



Monitoring report form for CDM programme of activities
(Version 03.0)

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

MONITORING REPORT

Title of the PoA	DelAgua Public Health Program in Eastern Africa	
UNFCCC reference number of the PoA	PoA 9626	
Version numbers of the PoA-DD applicable to this monitoring report	Version 4.4	
Version number of this monitoring report	2.4	
Completion date of this monitoring report	06/08/2020	
Monitoring period number	3	
Duration of this monitoring period	15/09/2015-31/12/2018	
Monitoring report number for this monitoring period	1	
Coordinating/managing entity	DelAgua Health Rwanda Limited	
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)
	Rwanda	Yes
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	
Sectoral scopes	Sectoral Scope – 3. Energy Demand	
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	735,623 tCO ₂ e
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	1,243,488 tCO ₂ e	

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

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This PoA involves the distribution of LifeStraw® Family units and/or 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 water¹. The LifeStraw® Family reduces the use and demand for firewood for water treatment by boiling. This directly leads to reduced CO₂ emissions.

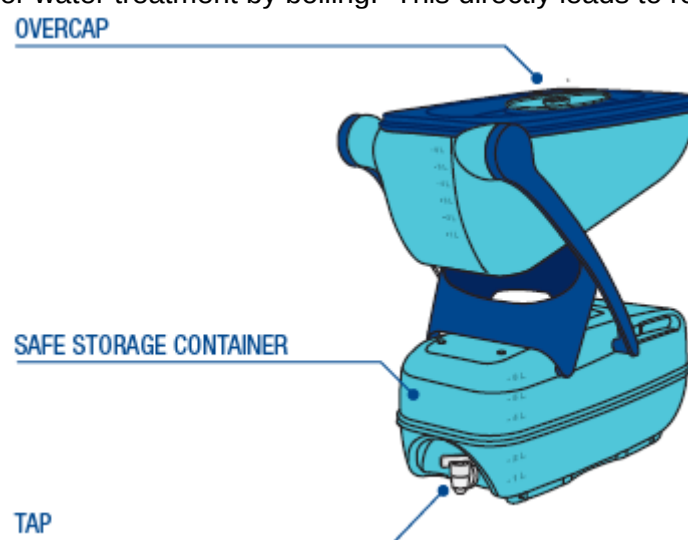


Figure 1: LifeStraw® Family 2.0 System

The 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.

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”.



Figure 2: Dura High-Efficiency Cook Stove

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.

A.1.1. Corresponding generic component project activities (CPAs)

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
CPA XXX – DelAgua Public Health Program: CPAXX in YY District in the ZZ Province of the Republic of Rwanda	Version 4.4	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	Version of the PoA-DD	Title and reference number of the corresponding generic CPA	Crediting period type and duration	Covered in this monitoring report? (yes/no)
DelAgua Rwanda Public Health Program: Rubavu District, Western Province, Republic of Rwanda. 9626-P1-0001-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	15/09/2014 - 14/09/2021 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA002,	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the	15/09/2014 - 14/09/2021	Yes

Ubedehe 1& 2 in Karongi District in the Western Province of the Republic of Rwanda 9626-P1-0002-CP1		ZZ Province of the Republic of Rwanda	7 years, twice renewable	
DelAgua Rwanda Public Health Program: CPA003, Ubedehe 1& 2 in Ngororero District in the Western Province of the Republic of Rwanda 9626-P1-0003-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	15/09/2014 - 14/09/2021 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA004, Ubedehe 1& 2 in Nyabihu District in the Western Province of the Republic of Rwanda 9626-P1-0004-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	15/09/2014 - 14/09/2021 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA005, Ubedehe 1& 2 in Nyamasheke District in the Western Province of the Republic of Rwanda 9626-P1-0005-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	15/09/2014 - 14/09/2021 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA006, Ubedehe 1& 2 in Rutsiro District in the Western Province of the Republic of Rwanda 9626-P1-0006-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	15/09/2014 - 14/09/2021 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA007, Ubedehe 1& 2 in Rusizi District in the Western Province of the Republic of Rwanda 9626-P1-0007-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	15/09/2014 - 14/09/2021 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA008-BUGESERA District in	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic	19/04/2016 - 18/04/2023	Yes

the Eastern Province of the Republic of Rwanda 9626-P1-0008-CP1		of Rwanda	7 years, twice renewable	
DelAgua Rwanda Public Health Program: CPA009-BURERA District in the Northern Province of the Republic of Rwanda 9626-P1-0009-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA010-GATSIBO District in the Eastern Province of the Republic of Rwanda 9626-P1-0010-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA011-RULINDO District in the Northern Province of the Republic of Rwanda 9626-P1-0011-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA012-KAYONZA District in the Eastern Province of the Republic of Rwanda 9626-P1-0012-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA013-KIREHE District in the Eastern Province of the Republic of Rwanda 9626-P1-0013-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA014-NGOMA District in the Eastern Province of the Republic of	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice	Yes

Rwanda 9626-P1-0014-CP1			renewable	
DelAgua Rwanda Public Health Program: CPA015- NYAGATARE District in the Eastern Province of the Republic of Rwanda 9626-P1-0015-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice renewable	Yes
DelAgua Rwanda Public Health Program: CPA016- RWAMAGANA District in the Eastern Province of the Republic of Rwanda 9626-P1-0016-CP1	Version 4.4	CPA XXX - DelAgua Rwanda Public Health Program: CPAXX, in YY District in the ZZ Province of the Republic of Rwanda	19/04/2016 - 18/04/2023 7 years, twice renewable	Yes

A.2. Coordinating/managing entity

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DelAgua Health Rwanda Limited

SECTION B. Implementation of PoA**B.1. Description of implemented PoA**

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The PoA includes 16 CPAs. Households within each CPA received a combination of two technologies: the LifeStraw® water filter and the Dura high efficiency cookstove. These technologies are described in section A.1.

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. Households that received both a stove and filter are referred to as “Group 1”, while households that received only a stove are referred to as “Group 2”.

The sampling plan was applied to each group separately. This is further described below.

Only credits generated from cookstoves are quantified for this monitoring period; credits from water filters are not claimed for this monitoring period.

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

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. Distribution records were reviewed and cleaned to ensure accuracy, and the monitoring survey was reviewed by senior staff to ensure that the requirements of the monitoring plan were met. Monitoring survey responses were reviewed by senior staff to ensure that the requirements of the monitoring plan were met.

B.2. Post-registration changes to PoA

B.2.1. Corrections

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On 16 July 2020, the EB approved a post-registration change to the PoA (PRC-9626-005). These changes are represented in version 4.4 of the PoA-DD and version 4.4 of the CPA-DDs, and include:

- Change to stove name
 - The stove distributed was previously called the EcoZoom Dura, which is a reference to a previous partner on the project. The CME is working with new project partners, and so the stove name is being changed to avoid confusion. The stove manufacturer has confirmed that this is a cosmetic change and will not affect stove performance. This change was confirmed by the manufacturer on July 24, 2019, and will be applied to all stove shipments confirmed after this date. This change has no impact on emission reduction calculations.
- Minor updates have been made to the PoA-DD to comply with the updated PoA-DD template (version 09.0), including:
 - A discussion of how the PoA encourages sustainable development (in section A.1)
 - The discussion of the baseline scenario has been moved to section H.4.
 - Section A.1 was updated to include a discussion of how the PoA contributes to the sustainable development of the host Party

B.2.2. Inclusion of monitoring plan

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N/A

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

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On 01 June 2017, the EB approved a permanent change to the PoA-DD (PRC-9626-002). 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).

