; in 5 liter container with tamper-resistant cap
Hardware lifetime	5 years
Load factor	28,800 L per day <sup>4</sup>

#### Relevant dates for the project activity

Timeline CPA	
29/07/2011	Validation start date of IWPP (PoA)
16/11/2012	Registration of the PoA under the CDM of the UNFCCC.
09/10/2013	Emission Reduction Purchase Agreement signed between Pure Water Ltd. (the CME) and Evidence Action (implementer).
17/11/2014	Start date of IWPP CPA 5 in Domasi and Likangala health clusters, Zomba district, Malawi. In total 1,208 dispensers were installed between 17/11/2014 and 17/11/2015 (see dispenser database for CPA 5).
26/04/2015	Start date of IWPP CPA 8 in Mayaka and Thondwe health clusters, Zomba district,

<sup>4</sup> Assuming 30 seconds per dispensing over 12 hours per day



	Malai. In total 1,330 dispensers were installed between 26/04/2015 and 18/11/2015 (see dispenser database for CPA 8).
13/10/2015	Start date of IWPP CPA 11 in the Chingale Health Cluster, Zomba district, Malawi. In total 1,012 dispensers were installed between 13/10/2015 and 30/11/2015 (see dispenser database for CPA 11).
19/11/2015	CDM inclusion date of CPA 5.
21/01/2016	CDM inclusion date of CPA 8.
13/09/2016	CDM inclusion date of CPA 11.
30/04/2017	Cut-off date PoA monitoring period#4: 1,208 chlorine dispensers installed for CPA 5, 1,330 dispensers installed for CPA 8 and 1,012 dispensers installed for CPA 11.

### Achieved emission reductions

Total GHG emission reductions achieved during this monitoring period are **92,317 tCO<sub>2</sub>e**.

CPA	Monitoring Period #4 (01/06/2016 – 30/04/2017)	Monitoring Period #3 (01/10/2015 – 31/05/2016)	Monitoring Period #2 (01/02/2015 – 30/09/2015)	Monitoring Period #1 (01/11/2013 – 31/01/2015)
CPA 5	37,820	3,913 <sup>5</sup>	N/A	N/A
CPA 8	33,499	2,458 <sup>6</sup>	N/A	N/A
CPA 11	20,998 <sup>7</sup>	N/A	N/A	N/A
<b>Total</b>	<b>92,317</b>	<b>6,371</b>	<b>0</b>	<b>0</b>

## **D.2. Geographical references or other means of identification of the location of the specific-case CPA(s)**

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The physical boundary of CPA 5, 8 and 11 are the communities who use the water points where chlorine dispensers are installed. A database containing the GPS coordinates and unique IDs for all included chlorine dispensers can be made available.

### CPA 5

All dispensers are located within Domasi and Likangala health clusters, Zomba district.  
Longitude: E 35.2948° – 35.3925°, Latitude: S 15.3603° - 15.4251°

### CPA 8

All dispensers are located within Mayaka and Thondwe health clusters, Zomba district.  
Longitude: E 35.1264° – 35.5083°, Latitude: S 15.3924° - 15.6573°

### CPA 11

All dispensers are located within Chingale Health Cluster, City Health Cluster and Matawale Health Cluster.  
Longitude: E 35.0126° – 35.4101°, Latitude: S 15.2125° - 15.4802°.

<sup>5</sup> Only including CERs generated after CPA inclusion date (19/11/2015)

<sup>6</sup> Only including CERs generated after CPA inclusion date (21/01/2016)

<sup>7</sup> Only including CERs generated after CPA inclusion date (13/09/2016)

**SECTION E. Post-registration changes to specific-case CPA(s)****E.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

&gt;&gt;

No temporary deviations from registered monitoring plan or applied methodology were necessary for the involved CPAs since the start date of the project activities.

**E.2. Corrections**

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No corrections were made to the registered CPA DDs.

**E.3. Changes to the start date of the crediting period of the specific-case CPA(s)**

&gt;&gt;

N/A

**E.4. Inclusion of a monitoring plan into the specific-case CPA(s) that was not included at registration**

&gt;&gt;

No monitoring plan was included into the specific-case CPAs that was not included at registration.

