Monitoring report form for CDM programme of activities
(version 02.0)

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		
Title of the programme of activities (PoA)	DelAgua Public Health Program in Eastern Africa	
UNFCCC reference number of the PoA	PoA 9626	
Version number(s) of the PoA-DD(s) applicable to this monitoring report	Version 3.0	
Version number of this monitoring report	01	
Completion date of this monitoring report	24/09/2018	
Monitoring period number	Monitoring Period # 4	
Duration of this monitoring period	07/11/2016- 31/12/2017	
Monitoring report number for this monitoring period	1	
Coordinating/managing entity (CME)	DelAgua Health Rwanda Limited	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no)
	Rwanda	Yes
Sectoral scope(s)	Sectoral Scope – 3. Energy Demand	
Applied methodologies and standardized baselines	AMS-III.AV. Low greenhouse gas emitting safe drinking water purification systems, Version 04 AMS II.G, Energy efficiency measures in thermal applications of non-renewable biomass, Version 07	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0	437,220
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the CPA-DDs for the CPAs covered in this monitoring report	0	500,494

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of the PoA

This PoA involves the distribution of LifeStraw® Family units and/or EcoZoom Dura high-efficiency cook stoves to households in the Republic of Rwanda, exclusive of those households in the case of the water filters that have existing running water in their homes.

The LifeStraw® Family is a point-of-use water filter that helps people access safe drinking water at home and outside. The LifeStraw® Family is an instant microbiological purifier that delivers at least 18,000 liters of EPA-quality drinking water[1]. The LifeStraw® Family reduces the use and demand for firewood for water treatment by boiling. This directly leads to reduced CO_2 emissions.

The EcoZoom Dura is a high-efficiency, family-sized cook stove based on the 'rocket stove' concept of operation. These stoves are considerably more efficient than the standard three-stone-fire and reduce the use of NRB for cooking. Additionally, these stoves can achieve a complete burn of combustible materials resulting in little to no smoke, greatly improving indoor air quality.

These technologies are distributed directly to households. Distributions are coordinated and managed by DelAgua Health Rwanda Limited, in collaboration with the Rwandan Ministry of Health.

All CPAs included in this PoA are eligible to distribute both technologies. At this time, CPAs 1-7 have distributed water filters and cookstoves, while CPAs 8-16 have distributed only cookstoves.

Table 1: Technologies Distributed By CPA

District	Technologies Distributed	
	Cookstoves	Filters
CPA001 - Rubavu	Yes	Yes
CPA002 - Karongi	Yes	Yes
CPA003 - Ngororero	Yes	Yes
CPA004 - Nyabihu	Yes	Yes
CPA005 - Nyamasheke	Yes	Yes
CPA006 - Rutsiro	Yes	Yes
CPA007 - Rusizi	Yes	Yes
CPA008 - Bugesera	Yes	No
CPA009 - Burera	Yes	No
CPA010 - Gatsibo	Yes	No
CPA011 - Rulindo	Yes	No
CPA012 - Kayonza	Yes	No
CPA013 - Kirehe	Yes	No
CPA014 - Ngoma	Yes	No
CPA015 - Nyagatare	Yes	No
CPA016 - Rwamagana	Yes	No

[1] Clasen, T. *et al.* 2009. Laboratory assessment of a gravity-fed ultrafiltration water treatment device designed for household use in low-income settings. *Am. J. Trop. Med. Hyg.*, 80(5), 2009, pp. 819–823".

A.1.1. Corresponding generic component project activities CPA(s)

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scope(s)	Applied methodologies and standardized baseline(s)
CPA XXX – DelAgua Public Health Program: CPAXX in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	Sectoral Scope – 3. Energy Demand	AMS-III.AV. Low greenhouse gas emitting safe drinking water purification systems, Version 04 AMS II.G, Energy efficiency measures in thermal applications of non-renewable biomass, Version 07

A.1.2. CPAs Included in the PoA

Title and UNFCCC reference number of the CPA	Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Crediting period type and duration	Covered in this monitoring report? (yes/no)
CPA001 - DelAgua Rwanda Public Health Program: Rubavu District, Western Province, Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	15/9/2014 - 14/9/2021	Yes
CPA002 - DelAgua Rwanda Public Health Program: CPA002, Ubedehe 1& 2 in Karongi District in the Western Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	15/9/2014 - 14/9/2021	Yes
CPA003 - DelAgua Rwanda Public Health Program: CPA003, Ubedehe 1& 2 in Ngororero District in the Western Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	15/9/2014 - 14/9/2021	Yes
CPA004 - DelAgua Rwanda Public Health Program: CPA004, Ubedehe 1& 2 in Nyabihu District in the Western Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	15/9/2014 - 14/9/2021	Yes
CPA005 - DelAgua Rwanda Public Health Program: CPA005, Ubedehe 1& 2 in Nyamasheke District in the Western Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	15/9/2014 - 14/9/2021	Yes
CPA006 - DelAgua Rwanda Public Health Program: CPA006, Ubedehe 1& 2 in Rutsiro District in the Western Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	15/9/2014 - 14/9/2021	Yes

CPA007 - DelAgua Rwanda Public Health Program: CPA007, Ubedehe 1& 2 in Rusizi District in the Western Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	15/9/2014 - 14/9/2021	Yes
CPA008 - DelAgua Rwanda Public Health Program: CPA008, Ubedehe 1& 2 in Bugesera District in the Eastern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes
CPA009 - DelAgua Rwanda Public Health Program: CPA009, Ubedehe 1& 2 in Burera District in the Northern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes
CPA010 - DelAgua Rwanda Public Health Program: CPA010, Ubedehe 1& 2 in Gatsibo District in the Eastern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes
CPA011 - DelAgua Rwanda Public Health Program: CPA011, Ubedehe 1& 2 in Rulindo District in the Nothern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes
CPA012 - DelAgua Rwanda Public Health Program: CPA012, Ubedehe 1& 2 in Kayonza District in the Eastern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes
CPA013 - DelAgua Rwanda Public Health Program: CPA013, Ubedehe 1& 2 in Kirehe District in the Eastern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes
CPA014 - DelAgua Rwanda Public Health Program: CPA014, Ubedehe 1& 2 in Ngoma District in the Eastern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes
CPA015 - DelAgua Rwanda Public Health Program: CPA015, Ubedehe 1& 2 in Nyagatare District in the Eastern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes

CPA016 - DelAgua Rwanda Public Health Program: CPA016, Ubedehe 1& 2 in Rwamagana District in the Northern Province of the Republic of Rwanda	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	Version 3.0	19/4/2016 - 18/4/2023	Yes

A.2. Coordinating/managing entity

>>

DelAgua Health Rwanda Limited

SECTION B. Implementation of PoA

B.1. Description of Implemented PoA

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The management system is based on EB 65, Annex 3 "Standard for Demonstration of Additionality, Development of Eligibility Criteria, and Application of Multiple Methodologies for Programme of Activities", Version 3.0, and is comprised of the following element:

(a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies;

CPA Implementer is responsible for developing the CPA-DD, and for gathering all required documentation to demonstrate compliance with the eligibility criteria. The CPA-DD and supporting documentation were submitted to the Program Director of DelAgua. The Program Director was responsible the process of inclusion of CPAs.

(b) Records of arrangement for training and capacity development for personnel;

The CME trained all staff involved in education and monitoring activities. The CME ensured training of all on-site staff with respect to adherence to the Monitoring Plan of the project activity. Records of the training will be kept for at least 2 years after the end of the crediting period of the relevant project activity.

(c) Procedures for technical review of inclusion of CPAs;

All CPAs are owned and managed by DelAgua, the CME. The Program Director of DelAgua designated appropriately trained technical staff to draft the CPA-DD and to gather sufficient documentation to demonstrate compliance with the eligibility criteria defined in section B.2 above.

(d) A procedure to avoid double accounting (e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA);

All CPAs were implemented by the CME, thus ensuring that the operator is aware of and agrees that the water filter and/or high efficiency stove distribution is included in this PoA confirms that no emission reduction benefit from the project shall be claimed by it through any other instrument either as a standalone project or as a CPA to any other PoA.

(e) Records and documentation control process for each CPA under the PoA;

The monitoring plan for this project is closely derived from the methodologies. A database for the project activity was maintained continuously. The monitoring plan consists of checking a

representative sample of all appliances at least once every two years to ensure that they are still operating or are replaced by an equivalent in service appliance.

A POA-level project database was maintained, which contains distribution records for each water filter and cookstove issued, subsequent replacements, as well as detailed data on the representative sample surveyed for monitoring purposes. The database is accessible to the project proponent, appropriate partners, and the verification DOE. The database includes the following:

- Unique identification number
- Installation date
- First and last name
- Contact details of user (where available)
- Baseline cooking fuel source
- Baseline stove type
- Date of replacement of filter and/or stove units
- Monitored parameters

Additionally, the CME has kept:

- CPA-DDs and supporting documentation
- Training records
- Database backups

The database is available to select a random, representative sample from for monitoring and verification purposes. This sample set will be integrated into the database to include additional monitoring parameters as required or as appropriate.