On 16 July 2020, the EB approved a post-registration change to the PoA (PRC-9626-005). These changes are represented in version 4.4 of the PoA-DD and version 4.4 of the CPA-DDs, and include:

- Correction to water quality monitoring & update to parameter
 - The previous version of the PoA allowed water quality to be confirmed through manufacturer certificates of compliance. However, AMS-III.AV requires water quality to be monitored on a sample basis via lab testing. The water quality parameter has therefore been revised to require annual monitoring by lab testing or official notification. This will ensure that water filters are delivering safe drinking water, and discount emission reductions accordingly if not. Further, the parameter value will be considered 0 in case monitoring results are not available. Given the cost of monitoring water quality, and depressed credit prices, the CME may elect set the parameter value to 0 to avoid the expense
- Update to Equation 2 (emission reductions from water filters)
 - Following on the correction to water quality monitoring discussed above, the calculation of emission reductions from water filters is discounted by WQ. This ensures a conservative estimate, as emission reductions are only claimed on the fraction of water filters that deliver safe drinking water.
- Change to sampling plan
 - The previous version of the sampling plan required the sampling frame to be differentiated by socioeconomic level, if the target group is a household. It was anticipated that household Ubedehe level could be used to this end. However, the ubedehe list is only updated every 4 years. Household wealth shifts significantly between list updates, and therefore the ubedehe level is an imperfect means for grouping households by wealth. Therefore, the sampling frame has been updated to differentiate households by either the ubedehe level, or the means by which households acquired the stove (free distribution, or retail sales). Further, the sampling plan previously stated the sampling frame include technologies with the same Installation year. This has been clarified to include technologies of similar operational lifetimes.
- Update to stove efficiency parameter
 - A comment was added to the parameter box in section I.7.1, stating that the efficiency of the project devices in the first batch must be monitored annually through representative samples and this rate of loss can be applied to subsequent batches. This corresponds to the monitoring procedures outlined in AMS-II.G, and was added to clarify that it is permissible in this PoA. It does not impact emission reductions. Further, paragraph 21(a) from AMS-II.G was added as a means to account for the loss in stove efficiency through time. This option allows a default schedule of linear decrease in efficiency up to the terminal efficiency assumed as 20 per cent shall be applied through the life span of the project device. If this option is selected, the device lifetime shall be set at 5 years, according to the lower end of the lifespan in the manufacturers specifications.

- Update to Life Span parameter
 - According to AMS-II.G, the life span should be reported in cases where the efficiency loss is determined using as per paragraph 21 (a). This parameter has therefore been updated to be required only if paragraph 21a is applicable in a CPA. This change follows the methodology and has no impact on emission reductions. Value shall be fixed and recorded at the time of commissioning/distribution.

B.2.4. Changes to programme design

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On 16 July 2020, the EB approved a post-registration change to the PoA (PRC-9626-005). These changes are represented in version 4.4 of the PoA-DD and version 4.4 of the CPA-DDs, and include:

- Change to installed/rated capacity
 - The stove specifications included in the previous version of the PoA-DD were for the version of the stove utilized in the pilot project. However, this was discovered only recently. Delagua reached out to the Rwanda Standards Board (RSB) in 2018, requesting certification of the project stove lifetime. In response to this request, RSB informed Delagua that it was still not able to conduct this testing, but that we should talk to the CREEEC lab because it was recently recognized testing agent (prior to this notification, Rwanda did not have a national standards body or certifying agent for woodstoves).
At the same time, Delagua was looking for alternatives to conducting in-house stove efficiency monitoring; our testing during the first two years of stove lifetime showed degradation levels that we suspected were excessive and we wanted a third-party to assess stove efficiency. Delagua therefore requested that CREEEC certify the stove lifetime and conduct efficiency tests for us. While CREEEC was not able to conduct the stove lifetime assessment, they were able to complete the efficiency tests. Delagua submitted project stoves that had been operational for 4 years to CREEEC for testing in August 2018, and was made aware of the change in efficiency upon completion of the CREEEC report the same month.
The stove efficiency in the PoA-DD was updated following DOE comments in August, 2019, from the initial value of 38.1% to 44.9% (with skirt) and 40.9% as specified in updated manufacturers specifications.
- Change to eligibility criterion #17 & 23, and 18 & 24:
 - This criterion previously required that all CPAs have aggregate energy savings below the relevant small-scale threshold (180 GWh thermal for Type II projects, and 60,000 tCO₂ for Type III projects). However, recent guidance from the EB² allows registered PoAs to submit a PRC to eliminate this threshold, so that CPAs can have aggregate energy savings below, equal to, or above the relevant threshold without penalty. This change streamlines management of the PoA without impacting emission reductions at the PoA-level.
 - Eligibility criterion # 18 & 24: Debundling check exemption has also been added. This change streamlines management of the PoA without impacting emission reductions at the PoA-level.

B.2.5. Changes specific to afforestation or reforestation activities

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N/A

² Paragraph 124(m) of CDM PS PoA Version 2

PART II Monitoring of CPAs

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This monitoring report covers the period from 15/09/2015 to 31/12/2018. As monitoring occurs on an annual basis, the full monitoring period is separated into the following subperiods:

Period A: 15/09/2015 – 31/08/2016

Period B: 01/09/2016 – 31/12/2016

Period C: 01/01/2017 – 31/12/2017

Period D: 01/01/2018 – 31/12/2018

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 100,567 households within 72 sectors of CPAs 1-7 in 2014. Group 2 included distribution of stoves to 195,227 households in CPAs 1-16; 156,291 households were in CPAs 8-16, and 38,936 households were located within 24 sectors of CPA 1-7 that did not receive technologies under Group 1. Group 2 distributions occurred between March and December, 2016, with 35,681 distributions occurring during Period A and 159,546 distributions occurring during Period B. 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	10537	7,295
CPA002 - Karongi	14482	4,303
CPA003 - Ngororero	17866	5,031
CPA004 - Nyabihu	10671	3,042
CPA005 - Nyamasheke	13959	5,801
CPA006 - Rutsiro	16765	6,111
CPA007 - Rusizi	16287	7,353
CPA008 - Bugesera	0	23,637
CPA009 - Burera	0	22,049
CPA010 - Gatsibo	0	21,786
CPA011 - Rulindo	0	15,066
CPA012 - Kayanza	0	13,394
CPA013 - Kirehe	0	13,955
CPA014 - Ngoma	0	15,515
CPA015 - Nyagatare	0	15,724
CPA016 - Rwamagana	0	15,165
Total	100567	195,227

Three types of surveys were conducted during this monitoring period.

1. Household surveys – These involve interview with end-users, with all survey results recorded on smartphones, to determine the following parameters

Parameter	Description
OC_filters	Operational Check, or the fraction of technologies in service
OC_stoves	Operational Check, or the fraction of technologies in service
AvgHHSIZE	Average HH Size
BS	Fraction of population for which baseline fuel is biomass

QPWhh,day,dryseason	Total Quantity of purified water per day - during the dry season
QPWhh,day,wetseason	Total Quantity of purified water per day - during the wet season
SDWfrac	Proportion of population served by a public distribution network of safe drinking water
UsageFrac - DRY	Fraction of total cooking that continues to be done on the baseline stove in the project scenario - during the dry season
UsageFrac - WET	Fraction of total cooking that continues to be done on the baseline stove in the project scenario - during the wet season
Uskirt	Pot skirt usage (% of cooking done with pot skirt)
Reboil	% of population that reboils water after filtering

Three rounds of household surveys were conducted during the monitoring period, each with a separate sample for Group 1 & Group 2

a. Survey 1

i. Group 1, conducted between 09/09/2016 – 25/10/2016 & 25/09/2017 – 28/09/2017

ii. Group 2, conducted between 09/08/2016 - 25/10/2016 & 25/09/2017 – 16/10/2017

b. Survey 2

i. Group 1, conducted between 18/06/2018 – 13/09/2018

ii. Group 2, conducted between 18/06/2018 – 24/09/2018

c. Survey 3

i. Group 1, conducted between 01/01/2019 – 22/01/2019

ii. Group 2, conducted between 01/01/2019 – 22/01/2019

2. Downtime Surveys - These surveys were conducted by Community Health Workers (CHWs), and involved interviews with end-users to determine the length of time that project technologies were not working. 2 rounds of Downtime surveys were conducted

a. Survey A

i. Group 1, conducted between 01/07/2018 – 01/10/2018

ii. Group 2, conducted between 01/07/2018 – 01/10/2018

b. Survey B

i. Group 1, conducted between 01/01/2019 – 25/03/2019

ii. Group 2, conducted between 01/01/2019 – 25/03/2019

3. Stove efficiency testing – Water boiling tests were conducted by the Centre for Research in Energy and Energy Conservation (CREEC) to determine project stove efficiency.

a. Efficiency Test 1 – 3 yr old stoves

b. Efficiency Test 2 – 4 yr old stoves

These surveys are further described in section E.3.

SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

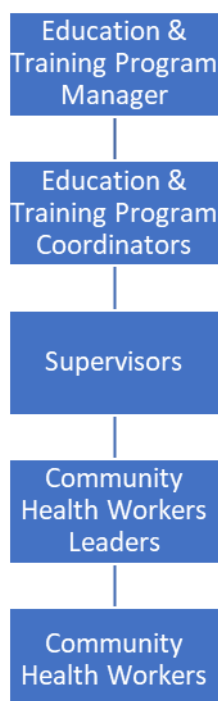
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Two technologies are distributed to CPAs; the LifeStraw® Family water filter and the Dura high-efficiency cook stove. These technologies are described in section A.1 above.

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). According to the approved monitoring plan, monitoring must be conducted separately for end-users with similar characteristics; combination of technologies 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:



Beneficiary households were identified based on Ubudehe lists developed by local authorities and approved by the government of Rwanda. All beneficiary households were members of Ubudehe 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 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 Northern 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

In addition to these distributions, CHW teams conducted follow-up HH visits to each beneficiary HH, to ensure the continued proper use of technologies and to identify maintenance concerns. The structure of the follow-up program was similar to the initial distributions. District Managers spent 1 day retraining each CHW team. CHWs then visited HHs, with one CHW visiting each house (the District Manager spent 3 or 4 days conducting visits with CHWs, to ensure consistency in survey delivery. During these visits, CHWs identified units that needed repair or replacement, and recorded this information in the CHW survey (via smart-phone). This information is currently being stored until DelAgua has the necessary parts. The CME has also established a call-center so that households can notify DelAgua when technologies need to be repaired or replaced. Households were informed of this during the initial distribution and made aware of it again during follow-up visits.

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 were approximately 4 years old at the end of this monitoring period. Efficiency tests on these stoves found that the average efficiency has not dropped below 20%, as described under parameter $\eta_{new,i,j}$.

C.2. Location of CPAs

>>

Each specific case CPA is 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
- CPA007 - Rusizi
- CPA008 – Bugesera
- CPA009 - Burera
- CPA010 - Gatsibo
- CPA011- Rulindo
- CPA012 – Kayonza
- CPA013 - Kirehe
- CPA014 – Ngoma
- CPA015 – Nyagatare
- CPA016 - Rwamagana

C.3. Post-registration changes to CPAs

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

>> On 23 July 2020, the EB approved temporary deviations to the component project activities included in the PoA "DelAgua Public Health Program in Eastern Africa" (9626) - PRC ref Nos. PRC-9626-006 through PRC-9626-021. These changes are represented in version 4.4 of the PoA-DD and version 4.4 of the CPA-DDs, and include:

Several temporary deviations are applied to this monitoring period:

1. Three deviations are applied to stove efficiency monitoring:
 - a. Project stoves were not submitted to CREEC for testing for period A (15/09/2015 - 31/08/2016) & period B (01/09/2016– 31/12/2016)
 - b. The monitored stove efficiency for the period 01/01/2017 – 31/12/2017 (45.2 w/ pot skirt) is higher than the design efficiency (44.9%).
 - c. Group 1 stoves were submitted to CREEC for testing, and these results were applied to Group 2.

Based on WBTs conducted by CREEC, the following stove efficiency values were found during this monitoring period:

	New Stove	3-yr old stove (01/01/2017 – 12/31/2017)	4 yr old stove (01/01/2018 – 12/31/2018)
With Pot Skirt	44.9%	45.2%	36.6%
Without Pot Skirt	40.9%	31.1%	31.1%

To address the 3 deviations identified above, the lowest monitored values will be applied to all Groups for the entire monitoring period. As the lowest value measured by CREEC is for 4 yr old stoves

The Group 1 stoves were in households with filters, and the Group 2 stoves were not, and therefore the Group 2 stoves could have experience more use (for water boiling) than the Group 1 stoves. However, the Group 1 stoves were 1.25 to 2 years older than the Group 2 stoves, and the efficiency results for these older stoves were applied to the younger Group 1 stoves. Regardless, to ensure a conservative result, the lowest CREEC monitoring result will be applied

2. The monitoring plan requires household surveys to be conducted annually. However, household surveys were not conducted for Period B (01/09/2016-31/12/2016). For parameters determined by household surveys, values for Period A are set as the most conservative value found by monitoring for each Group during other periods.
3. The downtime survey is required to be conducted annually. However, downtime surveys were not conducted for Period A (15/09/2015-31/08/2016) and Period B (01/09/2016-31/12/2016). Therefore, the most conservative result realized in other downtime surveys is applied to these two periods. Since Periods A and B are earlier than Periods C and D, and stoves tend to have more maintenance issues the longer they are in operation, this is conservative.

In sum, the deviations applied to each period are as follows:

	Household	Downtime	Stove Efficiency Testing
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			Group 1	Group 2
Period A: 15/09/2015- 31/08/2016	Monitored value used	Deviation – Max value applied	Deviation – Min value applied	Deviation – Min value applied
Period B: 01/09/2016- 31/12/2016	Deviation – Most conservative value applied	Deviation – Max value applied	Deviation – Min value applied	Deviation – Min value applied
Period C: 01/01/2017- 31/12/2017	Monitored value used	Monitored value used	Deviation – Min value applied	Deviation – Min value applied
Period D: 01/01/2018- 31/12/2018	Monitored value used	Monitored value used	Monitored value used	Deviation – Min value applied

4. Due to an error in the registered monitoring plan, water quality was not properly monitored during this monitoring period. Therefore, emission reductions from water filters are not claimed during this entire monitoring period. Water filters were otherwise monitored properly, and emission reductions from cookstoves were adjusted to account for cross-effects.