**E.5. Permanent changes to the monitoring plan as described in the registered specific-case CPA-DD(s), applied methodology or standardized baseline**

&gt;&gt;

N/A

**E.6. Changes to project design of the specific-case CPA(s)**

&gt;&gt;

No changes to project design of the specific-case CPAs were made.

**E.7. Types of changes specific to afforestation and reforestation specific-case CPA(s)**

&gt;&gt;

N/A

**SECTION F. Description of the monitoring system of specific-case CPA(s)**

&gt;&gt;

Evidence Action had the responsibility to monitor and record all relevant parameters for CPA 5, 8 and 11. The procedure is in line with the monitoring plan described in the CPA-DD section D.7.2. Details about the sampling design are given in section G.3 of this monitoring report.

**Parameters to be monitored**

- Existence of public distribution network supplying safe drinking water (*see 'interviews' below*)
- Number of functional chlorine dispensers ( $N_y$ ) (*see 'dispenser spot-checks' below*)
- Number of persons supplied with purified water from each chlorine dispenser ( $POP_y$ ) (*see 'dispenser spot-checks' below*)
- Average number of refills per functional dispenser (Refill#)

(see 'chlorine delivery records' below)

- Fraction of delivered chlorine available for use in dispenser (Refill%) (see 'surveys' below)
- Fraction of water treated with the dispenser that is actually drunk (Drink%)  
(see 'surveys' below)
- Water quality (see 'surveys' below)

The data were collected through three main monitoring activities:

a) Chlorine delivery records (Refill#)

Promoters collected chlorine in 5 L jerricans at the health centers. Each time chlorine was handed out to a promoter a chlorine delivery record was kept at a logbook at the health center. Evidence Action collected chlorine usage data.

Evidence Action regularly monitored the consumption of chlorine through the chlorine usage data to ensure the chlorine delivery/consumption is reasonable. Refill# is determined by adding up chlorine consumption at all chlorine dispensers functional during the monitoring period. Note: chlorine usage at non-functional dispensers was assumed to be always 0. The CME made a consistency check for the results.

The chlorine consumption was monitored and recorded by Evidence Action. In case of missing data, it is assumed that no chlorine was used.

b) Dispenser spot-checks ( $N_v$  and  $POP_v$ )

Through random spot-checks the functionality of the chlorine dispenser was checked by Evidence Action field staff using a mobile phone-based recording format (dispenser spot-check). The records were uploaded to a master database on a central server and analysed by Evidence Action's MLIS team using the statistics software package 'Stata'. In case a dispenser was found to be non-functional, the status of the respective dispenser was recorded as "non-functional" in the respective CPA's dispenser database. Functionality is defined as: the dispenser releases 3 ml of chlorine when the valve is turned. In case the dispenser is empty, chlorine is added and the dispenser is checked again. The CME made a consistency check for the results.

The number of persons supplied with purified water from each chlorine dispenser ( $POP_v$ ) is checked and updated in this monitoring period through spot-check.

c) Interviews (Existence of public distribution network supplying safe drinking water)

The Southern Region Water Board based in Zomba was visited by Evidence Action field staff to determine if a public distribution network supplying safe drinking water was constructed within the project area. Details are provided in a separate document.

d) Surveys (Refill%, Drink% and Water Quality)

Three parameters were quantified through surveys. Details about the surveys are given in section G.3 of this monitoring report.