(f)Measures for continuous improvements of the PoA management system;

An internal audit of all monitoring and education records was conducted in preparation for this verification. Note that distribution records are typically reviewed during the internal audit; however, no new distributions were conducted during this monitoring period. Monitoring survey responses were reviewed by senior staff to ensure that the requirements of the monitoring plan were met. In addition, the verification survey questions were revised following the Forward Action Requests issued during the third verification. These revisions are as follows:

FAR	How Addressed
FAR 1- As a result of FAR 01 from the 2nd verification period, the CME adjusted the monitoring survey questionnaire/09/ to address seasonality of use with end users. During the 3rd verification site visit survey, ERM CVS noted that a few end users that had reported no change in usage during changed seasons, also reported that they continued to use their baseline stoves (as a secondary stove) in some cases because they couldn't use the project stoves when their firewood is wet/when it rains. ERM CVS therefore noted that the design of the survey is such that there are opportunities missed to address the inconsistencies in end user responses with reference to seasonality. FAR 01 is raised because in order to clarify the end user responses with reference to seasonality of usage of stoves, the sequence of questions (esp. with regards to the continued use of traditional/baseline stoves) should be reviewed.	The order of the survey questions was revised so that end users are asked why they continue using traditional stoves, before asking seasonality questions. Surveyors are trained to look for inconsistencies in user responses.

B.2. Post-registration changes to the PoA (including the generic CPA(s))

B.2.1. Corrections

NA

B.2.2. Inclusion of a monitoring plan

NA

B.2.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

On 23 February 2017, the EB approved a permanent change to the PoA-DD for this monitoring period. These changes are represented in version 3.0 of the PoA-DD, and include the application of AMS-II.G, v07 (previously AMS-II.G v05 was applied).

B.2.4. Changes to programme design

NA

PART II Monitoring of CPAs

>> Each CPA involves the distribution of water filters and/or high-efficiency cook stoves in an established district in an established province in Rwanda. The distributions were coordinated and managed by DelAgua. Distributions occurred in two groups. Under Group 1, stoves and filters were distributed to 100906 households within 72 sectors of CPAs 1-7, during the first monitoring period. Group 2 included distribution of stoves to 202325 households in CPAs 1-16; 161300 households were located in CPAs 8-16, and 41,025 housholds were located within 24 sectors of CPA 1-7 that did not receive technologies under Group 1. Group 2 distributions occurred throughout 2016. The number of technologies distributed within each district/CPA is as follows:

Table 2: Households By Group & CPA

District	Total Households Group 1	Total Households Group 2
CPA001 - Rubavu	10582	7005
CPA002 - Karongi	14548	4301
CPA003 - Ngororero	17912	5031
CPA004 - Nyabihu	10734	2932
CPA005 - Nyamasheke	13963	5801
CPA006 - Rutsiro	16867	6111
CPA007 - Rusizi	16300	7129
CPA008 - Bugesera	0	23592
CPA009 - Burera	0	22049
CPA010 - Gatsibo	0	21786
CPA011 - Rulindo	0	15066
CPA012 - Kayonza	0	13394

CPA013 - Kirehe	0	13935
CPA014 - Ngoma	0	15513
CPA015 - Nyagatare	0	15724
CPA016 - Rwamagana	0	15165
Total	100906	194534

Project activities implementing AMS-II.G qualify as Type II small-scale projects, and therefore shall not exceed energy savings of 180 GWh per year[2] from cook stoves. Each Group 1 stove generated a maximum of 0.006 GWh of energy savings annually[3][4], and so a CPA could distribute up to 29,909 stoves. The greatest number of stoves distributed in any CPA is 23,592, and therefore the CPAs meet the Type II threshold.

Project activities implementing AMS-III.AV qualify as Type III small-scale projects, and therefore emission reductions from water filters shall not exceed 60,000 tonnes CO2e per year per CPA. Each filter generated 0.48 tonnes of CO_2e per year[5], and so each CPA could distribute up to 124823 filters. The maximum number of filters distributed in any CPA is 16,867, and so all CPAs are in compliance with the Type III threshold.

SECTION C. Implemenation of CPAs

C.1. Description of Implemented CPAs

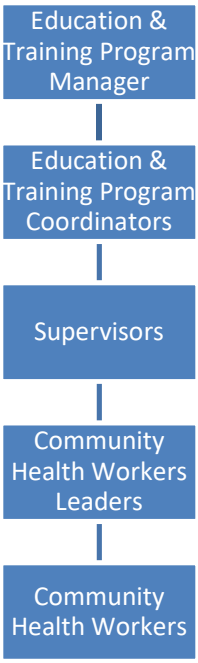
>> As described above, distributions are separated into two groups,depending on the time period that technologies were distributed (Group 1 distributions took place in 2014, while Group 2 distributions occurred in 2016), and the combination of technologies provided to the household (Group 1 distributions included stoves and filters, while Group 2 distributions included stoves only). For clarity, Group 1 and Group 2 distributions are not to be confused with "batches." DelAgua records the distribution date of every technology distributed under the PoA, and therefore does not aggregate technologies in batches. According to the approved monitoring plan, monitoring must be conducted separately for end-users with similar characteristics; combination of tehcnologies distributed and the installation are characteristics that are considered. Therefore, the PoA population is separated into Groups to comply with the monitoring plan.
Distributions were coordinated and managed by CME staff, and utilized the Rwandan Ministry of Health's network of collaboration with Community Health Workers (CHWs). The structure of the team responsible for technology distribution was as follows:

[2] Clarification on the threshold of thermal energy savings in AMS-IIG: http://cdm.unfccc.int/filestorage/A/M/_/AM_CLAR_VIIC5MTUUWR9PRPJL0EXOT3G2CKSFQ/Response%20SSC%20WG%20provided.pdf?t=WWN8bTk0eGFxfDApi7E1q-CgA9Aks0vN82S6

[3] Calculations provided to DOE.

[4] This calculation assumes that a filter is not present in the household, and so cross-effects is not accounted for. Accounting for cross-effects would increase the number of stoves that could be distributed under any CPA, and so this is a conservative approach to ensuring compliance with the threshold. This calculation is also based on the HHsize of Group 1 households; Group 1 HHs were larger (4.83 people vs. 4.35 people in Group 2). Since a stove in a larger HH would save more energy, this is also a conservative approach for ensuring compaling with the threshold.

[5] Calculations provided to DOE.



Beneficiary households were identified based on Ubedehe lists developed by local authorities and approved by the government of Rwanda. All beneficiary households were members of Ubedehe 1 or 2. Product distribution occurred at the cell level, and involved a two-step process; the initial distribution, and household (HH) visits.

The initial distributions for each Group were implemented by teams of trained CHWs (see training program below), and the team was overseen by supervisors. HHs came to a central distribution point, where they received a training on the use of technologies. Following this training, each Group 1 HH received a stove (Group 1 HHs received a filter and stove), and CHWs collected basic HH identification information on smart phones. The information collected during the initial distributions includes the following:

- Installation date
- Family name
- Contact details of user (where available)
- Socio-economic level (according to the Rwandan Ubudehe approach).
- Water filter barcode
- High efficiency stove barcode

Following the initial distribution, CHWs then visited each beneficiary HH, to conduct an in-home training to reinforce the proper use and maintenance of the technology, to respond to beneficiary questions about the program, and to conduct a household survey to collect more detailed information, including

- Baseline cooking fuel source
- Baseline stove type

Three different trainings were conducted in preparation for for Group 2 distributions during this monitoring period (similar trainings were conducted prior to Group 1 distributions in 2014). The sixteen District Managers (DMs) in Eastern and Nothern Province received a one-week training conducted by the Education and Training Program Manager. The DMs then conducted 1.5 day trainings in each district for the CHWs. Following the first day of the CHW training, a CHW leader was selected, and these individuals received an additional 2 hour training.
The CHW training focused on:

- Household Visit Communication Tools, including use of the smart phone for data collection surveys
- Technology Trainings

-Distribution Meeting Training
-Basics of conducting a survey
-Basics of communication

The supervisor training focused on the above elements, as well as the following:
-Leadership and Communication Training
-Administrative Tasks

As documented, in the PoA-DD, the operational lifetime of each stove is expected to be 5 years. Group 1 technologies were distributed between September and December of 2014, while Group 2 technologies were distributed in 2016. Therefore, the oldest stoves distributed under this PoA are approximately 2 years old. Efficiency tests on these stoves found that the average efficiency has not dropped below 20%, as described under parameter $\eta_{new,i,j.}$

Each water filter is expected to filter up to 18,000 liters of water over its operational lifetime[6]. To date, the total liters of water filtered per filter is 7,576.93 liters, as shown in the table below.