C.3.2. Corrections

>>

On 23 July 2020, the EB approved a post-registration change to the component project activities included in the PoA "DelAgua Public Health Program in Eastern Africa" (9626) - PRC ref Nos. PRC-9626-006 through PRC-9626-021. These changes are represented in version 4.4 of the PoA-DD and version 4.4 of the CPA-DDs, and include:

- Correction to water quality monitoring & update to parameter
 - The previous version of the PoA allowed water quality to be confirmed through manufacturer certificates of compliance. However, AMS-III.AV requires water quality to be monitored on a sample basis via lab testing. The water quality parameter has therefore been revised to require annual monitoring by lab testing or official notification. This will ensure that water filters are delivering safe drinking water, and discount emission reductions accordingly if not. Further, the parameter value will be considered 0 in case monitoring results are not available. Given the cost of monitoring water quality, and depressed credit prices, the CME may elect set the parameter value to 0 to avoid the expense
- Update to Equation 2 (emission reductions from water filters)
 - Following on the correction to water quality monitoring discussed above, the calculation of emission reductions from water filters is discounted by WQ. This ensures a conservative estimate, as emission reductions are only claimed on the fraction of water filters that deliver safe drinking water.
- Change to sampling plan
 - The previous version of the sampling plan required the sampling frame to be differentiated by socioeconomic level, if the target group is a household. It was anticipated that household Ubedehe level could be used to this end. However, the ubedehe list is only updated every 4 years. Household wealth shifts significantly between list updates, and therefore the ubedehe level is an imperfect means for grouping households by wealth. Therefore, the sampling frame has been updated to differentiate households by either the ubedehe level, or the means by which households acquired the stove (free distribution, or retail sales). Further, the sampling plan previously stated the sampling frame include technologies with the same Installation year. This has been clarified to include technologies of similar operational lifetimes.
- Update to stove efficiency parameter

- A comment was added to the parameter box in section I.7.1, stating that the efficiency of the project devices in the first batch must be monitored annually through representative samples and this rate of loss can be applied to subsequent batches. This corresponds to the monitoring procedures outlined in AMS-II.G, and was added to clarify that it is permissible in this PoA. It does not impact emission reductions. Further, paragraph 21(a) from AMS-II.G was added as a means to account for the loss in stove efficiency through time. This option allows a default schedule of linear decrease in efficiency up to the terminal efficiency assumed as 20 per cent shall be applied through the life span of the project device. If this option is selected, the device lifetime shall be set at 6 years, according to the lower end of the lifespan in the manufacturers specifications.
- Update to Life Span parameter
 - According to AMS-II.G, the life span should be reported in cases where the efficiency loss is determined using as per paragraph 21 (a). This parameter has therefore been updated to be required only if paragraph 21a is applicable in a CPA. This change follows the methodology and has no impact on emission reductions. Value shall be fixed and recorded at the time of commissioning/distribution.

C.3.3. Changes to the start date of the crediting period

>>
N/A

C.3.4. Inclusion of monitoring plan

>>
N/A

C.3.5. Permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

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On 01 June 2017, the EB approved a permanent change to the PoA (PRC-9626-002). 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.

On 23 July 2020, the EB approved a post-registration change to the component project activities included in the PoA "DelAgua Public Health Program in Eastern Africa" (9626) - PRC ref Nos. PRC-9626-006 through PRC-9626-021. These changes are represented in version 4.4 of the PoA-DD and version 4.4 of the CPA-DDs, and include:

- Correction to water quality monitoring & update to parameter
 - The previous version of the PoA allowed water quality to be confirmed through manufacturer certificates of compliance. However, AMS-III.AV requires water quality to be monitored on a sample basis via lab testing. The water quality parameter has therefore been revised to require annual monitoring by lab testing or official notification. This will ensure that water filters are delivering safe drinking water, and discount emission reductions accordingly if not. Further, the parameter value will be considered 0 in case monitoring results are not available. Given the cost of monitoring water quality, and depressed credit prices, the CME may elect set the parameter value to 0 to avoid the expense
- Update to Equation 2 (emission reductions from water filters)
 - Following on the correction to water quality monitoring discussed above, the calculation of emission reductions from water filters is discounted by WQ. This ensures a conservative estimate, as emission reductions are only claimed on the fraction of water filters that deliver safe drinking water.

- Change to sampling plan
 - The previous version of the sampling plan required the sampling frame to be differentiated by socioeconomic level, if the target group is a household. It was anticipated that household Ubedehe level could be used to this end. However, the ubedehe list is only updated every 4 years. Household wealth shifts significantly between list updates, and therefore the ubedehe level is an imperfect means for grouping households by wealth. Therefore, the sampling frame has been updated to differentiate households by either the ubedehe level, or the means by which households acquired the stove (free distribution, or retail sales). Further, the sampling plan previously stated the sampling frame include technologies with the same Installation year. This has been clarified to include technologies of similar operational lifetimes.
- Update to stove efficiency parameter
 - A comment was added to the parameter box in section I.7.1, stating that the efficiency of the project devices in the first batch must be monitored annually through representative samples and this rate of loss can be applied to subsequent batches. This corresponds to the monitoring procedures outlined in AMS-II.G, and was added to clarify that it is permissible in this PoA. It does not impact emission reductions. Further, paragraph 21(a) from AMS-II.G was added as a means to account for the loss in stove efficiency through time. This option allows a default schedule of linear decrease in efficiency up to the terminal efficiency assumed as 20 per cent shall be applied through the life span of the project device. If this option is selected, the device lifetime shall be set at 5 years, according to the lower end of the lifespan in the manufacturers specifications.
- Update to Life Span parameter
 - According to AMS-II.G, the life span should be reported in cases where the efficiency loss is determined using as per paragraph 21 (a). This parameter has therefore been updated to be required only if paragraph 21a is applicable in a CPA. This change follows the methodology and has no impact on emission reductions. Value shall be fixed and recorded at the time of commissioning/distribution.

C.3.6. Changes to project design

>>

On 23 July 2020, the EB approved a post-registration change to the component project activities included in the PoA "DelAgua Public Health Program in Eastern Africa" (9626) - PRC ref Nos. PRC-9626-006 through PRC-9626-021. These changes are represented in version 4.4 of the PoA-DD and version 4.4 of the CPA-DDs, and include:

- Change to installed/rated capacity
 - The stove specifications included in the previous version of the PoA-DD were for the version of the stove utilized in the pilot project. However, this was discovered only recently. Delagua reached out to the Rwanda Standards Board (RSB) in 2018, requesting certification of the project stove lifetime. In response to this request, RSB informed DelAgua that it was still not able to conduct this testing, but that we should talk to the CREEEC lab because it was recently recognized testing agent (prior to this notification, Rwanda did not have a national standards body or certifying agent for woodstoves). At the same time, DelAgua was looking for alternatives to conducting in-house stove efficiency monitoring; our testing during the first two years of stove lifetime showed degradation levels that we suspected were excessive and we wanted a third-party to assess stove efficiency. DelAgua therefore requested that CREEEC certify the stove lifetime and conduct efficiency tests for us. While CREEEC was not able to conduct the stove lifetime assessment, they were able to complete the efficiency tests. DelAgua submitted project stoves that had been operational for 4 years to CREEEC for testing in August 2018, and was made aware of the change in efficiency upon completion of the CREEEC report the same month.

The stove efficiency in the PoA-DD was updated following DOE comments in August, 2019, from the initial value of 38.1% to 44.9% (with skirt) and 40.9% (Without skirt) as specified in updated manufacturers specifications.

- Change to eligibility criterion #17 & 23, and 18 & 24:
 - This criterion previously required that all CPAs have aggregate energy savings below the relevant small-scale threshold (180 GWh thermal for Type II projects, and 60,000 tCO₂ for Type III projects. However, recent guidance from the EB³ allows registered PoAs to submit a PRC to eliminate this threshold, so that CPAs can have aggregate energy savings below, equal to, or above the relevant threshold without penalty. This change streamlines management of the PoA without impacting emission reductions at the PoA-level.
 - Eligibility criterion # 18 &24: Debundling check exemption has also been added. This change streamlines management of the PoA without impacting emission reductions at the PoA-level.

C.3.7. Changes specific to afforestation or reforestation CPA

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N/A

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 included 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 is accounted for and appropriately deducted from emission reduction claims.