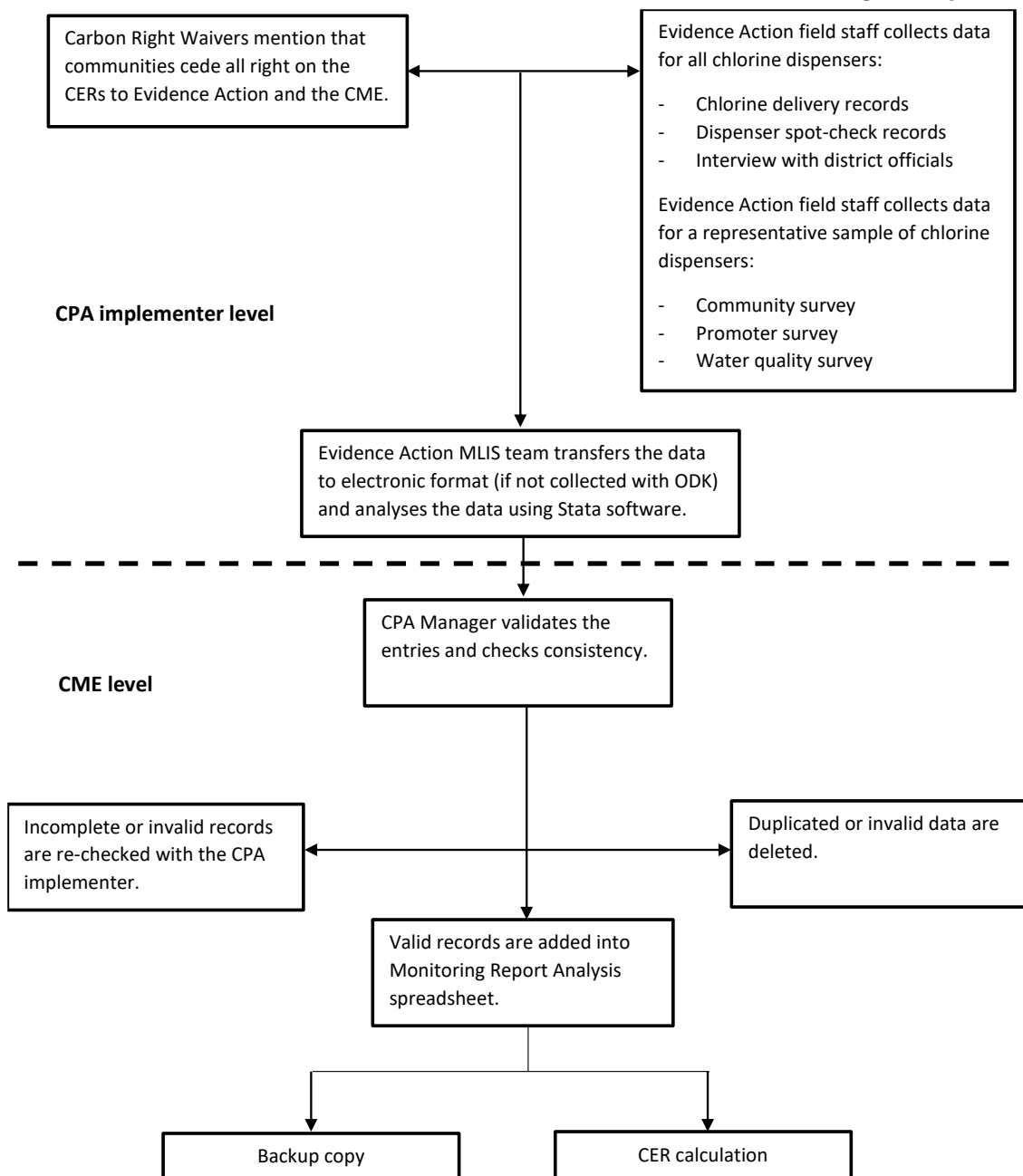


Figure: Records and documentation control process for CPA 5, 8 and 11

## SECTION G. Data and parameters

### G.1. Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period

Data/parameter	EF <sub>projected_fossilfuel</sub>
Unit	tCO <sub>2</sub> /TJ
Description	Emission factor as per AMS-I.E procedures when NRB is displaced or the emission factor of the fossil fuel substituted
Source of data	AMS-I.E for NRB displacement, IPCC for other fossil fuel displaced
Value(s) applied	81.6