Table 3: Total Liters of Water Filtered

MP#	Days In MP	Avg HH Size	L/P/D	Liters
1	198	4.77	1.5	1,416.69
2	167	4.6	1.55	1,190.71
3	419	4.83	1.31	2,651.13
4	420	4.60	1.2	2,318.40
Total Water Filtered				7,576.93

C.2. Location of CPAs

>> Each specific case CPA is located in a different district in the Western, Northern and Eastern Provinces of Rwanda, as follows:

- CPA001 – Rubavu
- CPA002 – Karongi
- CPA003 – Ngororero
- CPA004 - Nyabihu
- CPA005 – Nyamasheke
- CPA006 - Rutsiro
- CPA006 - Rutsiro
- CPA007 - Rusizi
- CPA008 – Bugesera
- CPA009 - Burera
- CPA010 - Gatsibo
- CPA011- Rulindo
- CPA012 – Kayonza
- CPA013 - Kirehe
- CPA014 – Ngoma
- CPA015 – Nyagatare
- CPA016 - Rwamagana

[6] Clasen, T. *et al.* 2009. Laboratory assessment of a gravity-fed ultrafiltration water treatment device designed for household use in low-income settings. *Am. J. Trop. Med. Hyg.*, 80(5), 2009, pp. 819–823".

C.3. Post-registration changes to CPAs

C.3.1. Temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies or standardized baselines

According to the monitoring plan included in the CPA-DDs, the Life Span parameter for improved cook stoves was supposed to be fixed confirmed by a "national standards body or an appropriate certifying agent recognized by that body" prior to the first verification. DelAgua requested the certification from the Rwanda Bureau of Standards (RBS); RBS does not have the equipment necessary for stove testing, and they suggested that DelAgua should work with the CREEC lab in Uganda. At this time, the CREEC lab does not have the equipment necessary to certify the lifetime of the stove. However, DelAgua did contract with CREEC to conduct duratbiility analyses and efficiency tests of new and used stoves. DelAgua is discussing with RBS how to obtain the certification. In the meantime, we are relying on life span estimates provided by the manufacturer, to demonstrate the expected life span of the EcoZoom Dura.
According to footnote 7 of AMS-II.G (v7), "the life span should be repoted in cases where the PPs are optiong to account the efficiency loss as per paragraph 23(a)". The CPAs within this PoA do not apply paragraph 23(a). Instead, the actual efficiency of project stoves is determined by Water Boiling Tests conducted by the CREEC lab, and show only modest decline over a 3.5 year period (and are well above 20%, as described in Section E.2 below). Therefore, this deviation has not impact on the implementation of the CPAs, and this monitoring report.

C.3.2. Corrections

NA

C.3.3. Changes to the start date of the crediting periodImplementation of CPAs

NA

C.3.4. Inclusion of monitoring plan

NA

C.3.5. Permannnt changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

>> On 23 February 2017, the EB approved a permanent change to the PoA-DD for this monitoring period. These changes the application of AMS-II.G, v07 (previously AMS-II.G v05 was applied), and are represented in version 3.0 of the PoA-DD and version 3.0 of the CPA-DDs.

C.3.6. Changes to project design

NA

SECTION D. Description of monitoring system of CPAs

>>
The monitoring plan for this project is closely derived from the methodologies. A database for the project activity as maintained by the CME, and a representative sample of all appliances in each Group was monitored to ensure that they are still operating or are replaced by an equivalent in service appliance.

The project database was populated during the initial distribution of technologies, and was updated based on subsequent replacements. The database was made accessible to the project proponent, appropriate partners, and the verification DOE. The database includes the following:

- Unique CPA identification number
- Installation date

- Family name
- Contact details of user (where available)
- Socio-economic level (according to the Rwandan Ubudehe approach).
- Baseline cooking fuel source
- Baseline stove type
- Date of replacement of filter or cook stove units
- Monitored parameters, for each HH selected in the verification sample

The monitoring surveys established the time to end of life of the filters distributed, based on the rated capacity divided by the average number of people in the household, divided by the average volume of water consumed per person per day. In this way, the PP will establish the need to replace filter units in CPA regions. The monitoring survey also established usage rates and performance of the filter units. Likewise, monitoring surveys will include examination of the cookstove installations and verification that they are in an operational condition. Therefore, should some filter or stove units not be replaced appropriately, this will be accounted for and appropriately deducted from emission reduction claims.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

Data / Parameter	$EF_{projected\_fossilfuel}$
Unit	tCO_2/TJ
Description	Emission factor for the projected fossil fuel consumption in the baseline, when NRB is displaced.
Source of data	AMS-II.G & AMS-III.AV
Value(s) applied	81.6 tCO2/TJ
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of baseline emissions for AMS-III.AV Calculation of emission reductions from AMS-II.G
Additional comment	-

Data / Parameter	LF
Unit	Fraction
Description	Leakage factor applied to account for increase in NRB use outside the project boundary
Source of data	Default value
Value(s) applied	0.95
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of leakage
Additional comment	-

Data / Parameter	$f_{NRB,y}$
Unit	Fraction
Description	Fraction of biomass used in the absence of the project activity in year y that can be established as non renewable biomass.
Source of data	Default values are used as published in EB 67 Annex 22 "Default Values for Fraction of Non-Renewable Biomass for Least-Developed Countries and Small Island Developing States".
Value(s) applied	Rwanda: 0.98
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	WH
Unit	(kJ/L ^{o}C)
Description	Specific heat of water
Source of data	AMS.III.AV default value
Value(s) applied	4.186
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	T_i
Unit	^{o}C
Description	Initial temperature of water
Source of data	AMS.III.AV default value
Value(s) applied	20
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	T_f
Unit	°C
Description	Final temperature of water
Source of data	AMS.III.AV default value
Value(s) applied	100
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	WHE
Unit	(kJ/L)
Description	Latent heat of water evaporation
Source of data	AMS.III.AV default value
Value(s) applied	2260
Choice of data or measurement methods and procedures	Methodological default
Purpose of data	Calculation of baseline emissions.
Additional comment	Used for water treatment calculation.

Data / Parameter	Xboil
Unit	Fraction
Description	The proportion of total population for which the common practice of water boiling is or would have been water boiling.
Source of data	Default value for Case 1
Value(s) applied	100%
Choice of data or measurement methods and procedures	According to the methodology, this parameter is only reported for Case 2 CPAs. Therefore, a value of 100% is applied, as all CPAs are Case 1.
Purpose of data	Calculation of emissions
Additional comment	This parameter is only relevant for Group 1 HHs.

Data / Parameter	IMP_{frac}
Unit	Fraction
Description	Determination of CPAs that fall under Case 1 or Case 2 (a proportion of the included population using an improved drinking-water source equal to or less than 60%).
Source of data	Baseline water quality study conducted independently by the London School of Hygiene and Tropical Medicine in September and October 2012
Value(s) applied	18.9%
Choice of data or measurement methods and procedures	Third party survey conducted by the London School of Hygiene and Tropical Medicine
Purpose of data	Required to validate emission reductions.
Additional comments	This parameter is only relevant for Group 1 HHs.

Data / Parameter	Case 1/Case 2
Unit	Dimensionless
Description	CPAs fall under Case 1 if they are implemented in rural or urban areas and the proportion of the populations using an improved drinking-water source is equal to or less than 60% If the CPA does not fall under Case1, it is Case 2
Source of data	See IMPfrac parameter
Value(s) applied	Case 1
Choice of data or Measurement methods and procedures	As IMPfrac is <60%, all CPAs are Case 1
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter is only relevant for Group 1 HHs.

Data / Parameter	$B_{old,i,j}$
Unit	t /year
Description	Annual quantity of woody biomass used in pre project scenario, per device.
Source of data	Calculated as $B_{old,i,j,pp}$ * HH_{size}. A default value of 0.5 tonnes/capita per year is used for $B_{old,i,j,pp}$ prior to adjustment for cross-effects. Number of persons served per device shall be monitored (see note #2 in additional comments)
Value(s) applied	Calculated
Choice of data or measurement methods and procedures	To account for cross-effects, $B_{old,i,j,pp}$ is reduced to remove biomass consumption that would have been for water treatment purposes. This process is described in Section F.1, and is applicable to Group 1 only
Purpose of data	Calculation of emission reductions.
Additional comment	1.If a HH receives both water filters and cookstove, and the filter is found to be in operation, $B_{old,i,j}$ is reduced to remove biomass consumption that would have been for water treatment purposes. This adjustment is described in section F.1. 2.According to the methodology $B_{old,i,j}$ is determined ex-ante, based on a value for the number of persons that utilize each device (represented by the parameter HHsize). However, the EB-approved cross-effects calculations used under this PoA allows for a monitored value of HHsize. Combining a monitored value of HH_{size} for the purpose of calculating cross effects, with a fixed value of HH_{size} for the purpose of calculating $B_{old,i,j}$, can result in overstated emission reductions, if the monitored value is less than the ex-ante value. As the cross-effects calculation (based on monitoring HH_{size}) was approved by the EB, and to avoid over-estimating emission reductions, CPAs within the PoA update $B_{old,i,j}$ based on monitored values of household size.