³ Paragraph 124(m) of CDM PS PoA Version 2

SECTION E. Data and parameters**E.1. Data and parameters fixed ex ante***(Copy this table for each data or parameter.)*

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 tCO ₂ /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 allowed by AMS-III.A.V. and AMS-II.G.
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	Default
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	EF _{projected_fossilfuel}
Unit	tCO ₂ /TJ
Description	Emission factor for the projected fossil fuel consumption in the baseline, when the displaced fuel is kerosene.
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 2.2
Value(s) applied	71.9 tCO ₂ /TJ
Choice of data or measurement methods and procedures	IPCC default value
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	WH
Unit	(kJ/L °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	°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	NCV _{biomass}
Unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass used in project devices
Source of data	IPCC default value for wood fuel
Value(s) applied	0.015
Choice of data or measurement methods and procedures	Default value specified in methodology.
Purpose of data	Calculation of emission reductions
Additional comments	Used for the cook stove calculation.

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/parameter	Calculation of emission reductions.

Additional comment	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. 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 HH_{size}). However, the EB-approved cross-effects calculations used under this PoA allows for a monitored value of HH_{size}. 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.
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E.2. Data and parameters monitored

As described in Part II above, three types of surveys were conducted for the four periods covered in this monitoring report. Parameter values are described for Period D below. Where the parameter results apply to all periods, this is noted in the applicable "Value" row in the parameter boxes below. Parameter values that vary between periods are described for Periods A,B and C in the Appendix.

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, for all Periods)
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/parameter	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) monitored parameter		Group 1		Group 2
		Stove	Filter	Stove
				241.09
	CPA001	189.61	220.90	
	CPA002	189.61	220.90	241.09
	CPA003	189.61	220.90	241.09
	CPA004	189.61	220.90	241.09
	CPA005	189.61	220.90	241.09
	CPA006	189.61	220.90	241.09
	CPA007	189.61	220.90	241.09
	CPA008			241.09
	CPA009	-	-	241.09
	CPA010	-	-	241.09
	CPA011	-	-	241.09
	CPA012	-	-	241.09
	CPA013	-	-	241.09
	CPA014	-	-	241.09
CPA015	-	-	241.09	
CPA016	-	-	241.09	
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. The steps to determining the average operating period is as follows: 1. The number of days that technologies are deployed is determined from the PoA database, based on the average distribution date within a CPA. Days Deployed <table border="1"> <thead> <tr> <th></th><th colspan="2">Group 1</th><th>Group 2</th></tr> <tr> <th></th><th>Stove</th><th>Filter</th><th>Stove</th></tr> </thead> <tbody> <tr><td>CPA001</td><td>365</td><td>365</td><td>365</td></tr> <tr><td>CPA002</td><td>365</td><td>365</td><td>365</td></tr> <tr><td>CPA003</td><td>365</td><td>365</td><td>365</td></tr> <tr><td>CPA004</td><td>365</td><td>365</td><td>365</td></tr> <tr><td>CPA005</td><td>365</td><td>365</td><td>365</td></tr> <tr><td>CPA006</td><td>365</td><td>365</td><td>365</td></tr> <tr><td>CPA007</td><td>365</td><td>365</td><td>365</td></tr> <tr><td>CPA008</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA009</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA010</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA011</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA012</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA013</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA014</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA015</td><td>-</td><td>-</td><td>365</td></tr> <tr><td>CPA016</td><td>-</td><td>-</td><td>365</td></tr> </tbody> </table> 2. The number of days that stoves & filters were not working was determined during HH visits conducted by CHWs (not during the same verification survey as other monitored parameters). Days Technologies Not Working <table border="1"> <thead> <tr> <th>Group</th><th>Stove</th><th>Filter</th></tr> </thead> <tbody> <tr> <td>Group 1</td><td>43.30</td><td>72.89</td></tr> <tr> <td>Group 2</td><td>18.50</td><td>NA</td></tr> </tbody> </table> 3. The final step is different for stoves and filters For stoves, the days in the field was discounted by continued usage of the baseline stove. Usage was captured by verification survey questions 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,		Group 1		Group 2		Stove	Filter	Stove	CPA001	365	365	365	CPA002	365	365	365	CPA003	365	365	365	CPA004	365	365	365	CPA005	365	365	365	CPA006	365	365	365	CPA007	365	365	365	CPA008	-	-	365	CPA009	-	-	365	CPA010	-	-	365	CPA011	-	-	365	CPA012	-	-	365	CPA013	-	-	365	CPA014	-	-	365	CPA015	-	-	365	CPA016	-	-	365	Group	Stove	Filter	Group 1	43.30	72.89	Group 2	18.50	NA
	Group 1		Group 2																																																																															
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	<table border="1"> <thead> <tr> <th></th> <th>Group 1</th> <th>Group 2</th> </tr> </thead> <tbody> <tr> <td>% of cooking on baseline system in the wet season</td> <td>46.66%</td> <td>31.73%</td> </tr> <tr> <td>% of cooking on baseline system in the dry season</td> <td>35.43%</td> <td>29.10%</td> </tr> <tr> <td>% Period in Wet Season</td> <td>50%</td> <td>50%</td> </tr> <tr> <td>Weighted Average Use of Project Stove</td> <td>58.94%</td> <td>69.58%</td> </tr> </tbody> </table>		Group 1	Group 2	% of cooking on baseline system in the wet season	46.66%	31.73%	% of cooking on baseline system in the dry season	35.43%	29.10%	% Period in Wet Season	50%	50%	Weighted Average Use of Project Stove	58.94%	69.58%
		Group 1	Group 2													
	% of cooking on baseline system in the wet season	46.66%	31.73%													
	% of cooking on baseline system in the dry season	35.43%	29.10%													
% Period in Wet Season	50%	50%														
Weighted Average Use of Project Stove	58.94%	69.58%														
For filters, the number of days deployed is discounted by the operational check (fraction of water filters deployed that are being used). Monitoring surveys determined that 75.88% of filters were being actively used by HHs. Note that the operational check for stoves is used to discount N, rather than this parameter.																
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) of monitored parameter	District	Group 1			Group 2 Stoves
		Stoves w/ cross—effects (CE)	Stoves w/o cross-effects (CE)	Filters	
	CPA001 - Rubavu	7,450.97	1,064.42	10,537	6,655.78
	CPA002 - Karongi	10,243.50	1,463.36	14,482	3,925.95
	CPA003 - Ngororero	12,612.16	1,801.74	17866	4,590.16
	CPA004 - Nyabihu	7,558.00	1,079.71	10,671	2,775.45
	CPA005 -			13,959	5,292.69