Choice of data or measurement methods and procedures	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.
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>WH</b>
Unit	kJ/L °C
Description	Specific heat of water
Source of data	AMS-III.AV version 03
Value(s) applied	4.186
Choice of data or measurement methods and procedures	Default value
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>T<sub>f</sub></b>
Unit	°C
Description	Final temperature
Source of data	AMS-III.AV version 03
Value(s) applied	100
Choice of data or measurement methods and procedures	Default value. Boiling point of water at standard conditions.
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>T<sub>i</sub></b>
Unit	°C
Description	Initial temperature
Source of data	AMS-III.AV version 03
Value(s) applied	20
Choice of data or measurement methods and procedures	Default value
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>WHE</b>
Unit	kJ/L
Description	Latent heat of water evaporation
Source of data	AMS-III.AV version 03
Value(s) applied	2,260

Choice of data or measurement methods and procedures	Default value. The latent heat required to boil one liter 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) <sup>8</sup>
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b><math>\eta_{wb}</math></b>
Unit	-
Description	Efficiency of the water boiling system being replaced
Source of data	Baseline survey
Value(s) applied	10.04% (CPA 5), 10.23% (CPA 8) and 10.10% (CPA 11)
Choice of data or measurement methods and procedures	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 0.20 default value will optionally be used. 0.50 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 system is encountered.
Purpose of data	Calculation of baseline emissions
Additional comments	The water boiling systems and the fuel used in the baseline have been established ex-ante via a baseline survey.

<b>Data/parameter</b>	<b><math>f_{NRB}</math></b>
Unit	-
Description	Non Renewable Biomass factor
Source of data	EB 67 Report Annex 22
Value(s) applied	81%
Choice of data or measurement methods and procedures	Fraction of woody biomass used in the absence of the project activity in year y for Malawi as per "Information note: Default values of fraction of non-renewable biomass for least developed countries and small island developing states (version 01.0)"
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b><math>L_P</math></b>
Unit	Liters/refill (chemical disinfection)
Description	Capacity of the water purification equipment
Source of data	Manufacturer's specifications / Water Point Verification
Value(s) applied	33,289 (CPA 5), 33,333 (CPA 8) and 32,977(CPA 11)
Choice of data or measurement methods and procedures	Manufacturer specifications of maximal amount of water treated based on one refill (5 liter chlorine solution) and dosage (3 ml dose treats 20 liters of water if turbidity is below 10 NTU and 6 ml if turbidity is above 10 NTU)
Purpose of data	Calculation of baseline emissions
Additional comments	For the sake of conservativeness the specifications are adjusted for chlorine losses during refills (Refill%) and chlorinated water used for other purposes than drinking (Drink%).

<sup>8</sup> WHO guidelines for Emergency Treatment of drinking water at point of the use

Data/parameter	POP <sub>P</sub>
Unit	-
Description	Number of persons supplied with purified water from each of the functional project appliances
Source of data	Survey
Value(s) applied	248 (CPA 5), 258 (CPA 8) and 230 (CPA 11)
Choice of data or measurement methods and procedures	This parameter was re-established by Evidence Action during this monitoring period.
Purpose of data	Calculation of baseline emissions
Additional comments	The project activity falls under Case 2 per paragraph 3(a) in AMS-III.AV version 03, therefore this parameter needs to be re-established at least every two years. The applied value is rounded to the closest integer (see POP <sub>y</sub> ).

Data/parameter	DW <sub>POP</sub>
Unit	Liters/person/day
Description	Average volume of drinking water per person per day
Source of data	Official data, WHO, minimum water quantity needed
Value(s) applied	3.5
Choice of data or measurement methods and procedures	Official data used on average volumes of drinking water per person per day in emergency situation published by World Health Organization <sup>9</sup> . Conservative value as according to AMS-III.AV Version 03 a value of 5.5 liters per person per day shall not be exceeded.
Purpose of data	Calculation of baseline emissions
Additional comments	

Data/parameter	POP <sub>Boiling</sub>
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	Baseline Survey
Value(s) applied	69.32% (CPA 5), 55.59% (CPA 8) and 68.10% (CPA 8)
Choice of data or measurement methods and procedures	Survey
Purpose of data	Calculation of baseline emissions
Additional comments	For Case 2, total project population needs to be adjusted for the fraction of the population serviced by the project equipment at households/buildings for which it can be demonstrated through documentation or survey that the practice of water purification would have been water boiling.