E.2. Data and parameters monitored

(Copy this table for each piece of data and parameter)

Parameters common to III.AV and II.G

Data / Parameter	η_{wb} ; η_{old}
Unit	%
Description	Efficiency of pre - project device. If the device is a three stone fire using firewood (not charcoal) , or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney, a default value of 0.1 is used as per the applied methodology; a value of 0.5 is used for fossil fuel combustion systems, and a default value of 0.2 is used for other types of devices. Use weighted average values (taking the amount of woody biomass consumed by each device as the weighting factor) if more than one type of device is being replaced
Measured/calculated/ default	Measured, using surveyed data and default values.
Source of data	Default value for stove efficiency combined with surveys of Group 1 and Group 2 households to determine the type of baseline device used in households and the amount of woody biomass consumed by each device.
Value(s) of monitored parameter	10.26% (for Group 1 and Group 2)
Monitoring equipment	Sampling was conducted in accordance with the sampling plan outlined in section B.7.2. Sampling was conducted at the time of distribution
Measuring/reading/recording frequency	This parameter is determined during technology distribution, and fixed thereafter.
Calculation method (if applicable)	Households were asked the following questions: (1)What was the predominant baseline stove used prior to the intervention? (2)How many times was it typically used to cook per week. (3)What other types of baseline stoves were used prior to the intervention? (4)For each other stove, how many times was it typically used to cook per week. (5)Did each baseline stoves have a grate or chimney. Based on the stove type and the presence of a grate/chimney, an efficiency value was assigned to each stove. The weighted average efficiency was then calculated based on the number of cooking events per stove.
QA/QC procedures	According to the QA/QC procedures in the registered monitoring plan, an outlier analysis shall be conducted. In this case, the outlier analysis would have removed higher efficiency values associated with improved stoves, resulting in a baseline efficiency of 10%. To ensure that all reasonable results were included in the final result, the outlier analysis was not conducted.

Purpose of data	Calculation of baseline and project emissions.
Additional comments	-

Data / Parameter	$\mu_{y,i,j}$
Unit	Days
Description	Number of days of utilization of the project device *i* and batch *j* during the year *y*
Source of data	Household Surveys
Value(s) applied	

	Group 1		*Group 2*
	Stove	*Filter*	*Stove*
CPA001	141.63	193.56	303.64
CPA002	141.63	193.56	303.64
CPA003	141.63	193.56	303.64
CPA004	141.63	193.56	303.64
CPA005	141.63	193.56	303.64
CPA006	141.63	193.56	303.64
CPA007	141.63	193.56	303.64
CPA008	141.63	193.56	303.64
CPA009	-	-	303.64
CPA010	-	-	303.64
CPA011	-	-	303.64
CPA012	-	-	303.64
CPA013	-	-	303.64
CPA014	-	-	303.64
CPA015	-	-	303.64
CPA016	-	-	303.64

Monitoring equipment	Surveys
Measuring/reading/recording frequency	Annually

Calculation method (if applicable)

The number of days that a technology is deployed will be calculated based on the average operating period of all similar technologies within a CPA.

For stoves, the following procedure was followed:

- A measurement campaign using data loggers was not feasible, so the number of days that a stove is deployed was calculated directly from the project database, as the average operating period of stoves. The average deployment time is then discounted by continued usage of the baseline stove.
    - Surveys designed to capture the cooking habits and stove usage of households in the region were conducted Households were asked as to their frequency of use of the improved stove versus the baseline stove, and the baseline fuel consumption was adjusted on the CPA household level to account for the average continued use of the baseline stove. For example, household surveys in a CPA may have reported a total average use of the improved stove 4 times per week, and the baseline stove 2 times per week, for a total of 6 stove uses per week, or 4/6 = 66% use of improved stove and 34% use of baseline stove. In this case, deployment days was adjusted by 66%.

For filters, the number of days deployed is discounted by the operational check (fraction of water filters deployed that are being used). Note that the operational check for stoves is used to discount N, rather than this parameter.

Days Deployed

	Group 1		*Group 2*
	Stove	*Filter*	*Stove*
CPA001	413.12	383.53	419.00
CPA002	413.12	383.53	419.00
CPA003	413.12	383.53	419.00
CPA004	413.12	383.53	419.00
CPA005	413.12	383.53	419.00
CPA006	413.12	383.53	419.00
CPA007	413.12	383.53	419.00
CPA008	413.12	383.53	419.00
CPA009	-	-	419.00
CPA010	-	-	419.00
CPA011	-	-	419.00
CPA012	-	-	419.00
CPA013	-	-	419.00
CPA014	-	-	419.00
CPA015	-	-	419.00
CPA016	-	-	419.00

	Use of baseline stove *Group 1* / *Group 2* *% of cooking on baseline system in the wet season*: *38.71%* / *29.73%* *% of cooking on baseline system in the dry season*: *33.46%* / *23.09%* *% MP in Wet Season*: *67%* / *67%* *Weighted Average Use of Project Stove*: *63.03%* / *72.47%* Operational Check (Filters) Surveys determined that 72.90% of filters were being actively used by HHs.
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions.
Additional comments	-

Data / Parameter	$N_{y,i,j}$
Unit	Units
Description	Number of project devices of type i and batch j operating during year y.
Measured/Calculated/ Default	Measured
Source of data	Project database
Value(s) applied	

District	Group 1			Group 2 Stoves
	Stoves w/ cross—effects (CE)	Stoves w/o cross-effects (CE)	Filters	
CPA001 - Rubavu	7,328.89	1,362.01	10,582	6,231.62
CPA002 - Karongi	10,075.66	1,872.47	14,548	3,826.15
CPA003 - Ngororero	12,405.50	2,305.45	17,912	4,475.55
CPA004 - Nyabihu	7,434.16	1,381.57	10,734	2,608.29
CPA005 - Nyamasheke	9,670.50	1,797.17	13,963	5,160.54
CPA006 - Rutsiro	11,681.76	2,170.95	16,867	5,436.32
CPA007 - Rusizi	11,289.06	2,097.97	16,300	6,341.93

	CPA008 - Bugesera	0	0	0	20,987.33
	CPA009 - Burera	0	0	0	19,614.69
	CPA010 - Gatsibo	0	0	0	6,231.62
	CPA011 - Rulindo	0	0	0	3,826.15
	CPA012 - Kayonza	0	0	0	4,475.55
	CPA013 - Kirehe	0	0	0	2,608.29
	CPA014 - Ngoma	0	0	0	5,160.54
	CPA015 - Nyagatare	0	0	0	5,436.32
	CPA016 - Rwamagana	0	0	0	6,341.93
	Total	79,292	13,610	100,906	**173056**

Monitoring Equipment	Distribution records & surveys
Measuring/reading/recording frequency	Measured Directly
Calculation Method	For stoves, the number of project devices is calculated as the number of technologies distributed (obtained from the database), discounted by the the Operational check (fraction of technologies deployed that are being used). Stoves within Group 1 HHs were also separated to account for cross-effects, as described below. The number of stoves distributed is as follows:

District	Group 1	Group 2
CPA001 - Rubavu	10,582	7,005
CPA002 - Karongi	14,548	4,301
CPA003 - Ngororero	17,912	5,031
CPA004 - Nyabihu	10,734	2,932
CPA005 - Nyamasheke	13,963	5,801
CPA006 - Rutsiro	16,867	6,111
CPA007 - Rusizi	16,300	7,129
CPA008 - Bugesera	0	23,592
CPA009 - Burera	0	22,049
CPA010 - Gatsibo	0	21,786
CPA011 - Rulindo	0	15,066
CPA012 - Kayonza	0	13,394
CPA013 - Kirehe	0	13,935
CPA014 - Ngoma	0	15,513
CPA015 - Nyagatare	0	15,724
CPA016 - Rwamagana	0	15,165

	Total | 100906 | 194,534 Surveys determined the Operational Check to be 98.77% for Group 2 stoves, and so the number of stoves distributed was discounted by 98.77%. For Group 1 stoves, the Operational Check was 86.45% for Group 1 stoves, and 72.90% for filters. Cross-effects are accounted for in the 72.90% of HHs that were found to be using the filter and stove. Cross-effects is not considered in the remaining 13.50% (86.45%-72.90%) of stoves in HHs that do not actively use the filter. For filters, N is the number of filters distributed, based on distribution records in the database. The operational check is used to discount $\mu_{y,i,j}$ (the number of days of utilization), and so does not effect N.
QA/QC procedures	N/A
Purpose of data	Calculation of baseline and project emissions.
Additional comments	-

Data / Parameter	HH_{size}
Unit	# of people
Description	Number of persons that utilize each of the functional project appliances
Measured/calculated/ default	Measured
Source of data	Household surveys
Value(s) applied	For Group 1 4.60 occupants For Group 2 4.39 occupants
Monitoring equipment	Survey results recorded on smart-phone
Measuring/reading/ recording frequency	Annual
Calculation method (if applicable)	Average value of all HHs that have operational products, as determined via self-reported surveys

QA/QC procedures	Please reference section B.2 for the detailed sampling plan.
Purpose of data	Calculation of baseline emissions.
Additional comments	For AMS-II.G, this parameter is multiplied by the average per capita quantity of biomass used in the absence of the project activity (see parameter $B_{old,PP}$ under the description of B_{old}) to determine B_{old}. According to AMS-III.AV, the ex-ante value of HH_{size} is typically multiplied by the number of households targeted to determine the population serviced by the project equipment (paragraph 18(a) in AMS-III.AV). Following CPA inclusion, this parameter is required to be monitored biennially, and only for Case 2 populations. However, this parameter is necessary to adjust biomass consumption for cross-effects under this PoA. Therefore, this parameter is monitored for all CPAs on an annual basis. As this is conservative relative to the methodological requirements, it is deemed acceptable. The total quantity of purified water (QPWy) shall be divided by HH_{size}, to determine $QPW_{PP.}$, which is used to adjust biomass consumption to account for cross-effects as described in Section F.1.