	Nyamasheke	9,831.59	1,404.51													
	CPA006 - Rutsiro	11,876.35	1,696.62	16,765	5,575.53											
	CPA007 - Rusizi	11,477.12	1,639.59	16,287	6,708.70											
	CPA008 - Bugesera	0	0	0	21,565.84											
	CPA009 - Burera	0	0	0	20,116.98											
	CPA010 - Gatsibo	0	0	0	19,877.03											
	CPA011 - Rulindo	0	0	0	13,745.86											
	CPA012 - Kayonza	0	0	0	12,220.37											
	CPA013 - Kirehe	0	0	0	12,732.21											
	CPA014 - Ngoma	0	0	0	14,155.52											
	CPA015 - Nyagatare	0	0	0	14,346.20											
	CPA016 - Rwamagana	0	0	0	13,836.19											
	Total		10,149.96	100,567												
		71,049.70			178,120.48											
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 Operational check. The operational check parameter is determined during monitoring surveys, as the percentage of technologies that are present in the household (specifically, surveyors observe whether technologies are present in the household; if the technologies are present, the operational check is 1, if the technology is not present, the operational check is 0. Users are separately asked about frequency of use, and the number of days that technologies could not be used because they needed repair, but these questions do not impact the Operational Check parameter; instead they determine other parameter values, including the % of cooking on baseline system in the wet season/dry season and $\mu_{y,ij}$. Stoves within Group 1 HHs were also separated to account for cross-effects, as described below.															
	The number of stoves distributed is as follows:															
	<table><tr><th>District</th><th>Group 1</th><th>Group 2</th></tr><tr><td>CPA001 - Rubavu</td><td>10,537</td><td>7,295</td></tr><tr><td>CPA002 - Karongi</td><td>14,482</td><td>4,303</td></tr><tr><td>CPA003 - Ngororero</td><td>17866</td><td></td></tr></table>					District	Group 1	Group 2	CPA001 - Rubavu	10,537	7,295	CPA002 - Karongi	14,482	4,303	CPA003 - Ngororero	17866
District	Group 1	Group 2														
CPA001 - Rubavu	10,537	7,295														
CPA002 - Karongi	14,482	4,303														
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			5,031	
	CPA004 - Nyabihu	10,671	3,042	
	CPA005 - Nyamasheke	13,959	5,801	
	CPA006 - Rutsiro	16,765	6,111	
	CPA007 - Rusizi	16,287	7,353	
	CPA008 - Bugesera	0	23,637	
	CPA009 - Burera	0	22,049	
	CPA010 - Gatsibo	0	21,786	
	CPA011 - Rulindo	0	15,066	
	CPA012 - Kayonza	0	13,394	
	CPA013 - Kirehe	0	13,955	
	CPA014 - Ngoma	0	15,515	
	CPA015 - Nyagatare	0	15,724	
	CPA016 - Rwamagana	0	15,165	
	Total	100,567	195,227	
	Surveys determined the Operational Check to be 96.04% for Group 2 stoves, and so the number of stoves distributed was discounted by 96.04%. For Group 1, the Operational Check was 84.71% stoves, and 74.12% for filters. Cross-effects are accounted for in the 75.88% of HHs where the stove and filter were both present. Cross-effects is not considered in the remaining 10.59% (84.71%-74.12%) of stoves in HHs that no longer had a 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 affect N.			
QA/QC procedures	N/A			
Purpose of data/parameter	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) of monitored	For Group 1

parameter	4.46 occupants For Group 2 4.08 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 Bold,PP under the description of Bold) to determine Bold. According to AMS-III.AV, the ex-ante value of HHsize 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 (QPW_y) shall be divided by HHsize, to determine QPWPP., 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 2 100%
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. These results found that 100% of HHs utilize biomass as well.
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	0 Zero credits are claimed from water filters during this monitoring period, and therefore QPW is 0. However, QPW was monitored in order to apply cross-effects to stove emission reductions. The results used to calculate cross-effects are presented in Appendix A. Using these results, QPW would be 2,113.86 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 surveys determined QPW per HH per day to be 6.61 litres/HH/day in the dry season and 4.97 litres/HH/day in the wet season. Based on the percent of the monitoring period in the wet season (50%), the average litres/year/HH is 2,113.86. 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 (4.46 people), the weighted average litres/pp/day is 1.29. 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.
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter is only relevant for Group 1 HHs. QPW _y 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	Measured
Source of data	See temporary deviation in C.3.1. Water quality was not properly monitored during this monitoring period, and therefore emission reductions from water filters are not claimed during this period.
Value(s) applied	0
Monitoring Equipment	See temporary deviation in C.3.1. Water quality was not properly monitored during this monitoring period, and therefore emission reductions from water filters are not claimed during this period.
Measuring/reading/recording frequency	Annually
Calculation method (if applicable)	See temporary deviation in C.3.1. Water quality was not properly monitored during this monitoring period, and therefore emission reductions from water filters are not claimed during this period.
QA/QC procedures	See temporary deviation in C.3.1. Water quality was not properly monitored during this monitoring period, and therefore emission reductions from water filters are not claimed during this period.
Purpose of data	Calculation of baseline emissions
Additional comments	See temporary deviation in C.3.1. Water quality was not properly monitored during this monitoring period, and therefore emission reductions from water filters are not claimed during this period.

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 0.00 %
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	$\eta_{\text{new},i,j}$																				
Unit	Fraction																				
Description	Efficiency of the device of each type <i>i</i> and batch <i>j</i> implemented as part of the project activity.																				
Measured/calculated/default	Calculated																				
Source of data	Efficiency value was certified by the Centre for Research in Energy and Energy Conservation (CREEC), an agent recognized by Rwanda's national standards body.																				
Value(s) applied	For Group 1 36.24% For Group 2 36.46%																				
Monitoring equipment	Tests conducted by 3 rd party lab recognized by Rwanda's national standards body																				
Measuring/reading/recording frequency	Annually																				
Calculation method (if applicable)	CREEC conducted 2 tests with pot skirt and 4 tests without pot skirt. The tests with pot skirt determined average efficiency to be 36.6%. The tests of stoves without a pot skirt determined the average efficiency to be 31.1%. The combined results are as follows: <table border="1"> <thead> <tr> <th></th><th colspan="2">Group 1</th><th colspan="2">Group 2</th></tr> <tr> <th></th><th>Stove Efficiency, based on water boiling test results</th><th>% Usage (Monitoring Survey)</th><th>Stove Efficiency, based on water boiling test results</th><th>% Usage (Monitoring Survey)</th></tr> </thead> <tbody> <tr> <td>w/ Pot Skirt*</td><td>36.6%</td><td>93.42%</td><td>36.6%</td><td>97.44%</td></tr> <tr> <td>w/o Pot Skirt*</td><td>31.1%</td><td>6.58%</td><td>31.1%</td><td>2.66%</td></tr> </tbody> </table> Pot Skirt usage is estimated for Dura users only. Results from non-Dura users (households that indicate they never use the Dura) are excluded from this calculation. Results from non-Dura users are instead used to determine the % of cooking done on the baseline stove in the wet/dry season. Based on the above values, the weighted average efficiency value is 36.24% for group 1 stoves, and 36.46% for group 2 stoves.		Group 1		Group 2			Stove Efficiency, based on water boiling test results	% Usage (Monitoring Survey)	Stove Efficiency, based on water boiling test results	% Usage (Monitoring Survey)	w/ Pot Skirt*	36.6%	93.42%	36.6%	97.44%	w/o Pot Skirt*	31.1%	6.58%	31.1%	2.66%
	Group 1		Group 2																		
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w/ Pot Skirt*	36.6%	93.42%	36.6%	97.44%																	
w/o Pot Skirt*	31.1%	6.58%	31.1%	2.66%																	
QA/QC procedures	Efficiency tests were conducted by CREEC, an approved agent Usage rates were determined by sampling, following the QA/QC procedures in the approved monitoring plan.																				

Purpose of data	Calculation of project emissions
Additional comments	-

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 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	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 3 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 $\eta_{new,i,j}$.