Data/parameter	Ex-ante determined parameters for the project emissions from fossil fuel combustion
Unit	-
Description	Parameters to be determined ex ante for the calculation of project emissions from fossil fuel combustion as per the tool.

<sup>9</sup> WHO SEARO, Minimum water quantity needed for domestic uses, 3 – 4 liters per person per day  
[http://ec.europa.eu/echo/files/evaluation/watsan2005/annex\\_files/WHO/WHO5%20-%20Minimum%20water%20quantity%20needed%20for%20domestic%20use.pdf](http://ec.europa.eu/echo/files/evaluation/watsan2005/annex_files/WHO/WHO5%20-%20Minimum%20water%20quantity%20needed%20for%20domestic%20use.pdf)

Source of data	-
Value(s) applied	No consumption of fossil fuel by chlorine dispenser
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comments	-

<b>Data/parameter</b>	<b>Ex-ante determined parameters for the project emissions from electricity consumption</b>
Unit	-
Description	Parameters to be determined ex ante for the calculation of project emissions from electricity consumption as per the tool
Source of data	-
Value(s) applied	No consumption of electricity by chlorine dispenser
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comments	-

<b>Data/parameter</b>	<b>Leakage</b>
Unit	-
Description	Fractional increase in NRB usage by households outside the project boundary
Source of data	AMS-I.E Version 5
Value(s) applied	0.95
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of leakage
Additional comments	

## G.2. Data and parameters monitored

<b>Data/parameter</b>	<b>QPW<sub>y</sub></b>
Unit	Liters
Description	Quantity of purified water in year y
Measured/calculated/ default	Calculated
Source of data	Derived from the capacity of the equipment established by the manufacturers' specifications, the number of functional project appliances, average number of refills per functional dispenser and two adjustment factors of Refill% and Drink%.  $QPW_{y,sample} = L_P * N_y * Refill\# * Refill\% * Drink\% * POP_{Boiling}$
Value(s) of monitored parameter	169,504,776 L [CPA 5], 152,983,261 L [CPA 8] and 94,679,140 L [CPA 11]
Monitoring equipment	N/A
Measuring/reading/ recording frequency	N/A
Calculation method (if applicable)	N/A
QA/QC procedures	N/A



Purpose of data	Calculation of baseline emissions
Additional comments	<p>QPW<sub>y</sub> is subject to a cap based on the number of persons supplied with purified water from each of the functional project appliances (POP<sub>y</sub>), the proportion of total population where water boiling would have been the purification practice (POP<sub>Boiling</sub>) multiplied by the average volume of drinking water per person per day (DW<sub>POP</sub>.)</p> <p><math>QPW_{y,cap} = N_y * POP_y * POP_{Boiling} * DW_{POP} * \text{monitoring period}</math></p> <p>QPW<sub>y</sub> is smaller than cap for CPA5, 8 and 11 during this monitoring period.</p>

<b>Data/parameter</b>	<b>N<sub>y</sub></b>
Unit	-
Description	Number of functional chlorine dispensers in monitoring period
Measured/calculated/ default	Measured
Source of data	<p>Periodical physical inspection of each device (spot-checks).</p> <p>N<sub>y</sub> is derived from regular functionality checks. In case a dispenser was found to be non-functional, the status of the respective dispenser was recorded as "non-functional" in the central database. In addition, dispensers that had no reported chlorine deliveries were also assumed to be non-functional.</p> <p>N<sub>y</sub> was determined by multiplying the total number of installed dispensers by the fraction of functional dispensers at the cut-off date (30/04/2017).</p>
Value(s) of monitored parameter	1,097 (CPA 5), 1,170 (CPA 8) and 945 (CPA 11)
Monitoring equipment	N/A
Measuring/reading/ recording frequency	At least annually
Calculation method (if applicable)	N/A
QA/QC procedures	<p>In case a dispenser was not operating and has not been replaced at the cut-off date (30/04/2017), it was excluded from the emission reduction calculation for the whole monitoring period.</p> <p>Monitoring data 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>
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>Refill#</b>
Unit	-
Description	Average number of refills per functional dispenser per year
Measured/calculated/ default	Measured
Source of data	<p>Number of chlorine containers delivered to promoters (chlorine delivery records)</p> <p>Refill# was determined by adding up all chlorine used during the monitoring period. For calculating Refill# only dispensers recorded as 'functional' at the cut-off date were considered.</p>
Value(s) of monitored parameter	7.77 (CPA 5), 8.18 (CPA 8) and 5.17 (CPA 11) during this monitoring period.
Monitoring equipment	N/A
Measuring/reading/ recording frequency	At least annually
Calculation method (if applicable)	Microsoft Excel (based on chlorine delivery records)