Data / Parameter	Baseline System (BS)
Unit	Fraction
Description	Fraction of population for which the baseline fuel displaced is biomass
Measured/calculated/ default	Measured
Source of data	Household surveys
Value(s) applied	For Group 1 100% For Group 2 97.53 %
Monitoring equipment	Verification survey results recorded on smart-phone
Measuring/reading/ recording frequency	According to the registered monitoring plan, this parameter is recorded at initial distribution and then confirmed during first household visit. These records suggest that 100% of HHs utilize biomass. In addition, the CME included this question in the monitoring surveys. The monitoring surveys suggest that this value is 100% from Group 1 and 97.53% for Group 2. As the staff who conducted the monitoring survey received more extensive training, and since these results are more conservative, the results of the monitoring survey are applied for this verification.
Calculation method (if applicable)	Surveys were conducted according to the approved sampling plan. .

QA/QC procedures	Please reference section E.3 for the detailed sampling plan
Purpose of data	Calculation of baseline emissions
Additional comments	Emission reductions were discounted by the fraction of the population that does not use biomass.

Parameters used exclusively for III.AV

Data / Parameter	QPW_y
Unit	Litres
Description	Quantity of purified water in year y
Measured/calculated/ default	Calculated from measured parameters
Source of data	Household survey
Value(s) applied	For Group 1 2,022.75 litres/year/HH
Monitoring equipment	Verification survey results recorded on smart-phone
Measuring/reading/ recording frequency	Annually
Calculation method (if applicable)	Self-reported surveys were administered, according to the sampling plan discussed in section E.3. Survey respondents are asked how much water is filtered per day in the wet and dry season. Filtered water used for purposes other than drinking (such as handwashing or other purposes) is removed, so that QPW includes only filtered drinking water. Verification survey's determined QPW per HH per day to be 6.54 literes/HH/day in the dry season and 5.05 liters/HH/day in the wet season. Based on the percent of the monitoring period in the wet season (67%), the average liters/year/HH is 2022.75. As stated in AMS-III.AV, this value shall not exceed the equivalent of 5.5 litres/person/day. Based on average Group 1 household size (4.83 people), the weighted average liters/pp/day is 1.22. This value is checked manually to ensure that it does not exceed 5.5 l/p/d.
QA/QC procedures	Please reference section E.3 for the detailed sampling plan The outlier analysis was conducted on liters/person/day (which is used to calculate QPWy); if this value exceeded 5 l/p/d, the datapoint was considered an outlier and removed from the dataset.
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter is only relevant for Group 1 HHs. QPWy was divided by the total number of persons that are supplied with purified water (see monitored parameter HH_{size}), to determine $QPW_{PP.}$, which is used to adjust biomass consumption to account for cross-effects as described in Section F.1.

Data / Parameter	Water Quality Monitoring
Unit	Fraction
Description	Fraction of LifeStraw® Family units that are in compliance with the water quality requirements of the methodology.
Measured/calculated/ default	Default
Source of data	Date of issue of LifeStraw® Family and certificate of quality for associated batch by manufacturer.
Value(s) applied	1
Monitoring Equipment	NA
Measuring/reading/ recording frequency	Annually
Calculation method (if applicable)	The LifeStraw® Family manufacturer guarantees compliance with EPA standards for microbiological contamination. As designed and produced, the LifeStraw® Family uses size exclusion to ensure that microbiological contamination is not present in treated water. As the filter clogs, the flowrate is reduced. Therefore, a filter at its end-of-life cannot pass water that is untreated. This is a fail-safe indicator of the end-of-life. Therefore, the water quality compliance of this technology is achieved via an annual operational check of the units in place (conducted as part of the determination of $N_{y,i,j}$ for stoves and $\mu_{y,i,j}$ for filtersand ensuring that each shipment of water filters is accompanied with a Certificate of Quality (COQ).
QA/QC procedures	Manufacturer certificate of quality for each batch of LifeStraw® Family units produced: http://www.vestergaard-frandsen.com/lifestraw/lifestraw-family/certificate-of-quality
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter is only relevant for Group 1 HHs. The LifeStraw® Family conforms to US EPA microbiological water quality standards, as allowed by the methodology. Each LifeStraw® Family batch produced is issued a Certificate of Quality by the manufacturer that demonstrates compliance of the batch with EPA standards. An example is shown here: http://www.vestergaard-frandsen.com/lifestraw/lifestraw-family/certificate-of-quality Annual emission reductions shall be discounted by water quality fraction.

Data / Parameter	SDW_{frac}
Unit	Fraction
Description	Proportion of CPA population served by a public distribution network of safe drinking water. The CPA total project area is defined by the project proponent to be households within a delineated geographical boundary within a country, minus those households that have running water within their households. Surveys will establish the proportion of households that have running water, and are therefore excluded from the total CPA project area.
Measured/calculated/ default	Measured
Source of data	Household surveys determine the fraction of the population within district who have access to running water in homes. These households were excluded from carbon credit calculations associated with the water filters.
Value(s) applied	For Group 1 2.55 %
Monitoring equipment	Verification survey results recorded on smart-phone
Measuring/reading/ recording frequency	Annual
Calculation method (if applicable)	Self-reported surveys were administered accordance with the sampling plan described in Section E.3
QA/QC procedures	Surveys followed the sampling plan described in Section E.3.
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter is only relevant for Group 1 HHs. In case the SDW is made available through the public distribution network, no claim for emission reductions can be made for that proportion of the CPA area.

Parameters used exclusively for II.G

Data / Parameter	$\eta_{new,i,j}$
Unit	Fraction
Description	Efficiency of the device of each type *i and batch j* implemented as part of the project activity.
Measured/calculated/ default	Calculated
Source of data	Based on certification by a certifying agent recognized by that body.
Value(s) applied	For Group 1 42.07% For Group 2 42.05%
Monitoring equipment	Verification survey results recorded on smart-phone
Measuring/reading/ recording frequency	Annually

<table>
<tr><td>Calculation method (if applicable)</td><td>A weighted average is applied to account for the use of a pot skirt. The household survey determined the percent of cooking on a project stove that was done with and without the pot skirt. These results were combined with the WBT results for stoves in the field approximately 3.5 years, to determine the average efficiency of stoves during the monitoring period. At the end of the monitoring period, Group 1 stoves have been in the field at mos 3.25 years, and Group 2 stoves have been in th the field at most 2 years. The Group 1 results were applied to Group 2 stoves as well, to ensure a conservative result. Tests were conducted by the CREEC lab in Kampala, Uganda, which is a certifying agent recognized by the Rwanda Bureau of Standards (RBS).
The tests with pot skirt determined average efficiency to be 42.3%. The tests of stoves without a pot skirt determined the average efficiency to be 35.0%. The combined results are as follows:

<table>
<tr><td></td><td colspan="2">Group 1</td><td colspan="2">Group 2</td></tr>
<tr><td></td><td>Stove Efficiency, based on water boiling test results</td><td>% Usage (Monitoring Survey)</td><td>Stove Efficiency, based on water boiling test results</td><td>% Usage (Monitoring Survey)</td></tr>
<tr><td>w/ Pot Skirt*</td><td>42.3%</td><td>96.91%</td><td>42.3%</td><td>96.62%</td></tr>
<tr><td>w/o Pot Skirt*</td><td>35.0%</td><td>3.09%</td><td>35.0%</td><td>3.38%</td></tr>
</table>

Based on the above values, the weighted average efficiency value is 42.07% for group 1 stoves, and 42.05% for group 2 stoves.</td></tr>
<tr><td>QA/QC procedures</td><td>NA</td></tr>
<tr><td>Purpose of data</td><td>Calculation of project emissions</td></tr>
<tr><td>Additional comments</td><td>-</td></tr>
</table>

Data / Parameter	Life Span
Unit	Number of Years
Description	The operating lifetime of the project device. The life span should be reported in cases where the PPs are opting to account the efficiency loss as per paragraph 22 of AMS-II.G..
Measured/calculated/ default	Default
Source of data	Manufacturer
Value(s) applied	5 years
Monitoring equipment	Manufacturer estimates
Measuring/reading/recording frequency	Only the EcoZoom Dura has been distributed under this PoA. This stove has an expected life span of 5 years. The actual life span is monitored annually, via water boiling tests, to ensure that stove efficiency exceeds 20%.
Calculation method (if applicable)	
QA/QC procedures	-
Purpose of data	Calculation of emission reductions.