Data / Parameter	Date of commissioning of batch j
Unit	Date
Description	Date of distribution
Measured/calculated/ default	Recorded at time of distribution
Source of data	Internal records
Value(s) applied	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 border="1"> <thead> <tr> <th>CPA</th><th>Group 1</th><th>Group 2</th></tr> </thead> <tbody> <tr><td>CPA001</td><td>04/11/2014</td><td>17/03/2016</td></tr> <tr><td>CPA002</td><td>12/11/2014</td><td>02/04/2016</td></tr> <tr><td>CPA003</td><td>09/11/2014</td><td>20/03/2016</td></tr> <tr><td>CPA004</td><td>11/11/2014</td><td>23/05/2016</td></tr> <tr><td>CPA005</td><td>17/11/2014</td><td>03/03/2016</td></tr> <tr><td>CPA006</td><td>09/11/2014</td><td>21/04/2016</td></tr> <tr><td>CPA007</td><td>12/11/2014</td><td>20/03/2016</td></tr> <tr><td>CPA008</td><td>-</td><td>28/04/2016</td></tr> <tr><td>CPA009</td><td>-</td><td>18/03/2016</td></tr> <tr><td>CPA010</td><td>-</td><td>08/06/2016</td></tr> <tr><td>CPA011</td><td>-</td><td>09/03/2016</td></tr> <tr><td>CPA012</td><td>-</td><td>10/03/2016</td></tr> <tr><td>CPA013</td><td>-</td><td>07/05/2016</td></tr> <tr><td>CPA014</td><td>-</td><td>17/03/2016</td></tr> <tr><td>CPA015</td><td>-</td><td>06/03/2016</td></tr> <tr><td>CPA016</td><td>-</td><td>21/03/2016</td></tr> </tbody> </table>	CPA	Group 1	Group 2	CPA001	04/11/2014	17/03/2016	CPA002	12/11/2014	02/04/2016	CPA003	09/11/2014	20/03/2016	CPA004	11/11/2014	23/05/2016	CPA005	17/11/2014	03/03/2016	CPA006	09/11/2014	21/04/2016	CPA007	12/11/2014	20/03/2016	CPA008	-	28/04/2016	CPA009	-	18/03/2016	CPA010	-	08/06/2016	CPA011	-	09/03/2016	CPA012	-	10/03/2016	CPA013	-	07/05/2016	CPA014	-	17/03/2016	CPA015	-	06/03/2016	CPA016	-	21/03/2016
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Monitoring Equipment	Recorded during distribution of each device, using smartphones																																																			
Monitoring frequency	Fixed and recorded at the time of commissioning/distribution of each device																																																			
Calculation method (if applicable)	-																																																			
QA/QC procedures	-																																																			
Purpose of data	Calculation of baseline emissions																																																			
Additional comments	To be reported in the monitoring report Relevant for cookstove technologies only (not water filters)																																																			

Data / Parameter	Date of commissioning of project stove device i																																							
Unit	Date																																							
Description	Actual date of commissioning of the project device.																																							
Measured/calculated/default	Recorded at time of distribution																																							
Source of data	Internal records																																							
Value(s) applied	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 border="1"> <thead> <tr> <th>CPA</th><th>Group 1</th><th>Group 2</th></tr> </thead> <tbody> <tr><td>CPA001</td><td>04/11/2014</td><td>17/03/2016</td></tr> <tr><td>CPA002</td><td>12/11/2014</td><td>02/04/2016</td></tr> <tr><td>CPA003</td><td>09/11/2014</td><td>20/03/2016</td></tr> <tr><td>CPA004</td><td>11/11/2014</td><td>23/05/2016</td></tr> <tr><td>CPA005</td><td>17/11/2014</td><td>03/03/2016</td></tr> <tr><td>CPA006</td><td>09/11/2014</td><td>21/04/2016</td></tr> <tr><td>CPA007</td><td>12/11/2014</td><td>20/03/2016</td></tr> <tr><td>CPA008</td><td>-</td><td>28/04/2016</td></tr> <tr><td>CPA009</td><td>-</td><td>18/03/2016</td></tr> <tr><td>CPA010</td><td>-</td><td>08/06/2016</td></tr> <tr><td>CPA011</td><td>-</td><td>09/03/2016</td></tr> <tr><td>CPA012</td><td>-</td><td>10/03/2016</td></tr> </tbody> </table>	CPA	Group 1	Group 2	CPA001	04/11/2014	17/03/2016	CPA002	12/11/2014	02/04/2016	CPA003	09/11/2014	20/03/2016	CPA004	11/11/2014	23/05/2016	CPA005	17/11/2014	03/03/2016	CPA006	09/11/2014	21/04/2016	CPA007	12/11/2014	20/03/2016	CPA008	-	28/04/2016	CPA009	-	18/03/2016	CPA010	-	08/06/2016	CPA011	-	09/03/2016	CPA012	-	10/03/2016
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CPA008	-	28/04/2016																																						
CPA009	-	18/03/2016																																						
CPA010	-	08/06/2016																																						
CPA011	-	09/03/2016																																						
CPA012	-	10/03/2016																																						

	CPA013	-	07/05/2016
	CPA014	-	17/03/2016
	CPA015	-	06/03/2016
	CPA016	-	21/03/2016
Monitoring equipment	Recorded on smartphones during distribution of each device		
Measuring/reading/recording frequency	Fixed and recorded at the time of commissioning/distribution		
Calculation method (if applicable)	-		
QA/QC procedures	-		
Purpose of data	Calculation of baseline emissions		
Additional comments	To be reported in the monitoring report		
	Relevant for cookstove technologies only (not water filters)		

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

- EF_{projected_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-KPT,i,j,ce} - This parameter is monitored if B_{y,savings,i,j,ce} is calculated by kitchen performance test. Instead WBTs were used to determine B_{y,savings,i,j,ce}.
- B_{y=1,new,i,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

>>

Given the duration of the monitoring period, three rounds of monitoring surveys were conducted. This section presents the description of the second round of monitoring surveys. Other survey rounds are described in the appendix.

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 a Dura cookstove.
2. For Group 2: All beneficiary HHs received a 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 December 2016

-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, Version 08.0*, 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 $\eta_{\text{new},i,j}$ above.

For parameters monitored via survey, sample sizes were estimated for each parameter using survey results from the previous monitoring period. Sample sizes were calculated for each surveyed parameter using simple random sampling. With the exception of the parameter 'number of days that stoves are not working', ex-ante calculations determined that 148 surveys would need to be conducted for Group 1 and 94 surveys would need to be conducted for Group 2 (note that this excludes the estimate for 'number of days that stoves are not working', which is discussed in the paragraph below). DelAgua actually conducted 271 surveys; 101 in Group 2 HHs and 170 in Group 1 HHs.

Survey size estimates for the downtime survey determined that a total of 11,890 surveys were required; 3,355 surveys for Group 1 and 8,525 for Group 2. A total of 80,044 surveys were conducted in Group 1 and 139,466 surveys were conducted in Group 2.

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:

- A training was held prior to each household survey and included a review of the survey questions and general communication skills. All surveyors 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 works (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.
- 2 rounds of downtime surveys were conducted by CHWs to monitor the parameters 'number of days that stoves are not working' and 'number of days that filters are not working'. CHW surveys were used. Teams of 11 CHWs were selected in each sector by DelAgua district managers and were invited to a one-day classroom training. Typically, the CHWs had already worked with DelAgua and were familiar with the program. In cases where a CHW was not available to return, the district manager interviewed additional CHWs and invited them to the training. Following the training, CHWs administered surveys to all households in their sector. The district manager evaluated all CHWs upon completion of the training (and prior to CHWs administering surveys) across several variables, including command of the smart phone (used to collect survey information), ability to communicate, preparedness, program knowledge and general attitude; if a CHW did not achieve a 75% score, then the district manager accompanied the CHW on the first surveys to deliver additional support. District managers revisited at least 2 households surveyed by each CHW, to assess the effectiveness of the survey administered by the CHW.
- 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, with the exception of the following surveyed parameters:

- The number of days that stoves are not working and the number of days that filters are not working. As described below, surveys to determine these parameters were conducted nearly a year after the end of the monitoring period. Since technologies have been operating longer, it would be expected that they would have more

maintenance issues that could reduce usage. Therefore, to be conservative, we did not remove outliers for these surveyed parameters. The two surveyed parameters are used to calculate the Operating Fraction for stoves and filters, respectively.

- Pot skirt usage. This value can reasonably be expected to fluctuate between 0%-100%, based on household usage patterns, and therefore results were not limited to the inner quartile range. Instead, datapoints were only removed due to data entry errors, or to exclude households that did not use the Dura stove (pot skirt usage is only recorded for Dura users).
- Quantity of Purified Water – The outlier analysis was conducted on litres/person/day; if this value exceeded 5 l/p/d, the datapoint was considered an outlier and removed from the dataset.
- The number of days that a filter/stove was not operational was limited to the duration of the monitoring period.
- An outlier analysis was not conducted on the Downtime Survey results. All survey results were valid (no outliers were identified). Since these visits were conducted approximately two years after the end of this reporting period, they are more likely to have problems that render them inoperable, increasing the number of days that the technology was not working, and decreasing emission reductions.