QA/QC procedures	Monitoring data 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.
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>Refill%</b>
Unit	%
Description	Fraction of delivered chlorine available for use in dispenser
Measured/calculated/ default	Measured
Source of data	Promoter survey.  Survey question: "From the time that you receive the jerrican of chlorine to the time that the chlorine is put into the dispenser, is any chlorine lost?"
Value(s) of monitored parameter	100%
Monitoring equipment	N/A
Measuring/reading/ recording frequency	At least annually
Calculation method (if applicable)	N/A
QA/QC procedures	Monitoring data 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.
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>Drink%</b>
Unit	%
Description	Fraction of water treated with the dispenser that is actually drunk
Measured/calculated/ default	Measured
Source of data	Interview question included into water quality survey. Survey question: "What is your primary use for chlorinated water?" and "How much of your chlorinated water is used for [primary use]?"
Value(s) of monitored parameter	86.2%
Monitoring equipment	N/A
Measuring/reading/ recording frequency	At least annually
Calculation method (if applicable)	N/A
QA/QC procedures	Monitoring data 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.
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>Existence of public distribution network supplying safe drinking water</b>
Unit	-
Description	Existence of public distribution network supplying safe drinking water to the project boundary in year y
Measured/calculated/ default	Interviews
Source of data	Interview at Southern Region Water Board based in Zomba
Value(s) of monitored parameter	0 (no households need to be discounted)
Monitoring equipment	N/A

Measuring/reading/recording frequency	Annual
Calculation method (if applicable)	N/A
QA/QC procedures	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.
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>Water quality</b>
Unit	-
Description	Water quality
Measured/calculated/ default	Measured
Source of data	Sampling surveys
Value(s) of monitored parameter	99.8%
Monitoring equipment	Hach Color Wheel for Total Chlorine Residual (TCR) and IDEXX machine for E.coli
Measuring/reading/recording frequency	At least annually
Calculation method (if applicable)	The fraction of households with sufficient water quality was established as the number of water samples with E.coli below 10 CFU/100 ml divided by the number of water samples that tested positive for the presence of TCR ('users').
QA/QC procedures	The fraction of water quality measurements providing water of insufficient quality shall be excluded from the calculation of emission reductions.
Purpose of data	Calculation of baseline emissions
Additional comments	

<b>Data/parameter</b>	<b>POP<sub>y</sub></b>
Unit	-
Description	Number of persons supplied with purified water from each of the functional project appliances
Measured/calculated/ default	Measured
Source of data	Survey
Value(s) of monitored parameter	248 (CPA 5), 258 (CPA 8) and 230 (CPA 11)
Monitoring equipment	This parameter was re-established by Evidence Action during this monitoring period.
Measuring/reading/recording frequency	At least every two years.
Calculation method (if applicable)	N/A
QA/QC procedures	The fraction of water quality measurements providing water of insufficient quality shall be excluded from the calculation of emission reductions.
Purpose of data	Calculation of baseline emissions
Additional comments	Only relevant for Case 2.

<b>Data/parameter</b>	<b>Monitoring parameters for the project emissions from fossil fuel combustion</b>
Unit	-
Description	Parameters to be monitored for the calculation of project emissions from fossil fuel combustion as per the tool
Measured/calculated/ default	-

Source of data	-
Value(s) of monitored parameter	No consumption of fossil fuel by chlorine dispensers.
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Used to quantify project emissions
Additional comments	To be considered only in the case the water purification devices consumes fossil fuels.