Additional comments

A temporary deviation was applied to this parameter. See section C.3.1 for a description.

If the life span of devices is less than the crediting period it shall be demonstrated that the devices shall be replaced after the life span has ended. No technology has reached the end of its operational lifespan.

The operational lifetime of each stove is expected to be 5 years. The oldest stoves distributed under this PoA were approximately 2 years old at the end of this monitoring period (Group 1 stoves were distributed in late 2014). Efficiency tests on these stoves found that the average efficiency has not dropped below 20%, as described under parameter $\eta_{new,i,j.}$

Each water filter is expected to filter up to 18,000 liters of water over its operational lifetime[7]. To date, the total liters of water filtered per filter is 7,576.93 liters, as shown in the table below.

Table 4: Total Liters of Water Filtered

MP#	Days In MP	Avg HH Size	L/P/D	Liters
1	198	4.77	1.5	1,416.69
2	167	4.6	1.55	1,190.71
3	419	4.83	1.31	2,651.13
4	420	4.60	1.2	2,318.40
Total Water Filtered				7,576.93

[7] Clasen, T. *et al.* 2009. Laboratory assessment of a gravity-fed ultrafiltration water treatment device designed for household use in low-income settings. *Am. J. Trop. Med. Hyg.*, 80(5), 2009, pp. 819–823".

<table>
<tr><td>Data / Parameter</td><td>Date of commissioning of batch j</td></tr>
<tr><td>Unit</td><td>Date</td></tr>
<tr><td>Description</td><td>Date of distribution</td></tr>
<tr><td>Measured/calculated/ default</td><td>Recorded at time of distribution</td></tr>
<tr><td>Source of data</td><td>Internal records</td></tr>
<tr><td>Value(s) applied</td><td>Since the project records the date of distribution of every device, the average distribution date for each CPA is used. The average distribution date for each Group is reported below:
<table>
<tr><th>CPA</th><th>Group 1</th><th>Group 2</th></tr>
<tr><td>CPA001</td><td>04/11/14</td><td>11/07/16</td></tr>
<tr><td>CPA002</td><td>12/11/14</td><td>29/07/16</td></tr>
<tr><td>CPA003</td><td>09/11/14</td><td>19/07/16</td></tr>
<tr><td>CPA004</td><td>11/11/14</td><td>24/07/16</td></tr>
<tr><td>CPA005</td><td>17/11/14</td><td>25/07/16</td></tr>
<tr><td>CPA006</td><td>09/11/14</td><td>24/06/16</td></tr>
<tr><td>CPA007</td><td>12/11/14</td><td>02/09/16</td></tr>
<tr><td>CPA008</td><td>-</td><td>13/07/16</td></tr>
<tr><td>CPA009</td><td>-</td><td>26/07/16</td></tr>
<tr><td>CPA010</td><td>-</td><td>23/06/16</td></tr>
<tr><td>CPA011</td><td>-</td><td>08/08/16</td></tr>
<tr><td>CPA012</td><td>-</td><td>02/06/16</td></tr>
<tr><td>CPA013</td><td>-</td><td>15/06/16</td></tr>
<tr><td>CPA014</td><td>-</td><td>18/06/16</td></tr>
<tr><td>CPA015</td><td>-</td><td>12/06/16</td></tr>
<tr><td>CPA016</td><td>-</td><td>17/06/16</td></tr>
</table></td></tr>
<tr><td>Monitoring Equipment</td><td>Recorded during distribution of each device, using smartphones</td></tr>
<tr><td>Monitoring frequency</td><td>Fixed and recorded at the time of commissioning/distribution of each device</td></tr>
<tr><td>Calculation method (if applicable)</td><td>-</td></tr>
<tr><td>QA/QC procedures</td><td>-</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comments</td><td>To be reported in the monitoring report

Relevant for cookstove technologies only (not water filters)</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>Date of commissioning of project stove device i</td></tr>
<tr><td>Unit</td><td>Date</td></tr>
<tr><td>Description</td><td>Actual date of commissioning of the project device.</td></tr>
<tr><td>Measured/calculated/default</td><td>Recorded at time of distribution</td></tr>
<tr><td>Source of data</td><td>Internal records</td></tr>
<tr><td>Value(s) applied</td><td>Since the project records the date of distribution of every device, the average distribution date for each CPA is used. The average distribution date for each Group is reported below:

<table>
<tr><th>CPA</th><th>Group 1</th><th>Group 2</th></tr>
<tr><td>CPA001</td><td>11/4/2014</td><td>11/07/2016</td></tr>
<tr><td>CPA002</td><td>11/12/2014</td><td>29/07/2016</td></tr>
<tr><td>CPA003</td><td>11/9/2014</td><td>19/07/2016</td></tr>
<tr><td>CPA004</td><td>11/11/2014</td><td>24/07/2016</td></tr>
<tr><td>CPA005</td><td>11/17/2014</td><td>25/07/2016</td></tr>
<tr><td>CPA006</td><td>11/9/2014</td><td>24/06/2016</td></tr>
<tr><td>CPA007</td><td>11/12/2014</td><td>02/09/2016</td></tr>
<tr><td>CPA008</td><td>-</td><td>13/07/2016</td></tr>
<tr><td>CPA009</td><td>-</td><td>26/07/2016</td></tr>
<tr><td>CPA010</td><td>-</td><td>23/06/2016</td></tr>
<tr><td>CPA011</td><td>-</td><td>08/08/2016</td></tr>
<tr><td>CPA012</td><td>-</td><td>02/06/2016</td></tr>
<tr><td>CPA013</td><td>-</td><td>15/06/2016</td></tr>
<tr><td>CPA014</td><td>-</td><td>18/06/2016</td></tr>
<tr><td>CPA015</td><td>-</td><td>12/06/2016</td></tr>
<tr><td>CPA016</td><td>-</td><td>17/06/2016</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>Recorded on smartphones during distribution of each device</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Fixed and recorded at the time of commissioning/distribution</td></tr>
<tr><td>Calculation method (if applicable)</td><td></td></tr>
<tr><td>QA/QC procedures</td><td>-</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comments</td><td>To be reported in the monitoring report

Relevant for cookstove technologies only (not water filters)</td></tr>
</table>

The following parameters were not included in this monitoring report because they were not applicable to the situation in each CPA:

-EFprojected_kerosene – Kerosene was not a displaced baseline fuel, and so this parameter is not included.

-LEC_{y} – Charcoal & briquettes were not used by the project technologies during this monitoring period

-$B_{new\text{-}KPT,,i,j,ce}$ - This parameter is monitored if By,savings,i,j,ce is calculated by kitchen performance test. Instead WBTs were used to determine By,savings,i,j,ce.

-$B_{y=1,new,l,j,survey,ce}$ - This parameter is only monitored if $B_{y,savings,i,j,ce}$ is calculated according to option 2-Equation 8 in the PoA. This equation was not used.

E.3. Implementation of sampling plan(s)

>>

A single sampling plan was implemented for each Group in the PoA, as described above.

a.Objectives and Reliability Requirement

The objective for each parameter is defined in the tables below. A single sampling plan was implemented for all CPAs, and therefore the results for each parameter must meet 95/10 confidence/precision.

b.Target Population & Sampling Frame

The target population is the end-users who receive project technologies under a CPA within the PoA, and that share the characteristics outline below. As described in section F, end-users fell into two groups, and so the target population is adjusted accordingly.

-Region

1. For Group 1: Beneficiary HHs were located in the 7 districts of Rwanda's Western Province
2. For Group 2: Beneficiary HHs were located in all CPAs

-Combination of project technology.

1. For Group 1: All beneficiary HHs received a stove and a filter
2. For Group 2: All beneficiary HHs received a stove

-Model of project technology

1. For Group 1: All beneficiary HHs received a Vestergaard Lifestraw Family, 2.0, and an EcoZoom Dura coosktove.
2. For Group 2: All beneficiary HHs received an EcoZoom Dura cookstove

-Installation year (by technology)

1. For Group 1: All technologies were installed between 15 September, 2014 and 12 December, 2014
2. For Group 2: All technologies were installed between 15 January, 2016 and 1 November, 2016

As described in section C.1, Group 1 and Group 2 are not equivalent to batches. DelAgua does not separate end-users into batches, as it records the distribution date of every individual technology.