The dataset is provided to the DOE for review.

SECTION F. Calculation of emission reductions or net anthropogenic removals

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

>>

The calculations below are for improved cookstoves. Water filter calculations are not included here because no emission reductions are claimed during this monitoring period.

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

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 ₂ e
$ER_{y,i,j}$	Emission reductions by project device of type i and batch j during year y in t CO ₂ e
LEC_y	Leakage emissions from charcoal production in year y

POA EQUATION (6)

$$ER_{y,i,j} = (B_{y,savings,i,j,ce} \times N_{y,i,j,ce} \times LF) \times \frac{\mu_{y,i,j}}{365} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossil_fuel}$$

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 (f_{NRB}) 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')
$EF_{projected fossil fuel}$	=	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 CO ₂ /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 $B_{y,savings,i,j,ce}$ following Option 2 (water boiling test), as described here:

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

F.2. Calculation of project emissions or actual net removals

>>

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.

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. Calculation of emission reductions or net anthropogenic removals

CPA UNFCCC reference number	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
9626-P1-0001-CP1	45,701	-	-	-	45,701	45,701
9626-P1-0002-CP1	49,589	-	-	-	49,589	49,589
9626-P1-0003-CP1	60,691	-	-	-	60,691	60,691
9626-P1-0004-CP1	36,965	-	-	-	36,965	36,965
9626-P1-0005-CP1	51,893	-	-	-	51,893	51,893
9626-P1-0006-CP1	60,084	-	-	-	60,084	60,084
9626-P1-0007-CP1	61,879	-	-	-	61,879	61,879
9626-P1-0008-CP1	54,677	-	-	-	54,677	54,677
9626-P1-0009-CP1	50,810	-	-	-	50,810	50,810
9626-P1-0010-CP1	54,120	-	-	-	54,120	54,120
9626-P1-0011-CP1	36,091	-	-	-	36,091	36,091
9626-P1-0012-CP1	31,752	-	-	-	31,752	31,752
9626-P1-0013-CP1	32,114	-	-	-	32,114	32,114
9626-P1-0014-CP1	36,474	-	-	-	36,474	36,474
9626-P1-0015-CP1	37,493	-	-	-	37,493	37,493
9626-P1-0016-CP1	35,290	-	-	-	35,290	35,290
Total	735,623	-	-	-	735,623	735,623

F.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the included CPA-DDs

CPA UNFCCC reference number	Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the CPA-DD (t CO ₂ e)*
9626-P1-0001-CP1	45,701	51,364
9626-P1-0002-CP1	49,589	66,889
9626-P1-0003-CP1	60,691	83,672
9626-P1-0004-CP1	36,965	48,885
9626-P1-0005-CP1	51,893	51,364
9626-P1-0006-CP1	60,084	82,290
9626-P1-0007-CP1	61,879	74,247

9626-P1-0008-CP1	54,677	118,757
9626-P1-0009-CP1	50,810	109,791
9626-P1-0010-CP1	54,120	105,857
9626-P1-0011-CP1	36,091	85,149
9626-P1-0012-CP1	31,752	66,631
9626-P1-0013-CP1	32,114	68,285
9626-P1-0014-CP1	36,474	78,336
9626-P1-0015-CP1	37,493	75,982
9626-P1-0016-CP1	35,290	75,973
Total	735,623	1,243,488

*Note that the ex-ante estimates shown here are for improved cookstoves only. Ex-ante water filter estimates are not included here as no emission reductions are claimed during this monitoring period.

F.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the CPA-DD”

>>

Ex ante estimates are based on annual emission reduction estimates included in the registered CPA-DD. An example of these calculations are provided below for improved cookstoves (water filter estimates are not included here, as no credits are claimed during this monitoring period). Actual calculations for all CPAs have been provided to the DOE.

Emissions reductions for cookstoves (AMS II.G)

Variable	Unit		Cross-Effects	No Cross-Effects
B _{old,PP}	kg / PP / year		451.57	500.00
Hh _{size}	Average HH size	5.41		
B_{old} (per device)	Tonnes		2.44	4.74
$\eta_{\text{new-skirt}}$	Fraction	44.9%		
$\eta_{\text{new-noskirt}}$	Fraction	40.9%		
% usage skirt	Fraction	90%		
% usage - no skirt	Fraction	10%		
$\eta_{\text{new},i,j}$	Fraction	44.5%		
nold	Fraction	10.2%		
B_{savings}	Tonnes		1.88	2.09
N _{distributed}	Units		29,750	4,900
LF		95%		
N_{y,i,j,ce}	Units		28,262.50	4,655.00
# Days Deployed		365		
% usage _{project stove}	Fraction	85%		
u_{y,i,j}	Fraction	0.85		
f _{NRB}	Fraction	98%		
NCV _{biomass}	TJ/tonne	0.015		
E _{fprojected_fossilfuel}	CO ₂ /TJ			

		81.60	
BS	Fraction	100%	
ER_{y,i,j}	Tonnes	64,191	

F.6. Remarks on increase in achieved emission reductions

>>

The actual emission reductions achieved during the monitoring period are less than anticipated in the registered/revised 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 less than 4.8 for all periods.
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 between 30% and 40%
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%.

F.7. Remarks on scale of small-scale CPAs

>>

According to inclusion criterion 18, CPAs consisting solely of microscale units, as defined by paragraph 124(m) of CDM PS PoA Version, are exempt from the debundling check. As demonstrated in the CPA-DD, all technologies qualify as microscale CDM units, this CPA is exempt from the small-scale size threshold.

Appendix A: Parameter values for Period A, B, C and D

Parameter	Period A		Period B		Period C		Period D	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
OC_filters	80.25%	NA	70.00%	NA	70.00%	NA	74.12%	NA
OC_stoves	96.91%	98.77%	84.71%	84.71%	86.45%	93.64%	84.71%	96.04%
AvgHHSize	4.83	4.35	4.08	4.08	4.60	4.39	4.46	4.08
BS	1.00	0.98	0.98	0.98	0.98	0.99	0.99	0.99
QPWhh,day,dryseason	7.66	NA	7.66	NA	6.54	NA	6.61	NA
QPWhh,day,wetseason	5.65	NA	5.65	NA	5.05	NA	4.97	NA
SDWfrac	0.62%	NA	0.00%	NA	2.55%	NA	0.00%	NA
UsageFrac - DRY	33.20%	23.61%	35.43%	35.43%	33.46%	23.09%	35.43%	29.10%
UsageFrac - WET	34.95%	24.42%	46.66%	46.66%	38.71%	29.73%	46.66%	31.73%
Uskirt	91.50%	93.19%	91.50%	91.50%	96.91%	96.62%	93.42%	97.44%
Downtime-Filters	72.89	NA	72.89	NA	49.65	NA	72.89	NA
Downtime-Stove	43.30	43.30	43.30	43.30	31.97	43.30	43.30	18.50
BS	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100%
Reboil	0.00%	NA	0.00%	NA	0.00%	NA	0.00%	0.00%
η new, wskirt	36.6%	36.6%	36.6%	36.6%	36.6%	36.6%	36.6%	36.6%
η new, woskirt	31.1%	31.1%	31.1%	31.1%	31.1%	31.1%	31.1%	31.1%

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN); • Add a section on remarks on the observance of the scale limit of small-scale CPAs during the crediting periods; • Add "changes specific to afforestation or reforestation activities/CPA" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R PoAs between two commitment periods; • Make structural and editorial improvements.
02.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN); • Make editorial improvements.
01.0	1 April 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report, programme of activities		