Data/parameter	Monitoring parameters for the project emissions from electricity consumption
Unit	-
Description	Parameters to be monitored for the calculation of project emissions from electricity consumption as per the tool
Measured/calculated/ default	-
Source of data	-
Value(s) of monitored parameter	No consumption of electricity by chlorine dispensers.
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Used to quantify project emissions
Additional comments	To be considered only in the case the water purification devices consumes electricity.

### G.3. Implementation of specific-case CPA level sampling plan

>>

As indicated in Section F of this monitoring report, three parameters were quantified through surveys: Water quality, Drink% and Refill%. The single sampling design was implemented in line with the validated CPA DD Section D.7.2:

#### (i) Objectives and Reliability Requirements

The objective was to obtain reliable and conservative estimates of the parameters listed in Section F obtained through surveys over the course of the monitoring period and meeting the indicated confidence/precision levels. The results were consolidated in one single value over the full monitoring period.

#### (ii) Target Population

The target population are the people with access to chlorine dispensers installed as a result of CPA 5, CPA 8 and CPA11 under the IWPP PoA. Each dispenser casing is marked with a unique identification number on a scannable tag, which is part of the CPA dispenser database and linked to a unique water point ID. Each end user is linked to a cluster (water point with a dispenser) and each chlorine dispenser is assigned to a specific CPA. Surveys were conducted by Evidence Action field staff using mobile-based surveys (Open Data Kit).

#### (iii) Sampling Method

Grouping of CPAs was applied for this monitoring period (CPA 5, CPA 8 and CPA11). Clustered sampling was undertaken for the water quality and Drink% monitoring, and simple

random sampling for Refill%. The sampling was done using Stata software to randomly select numbers corresponding to unique ID numbers of the clusters.

(iv) Sample Size

A 95/10 confidence/precision requirement has to be fulfilled. The number of visited dispensers is line with sample approach.

(v) Sampling Frame

The sampling frame for CPA 5, CPA 8 and CPA11 consisted of all installed chlorine dispensers allocated to CPA 5, CPA 8 and CPA11, represented by their unique identification numbers stored in the chlorine dispenser databases.

The following section describes the details of the implemented sampling design:

**Water Quality & Drink%:** waterpoint IDs were randomly selected from the CPA 5, CPA 8 and CPA11 dispenser databases. The field officers visit the households listed and tests their drinking water quality

**Refill%:** Randomly selected promoters were interviewed during the monitoring period.

The collected data were summarized and analysed in an Excel spreadsheet. It is concluded the 95/10 confidence/precision level was met.

## SECTION H. Calculation of GHG emission reductions or net GHG removals by sinks

### H.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

$$\begin{aligned}
 BE_y &= QPW_y * SEC * f_{NRB,y} * EF_{projected\_fossilfuel} * 10^{-9} & (1) \\
 &= 39,891 \text{ tCO}_2\text{e [CPA 5]} \\
 &= 35,334 \text{ tCO}_2\text{e [CPA 8]} \\
 &= 22,149 \text{ tCO}_2\text{e [CPA 11]}
 \end{aligned}$$

Where:

$BE_y$	Baseline emissions during the year $y$ (tCO <sub>2</sub> e)
$QPW_y$	Quantity of purified water in year $y$ = 169,504,776 L (cap) [CPA 5] = 152,983,261 L (cap) [CPA 8] = 94,679,140 L (cap) [CPA 11]
$SEC$	Specific energy consumption required to boil one liter of water = 3,561 kJ/L [CPA 5], 3,494 kJ/L [CPA 8] and 3,539 kJ/L [CPA 11] (SEC calculation below)
$f_{NRB,y}$	Fraction of non-renewable biomass = 81% (default value for Malawi)
$EF_{projected\_fossilfuel}$	Emission factor = 81.6 tCO <sub>2</sub> /TJ (default value)

The specific energy consumption required to boil one liter of water was calculated as follows:

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

Where:

$WH$	Specific heat of water = 4.186 kJ/L °C (default value)
$T_f$	Final temperature = 100 °C (default value)
$T_i$	Initial temperature of water = 20 °C (default value)
$WHE$	Latent heat of water evaporation = 2,260 kJ/L (default value)
$\eta_{wb}$	Efficiency of the water boiling systems being replaced = 10.04% [CPA 5], 10.23% [CPA 8] and 10.10% [CPA 11] (baseline survey)

The water quality was monitored on sample basis for contamination with Escherichia coli (E. coli). A presence of up to 10 E. coli CFU/100 ml shall be acceptable. The fraction of water quality measurements providing water of insufficient quality needs be excluded from the calculation of emission reductions and BE<sub>y</sub> was adjusted accordingly.

$$39,891 \text{ tCO}_2\text{e} * 99.8\% = 39,811 \text{ tCO}_2\text{e} \text{ [CPA 5]}$$

$$35,334 \text{ tCO}_2\text{e} * 99.8\% = 35,263 \text{ tCO}_2\text{e} \text{ [CPA 8]}$$

$$22,149 \text{ tCO}_2\text{e} * 99.8\% = 22,104 \text{ tCO}_2\text{e} \text{ [CPA 11]} \quad (3)$$

(Adjustment for water with insufficient quality, rounded down)

## H.2. Calculation of project emissions or actual net GHG removals by sinks

>>

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

## H.3. Calculation of leakage

>>

Leakage relating to the non-renewable woody biomass is assessed as per the relevant procedures of AMS-I.E version 5 explained below: BE<sub>y</sub> is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

$$39,811 \text{ tCO}_2\text{e} * 0.95 = 37,820 \text{ tCO}_2\text{e} \text{ [CPA 5]} \quad (4)$$

$$35,263 \text{ tCO}_2\text{e} * 0.95 = 33,499 \text{ tCO}_2\text{e} \text{ [CPA 8]}$$

$$22,104 \text{ tCO}_2\text{e} * 0.95 = 20,998 \text{ tCO}_2\text{e} \text{ [CPA 11]}$$

Adjustment for leakage (1,991 tCO<sub>2</sub>e [CPA 5], 1,764 tCO<sub>2</sub>e [CPA 8] and 1,106 tCO<sub>2</sub>e [CPA 11], rounded up)

**H.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks**

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (tCO <sub>2</sub> e)	Leakage (tCO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (tCO <sub>2</sub> e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
5962-0004	39,811	0	1,991	0	37,820	37,820
5962-0007	35,263	0	1,764	0	33,499	33,499
5962-0010	22,104	0	1,106	0	20,998	20,998
<b>Total</b>	<b>97,178</b>	<b>0</b>	<b>4,861</b>	<b>0</b>	<b>92,317</b>	<b>92,317</b>

**H.5. Comparison of GHG emission reductions or net GHG removals by sinks with estimates in the included CPA-DD(s)**

Specific-case CPA reference number	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
5962-0004	46,492 <sup>10</sup>	37,820
5962-0007	44,840 <sup>11</sup>	33,499
5962-0010	27,861 <sup>12</sup>	20,998
<b>Total</b>	<b>119,193</b>	<b>92,317</b>

**H.6. Remarks on difference from the estimated value in the included CPA-DD(s)**

&gt;&gt;

For CPA 5 (5962-0004), CPA 8 (5962-0007) and CPA 11 (5962-0010) the measured emission reductions during the 334, 334 and 230 day monitoring period, respectively, are lower than the estimated emission reductions in the CPA-DDs.

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<sup>10</sup> Estimated average annual emission reductions in CPA-DD (50,808 CERs) adjusted to 334 days

<sup>11</sup> Estimated average annual emission reductions in CPA-DD (49,002 CERs) adjusted to 334 days

<sup>12</sup> Estimated average annual emission reductions in CPA-DD (44,215 CERs) adjusted to 230 days

# Appendix 1. Contact information of coordinating/managing entity and/or responsible persons/entities

<b>Coordinating/managing entity and/or responsible person/entity</b>	<input checked="" type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
<b>Organization name</b>	Pure Water Ltd.
<b>Street/P.O. Box</b>	Technoparkstrasse 1
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