-Target group

1.All technologies were distributed to households

-Socioeconomic level

1.All technologies were distributed to Ubedehe 1 & 2 households.

As the beneficiary HHs share the above characteristics, the project population for each Group is homogenous and the sampling frame is the full list of households in each Group within the PoA database.

c.Sampling Method

Simple random sampling was utilized within each Group.

d.Sample Size

In accordance with the *Standard for sampling and surveys for CDM project activities and programme of activities*, the sample size was chosen to meet the required reliability (95/10 confidence/precision, as the sampling plan covers a group of CPAs).

The sample size for stove efficiency tests was calculated separately from those parameters monitored via survey. These calculations are discussed under the parameter $\eta_{new,i,j}$ above.

For parameters monitored via survey, sample sizes were estimated for each parameter using survey results from the previous (second) monitoring period. Sample sizes were calculated for each surveyed parameter using simple random sampling. The largest ex-ante sample size was used for survey implementation. Ex-ante calculations determined that 253 surveys would need to be conducted for Group 1 and 154 surveys would need to be conducted for Group 2. DelAgua actually conducted 657 surveys; 346 in Group 2 HHs and 311 in Group 1 HHs.

Sample size calculations are provided to the DOE for review.

e.Sampling Frame

The sampling frame for each Group is the portion of the population that shares the key characteristics described above in section b, and is selected from the PoA level database. Samples were selected using a random number generator in Excel. Records of the sampling frame will be maintained for a period of 2 years after the lifetime of the PoA.

Data:

f.Field Measurements

Parameters that were measured via surveys are identified in section G above. All surveyed parameters are measured via in-person survey. A single survey was developed to address all monitored parameters, though the survey administered to Group 2 HHs excluded the filter-related questions (the stove-related questions were identical for Group 1 and Group 2 HHs). Survey questions are made available to the DOE for review.

g.QA/QC

The data collected during monitoring is verified and controlled in the following way:

-Suryeys were conducted between 18/6/2018 and 24/9/2018.

A training was held on 13/6/2018, and included a review of the survey questions and general communication skills. All surveyers participated in the training, and all were trained on the full survey (including stove and filter questions), but were informed that the filter questions were not administered in Group 2 HHs. Participants practiced conducting interviews in group work (with newer staff paired with experienced surveyors). All surveyors were provided with a printout of the verification survey and training notes, that highlighted the revisions to the survey.

Records of the trainings are available to the DOE.

-All ex-ante and monitored data parameters were collected on smart-phone based surveys, and surveys are uniform across all surveyors.

-Unknown to the surveyors, the database analysis includes verification of “valid” surveys including by a.) verifying household consent is received and b.) that the survey

duration, as recorded by Internet time, is no shorter or longer than a reasonable value.

-Data validation is conducted on the database to ensure that values are numerically consistent, i.e. multiple choice values add up to 100% of respondents.

Data was downloaded from the PoA database, and assessed for outliers. A data point was considered an outlier if it was more than 1.5 times the inner quartile range. Datapoints identified as outliers were removed from the dataset.

The dataset is provided to the DOE for review.

h.Analysis

Once outliers were removed, the mean/proportion value was calculated, and the reliability of the results were assessed. This analysis is provided to the DOE.

SECTION F. Calculation of emission reductions or net anthropogenic removals

F.1. Calculation of baseline emissions or baseline net removals

>>

Baseline emissions for water filters (AMS-III.AV) – This calculation is relevant for Group 1 HHs only

The following changes were made to the calculation of baseline emissions for water filters, as compared to the registered PoA-DD:

1.Ongoing monitoring determined that several HHs continued to boil water after introduction of the water filter. Therefore, baseline emissions were discounted by the percent of households that boiled water after filtering. See parameter BAF in the calculations below.

$BE_{y,water\_treatment} = BE_{y,I} * N_{y,i}$

Where:

$BE_{y,water\_treatment}$ Baseline emissions during the year y in tCO_2e

$BE_{y,I}$ Baseline emissions per water filter of type *I*, *calculated as below*

$N_{y,I}$ Number of project devices of type I operating in year y, *monitored*

$BE_{y,I} = QPW_y * SEC * f_{NRB,y} * EF_{projected\_fossilfuel} * 10^{-9} * (1-SDW_{frac}) * X_{BOIL} * BS * \mu_{y,i} /365 * (1-BAF)$

Where:

$BE_{y,I}$ Baseline emissions from filters of type *I* during the year *y* in (tCO_2e). *Calculated.*

QPW_y Quantity of purified water as established in year y (litres), capped at 5.5 lppd. *Monitored*

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

$F_{NRB,y}$ Fraction of woody biomass used in the absence of the project activity in year y that can be established as non renewable as per the relevant provisions of AMS-I.E “Switch from Non-Renewable Biomass for Thermal Applications by the User”. *Determined at the CPA level*

$EF_{projected\_fossil\ fuel}$	Emission factor as per AMS-I.E procedures when NRB is displaced or the emission factor of the fossil fuel substituted (tCO_2/TJ). *Determined at the CPA level*
SDW_{frac}	Proportion of CPA population served by public safe drinking water distribution system, *monitored.*
X_{boil}	The proportion of total population for which the common practice of water boiling is or would have been water boiling. *Determined at the CPA level*
BS	Fraction of population for which the baseline fuel displaced is biomass, *monitored*.
$\mu_{y,i}$	Number of days of utilization of the project device i during year *y*
BAF	Fraction of HHs that continue to boil water after introduction of the filter

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

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

Where:

WH Specific heat of water (kJ/L ^oC). *The default value of 4.186 kJ/L ^oC is used.*

T_f Final temperature (^oC). *The default value of 100 °C5 is used.*

T_i Initial temperature of water (°C). *A default value of 20 °C will be used.*

WHE	Latent heat of water evaporation (kJ/L). *The default value of 2260 kJ/L will be used.*
H_{wb}	Efficiency of the water boiling systems being replaced. *Determined at the CPA level*

The Lifestraw Family water filter distributed to Group 1 HHs uses gravity filtration, and does not invole consumption of fossil fuels or electricity. Therefore, project emissions are 0.

<u>Emission reduction calculation for stoves (AMS-II.G) – This calculation is relevant for both Group 1 and Group 2</u>

$$ER_y = \sum_i \sum_j ER_{y,i,j} - LEC_y - LE_y$$ EQUATION (5)

Where:

i	Indices for the situation where more than one type of project device is introduced to replace the pre-project devices
j	Indices for the situation where there is more than one batch of project device
ER_y	Emission reductions during year *y* in t CO_2e
$ER_{y,i,j}$	Emission reductions by project device of type i *and* batch j during year *y* in t CO_2e
LEC,y	Leakage emissions from charcoal production in year y

$$ER_{y,i,j} = \left(B_{y,savings,i,j,ce} \times N_{y,i,j,ce} \times LF\right) \times \frac{\mu_{y,i,j}}{365} \times f_{NRB,y} \times NCV_{bioma} \times EF_{projected\_fossil\ fuel}$$ EQUATION (6)

Where:

ce	=	Index to identify whether cross-effects is accounted for (ce= 1 if cross-effects is accounted for; ce=0 otherwise)
$B_{y,savings,i,j,ce}$	=	Quantity of woody biomass that is saved in tonnes per cook stove device of type *i* and batch *j* during year *y*
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (fNRB) values available on the CDM website.
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
$EF_{projected\_fossilfuel}$	=	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 t CO2/TJ
$N_{y,i,j,ce}$	=	Number of project devices of type *i* and *batch j* operating during year *y*,
$\mu_{y,i,j}$	=	Number of days of utilization of the project device *i* and batch *j* during the year *y*.
LF	=	Leakage factor, to account for increase in NRB use outside the project boundary

Note that equation 2 in AMS-II.G(v7),), which corresponds to equation 6 above, does not include the ce parameter. As cookstoves and water filters may be distributed/in-operation together as a result of this program, this parameter was added to the calculations in this PoA to ensure that emission reductions are appropriately adjusted to account for cross-effects.

This CPA will determine $B_{ysavings,i,j,ce}$ following Option 2 (water boiling test), as described here:

$$B_{y,savings,i,j,ce} = B_{old,i,j,ce} \times (1 - \frac{\eta_{old,i,j}}{\eta_{new,i,j}})$$ EQUATION (8)

Calculation of Cross-Effects

AMSIII.AV assumes a baseline water boiling practice on unimproved stoves that is mitigated by a water filter technology. AMSII.G assumes a baseline cooking fuel consumption on unimproved

stoves that is reduced by a high efficiency stove technology. In order to eliminate cross-effects between these measures in households that utilize both tehcnologies, the baseline fuel consumption on the unimproved stoves,CPAs that utilize both AMS-III.AV and AMS-II.G shall adjust B_{old} in order to eliminate potential cross-effects between these measures. This adjustment shall follow the procedure outlined below.

Step 1 – Determine baseline wood consumption per capita
Step 2 – Determine total litres of drinking water consumed per capita
Step 3 – Calculate the energy required to boil one litre of water (SEC). This calculation follows the process described in AMS-III.AV for the calculation of SEC.
Step 4 – Calculate energy required to boil drinking water, by multiplying SEC (Step 3) by the total litres of drinking water (step 2). This calculations assumes that all drinking water is boiled in the baseline.
Step 5 – Calculate the per capita quantity of wood required to boil drinking water, by dividing per capita energy to boil water (step 4) by the NCV of the baseline fuel source.
Step 6 – Discount the per capita quantity of wood required to boil water by the fraction of the population that does not boil water in the baseline, by multiplying the per capita quantity of wood required to boil water (step 5) by the fraction of the population that boils water in the baseline (as determined by a survey in the project area).
Step 7 - Subtract per capita quantity of wood required to boil water (step 6) from per capita wood consumption (Step 1).

Through this calculation, cross effects are eliminated from CPAs implemented under this PoA.

Step 1 - Determine baseline wood consumption per capita (incl. cooking & water treatment)		**Source**
500	Per capita baseline wood consumption (kg), incl water treatment	Methodology Default
Step 2 - Determine Total Litres Drinking Water Consumed per capita in project area		
1.31	litres of drinking water consumed per person per day	Survey conducted by CME
439.73	total litres per year	Calculated
Step 3 - Calculation of energy required to boil one litre of water		
4.19	Specific heat of water	Default Value in AMS-III.AV
100.00	Final temperature of water	Default Value in AMS-III.AV
20.00	Initial temperature of water	Default Value in AMS-III.AV
2260.00	Latent heat of water evaporation	Default Value in AMS-III.AV
0.10	Efficiency of water boiling system being replaced	Survey conducted by CME
3484.21	Specific energy consumption (kj/L)	Calculated
Step 4 - Calculation of energy required to boil water (if all water was boiled)		
0.00	Energy to boil water per year (TJ), if all water is boiled	Calculated
Step 5 - Calculation of tonnes wood required to boil water (if all water was boiled)		
0.02	NCV biomass (TJ/tonne)	IPCC default value
102.14	Total biomass (kg) to boil water per year, if all drinking water is boiled	Calculated
Step 6 - Adjust for suppressed demand		
0.38	Fraction of population that boils water in baseline	Survey conducted by CME
168.86	Average drinking water boiled per person (Litres)	Calculated
39.22	Total biomass (kg) consumed in baseline for water treatment	Calculated
Step 7 - Adjust baseline per-capita wood consumption for cross effects		

460.78	Per capita biomass consumption, excl water treatment.	Calculated
Step 8 - Calculate total HH wood consumption (excl. water treatment) in project area		
4.60	Avg HH size in project area	Survey conducted by CME
2119.58	Cross-effects adjusted wood consumption in baseline area (kg)	Calculated

All Group 1 households received a stove and filter. However, some households did not utilize the filter. The cross-effects adjustment was only applied to households that were found to utilize both filters and cookstoves, as determined by the monitored parameter OCy,i.Calculation of project emissions or actual net GHG removals by sinks.

F.2. Calculation of proejct emissions

AMS-II.G describes the calculation of emission reductions, and does not require estimation of project emissions separately from baseline emissions. The emission reduction calculation methodology is described in section F.1 above.
The emission reduction calculation methodology for AMS-III.AV is described in section F.1 as well.

F.3. Calculation of leakage emissions

>>
As established in the monitoring plan, leakage is accounted for through the application of a net to gross adjustment factor of 0.95. According to AMS-II.G, this adjustment factor is applied to $B_{y,savings,i,j,ce}$ (see Equation 6 in section F.1), and so is factored into the stove-related baseline emissions calculations in the tables in section F.4.

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

Water Filter Summary

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO2e)	Project emissions or actual net GHG removals by sinks (tCO2e)	Leakage (tCO2e)	GHG emission reductions or net GHG removals by sinks (tCO2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
CPA001	4380	0	220	0	4160	4160
CPA002	6022	0	302	0	5720	5720
CPA003	7414	0	371	0	7043	7043
CPA004	4443	0	223	0	4220	4220
CPA005	5780	0	290	0	5490	5490
CPA006	6982	0	350	0	6632	6632
CPA007	6747	0	338	0	6409	6409
CPA008	0	0	0	0	0	0
CPA009	0	0	0	0	0	0
CPA010	0	0	0	0	0	0

CPA011	0	0	0	0	0	0
CPA012	0	0	0	0	0	0
CPA013	0	0	0	0	0	0
CPA014	0	0	0	0	0	0
CPA015	0	0	0	0	0	0
CPA016	0	0	0	0	0	0
Total	41768	0	2094	0	39674	39674

Stove Summary

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO2e)	Project emissions or actual net GHG removals by sinks (tCO2e)	Leakage (tCO2e)	GHG emission reductions or net GHG removals by sinks (tCO2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
CPA001	22117	0	0	0	22117	22117
CPA002	22620	0	0	0	22620	22620
CPA003	27464	0	0	0	27464	27464
CPA004	16336	0	0	0	16336	16336
CPA005	24155	0	0	0	24155	24155
CPA006	27869	0	0	0	27869	27869
CPA007	28719	0	0	0	28719	28719
CPA008	34471	0	0	0	34471	34471
CPA009	32217	0	0	0	32217	32217
CPA010	31833	0	0	0	31833	31833
CPA011	22014	0	0	0	22014	22014
CPA012	19570	0	0	0	19570	19570
CPA013	20361	0	0	0	20361	20361
CPA014	22667	0	0	0	22667	22667
CPA015	22975	0	0	0	22975	22975
CPA016	22158	0	0	0	22158	22158
Total	397546	0	0	0	397546	397546

Total Summary

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO2e)	Project emissions or actual net GHG removals by sinks (tCO2e)	Leakage (tCO2e)	GHG emission reductions or net GHG removals by sinks (tCO2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
CPA001	26497	0	220	0	26277	26277
CPA002	28642	0	302	0	28340	28340
CPA003	34878	0	371	0	34507	34507
CPA004	20779	0	223	0	20556	20556

CPA005	29935	0	290	0	29645	29645
CPA006	34851	0	350	0	34501	34501
CPA007	35466	0	338	0	35128	35128
CPA008	34471	0	0	0	34471	34471
CPA009	32217	0	0	0	32217	32217
CPA010	31833	0	0	0	31833	31833
CPA011	22014	0	0	0	22014	22014
CPA012	19570	0	0	0	19570	19570
CPA013	20361	0	0	0	20361	20361
CPA014	22667	0	0	0	22667	22667
CPA015	22975	0	0	0	22975	22975
CPA016	22158	0	0	0	22158	22158
Total	439314	0	2094	0	437220	437220

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

Filter Comparsion

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
CPA001	26681	4160
CPA002	10504	5720
CPA003	13139	7043
CPA004	7676	4220
CPA005	9993	5490
CPA006	12922	6632
CPA007	11658	6409
CPA008	0	0
CPA009	0	0
CPA010	0	0
CPA011	0	0
CPA012	0	0
CPA013	0	0
CPA014	0	0
CPA015	0	0
CPA016	0	0
Total	92576	39674

Stove Comparison

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
CPA001	51355	22117
CPA002	20219	22620
CPA003	25289	27464
CPA004	14775	16336
CPA005	19236	24155
CPA006	24873	27869
CPA007	22442	28719
CPA008	34764	34471
CPA009	32140	32217
CPA010	30987	31833
CPA011	24925	22014
CPA012	19504	19570
CPA013	19990	20361
CPA014	22931	22667
CPA015	22242	22975
CPA016	22239	22158
Total	407917	397546

Total Comparison

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
CPA001	78036	26277
CPA002	30723	28340
CPA003	38429	34507
CPA004	22451	20556
CPA005	29230	29645
CPA006	37796	34501
CPA007	34101	35128
CPA008	34764	34471
CPA009	32140	32217
CPA010	30987	31833
CPA011	24925	22014
CPA012	19504	19570
CPA013	19990	20361
CPA014	22931	22667
CPA015	22242	22975
CPA016	22239	22158
Total	500494	437220

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

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The actual emission reductions achieved during the monitoring period are less than anticipated in the registered CPA-DDs. This is due to the following factors:

1. The average HH size was estimated to be 5.41 in the CPA-DDs. The actual monitored value was 4.60 occupants for Group 1, and 4.39 for Group 2 HHs.
2. Stove stacking (continued usage of baseline stove in the project scenario) was larger than anticipated in the CPA-DD. The registered value was 0%, compared to a monitored value of 36.97% for group 1, and 27.53% for group 2.
3. The baseline stove efficiency estimated in the registered CPA-DDs was 10%. Updated surveys (required with the post-registration change to the PoA) determined the baseline stove efficiency to be 10.26%.