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	Up Energy Improved Cookstove Programme, Uganda	
UNFCCC reference number of the PoA	9956	
Version numbers of the PoA-DD applicable to this monitoring report	4.0	
Version number of this monitoring report	2.0	
Completion date of this monitoring report	15/12/2020	
Monitoring period number	Seventh Monitoring Period	
Duration of this monitoring period	01/02/2020 - 31/07/2020 (both days inclusive)	
Monitoring report number for this monitoring period	2.0	
Coordinating/managing entity	UpEnergy Group	
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)
	Uganda	Yes
Applied methodologies and standardized baselines	AMS-II.G.: "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" (Version 05.0) Standardized baseline: Not applicable	
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
	NA	390,304 tCO_2e
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	493,638 tCO_2e	

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

>>

The PoA is located in the Republic of Uganda and involves distribution of efficient biomass fired Improved Cookstoves (ICS). The project ICSs replace the low efficiency, traditional biomass fired stoves, used for meeting similar thermal energy needs in the baseline.

Uganda is considered by the UN to be a Least Developed Country. 94.8% population use wood or charcoal for cooking[1]. The target areas are all regions with traditional biomass stove users. The consumption of non-renewable biomass for fuel, in the form of both wood and charcoal derived from wood, consumes high proportion of beneficiaries' income and time through fuel collection and purchase. Fuel harvest leads to deforestation, erosion and threatens habitat in Uganda.

Policy/measure or stated goal of the PoA

The purpose of the PoA is to facilitate the transition away from inefficient traditional biomass fired stoves, by providing high-efficiency and clean combustion ICS that reduce wood and charcoal consumption. Several greenhouse gases (GHG), including carbon dioxide, are produced as a result of combustion of non-renewable biomass used in baseline cooking stoves. The project ICS improve heat transfer efficiency thereby reducing the amount of fuel consumed by ICS beneficiaries. Thus, the PoA supports the intended goals of reducing fuel consumption, improving health, and reducing deforestation in Uganda.

The PoA is being coordinated by UpEnergy Group (hereby UpEnergy), the Coordinating/Managing Entity (hereby CME), which is the project participant providing the framework and incentives for the rest of parties involved to achieve the emission reductions. The CME communicates with the Executive Board and/or the pertinent DOE on all matters.

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
Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014	Version: 04	Sectoral scope 3: Energy demand	AMS-II.G: "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" (Version 05.0)

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)
Up Energy Improved Cookstoves Programme, Uganda – CPA No 001 Version 06 dated 17/05/2018 Ref No.: 9956-P1-0001-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	22/07/2014 – 21/07/2021 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 002 Version 05 dated 17/05/2018	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014	17/03/2015 – 16/03/2022 (Renewable)	Yes

[1] Uganda Demographic and Health survey Report, January 2018, table 2.4

Ref No.: 9956-P1-0002-CP1		Part II		
Up Energy Improved Cookstoves Programme, Uganda – CPA No 003 Version 04 dated 17/05/2018 Ref No.: 9956-P1-0003-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	17/04/2015 – 16/04/2022 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 004 Version 04 dated 17/05/2018 9956-P1-0004-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	17/04/2015 – 16/04/2022 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 005 Version 03 dated 08/06/2018 Ref No.: 9956-P1-0005-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	01/01/ 2017 – 31/12/2023 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 006 Version 03 dated 24/06/2019 Ref No.: 9956-P1-0006-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	01/01/ 2017 – 31/12/2023 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 007 Version 03 dated 24/06/2019 Ref No.: 9956-P1-0007-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	01/01/ 2017 – 31/12/2023 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 008 Version 03 dated 24/06/2019 Ref No.: 9956-P1-0008-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	01/01/ 2017 – 31/12/2023 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 009 Version 03 dated 24/06/2019 Ref No.: 9956-P1-0009-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	15/07/ 2017 – 14/07/2024 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0010 Version 03 dated 24/06/2019 Ref No.: 9956-P1-0010-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	20/08/ 2017 – 19/08/2024 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0011 Version 03 dated 24/06/2019 Ref No.: 9956-P1-0011-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	25/09/ 2017 – 24/09/2024 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0012 Version 03 dated 24/06/2019 Ref No.: 9956-P1-0012-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	21/10/ 2017 – 20/10/2024 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0013 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0013-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0014 Version 02	Version: 04	Up Energy Improved Cookstove Programme, Uganda	05/12/ 2019 – 04/12/2026 (Renewable)	Yes

dated 22/11/2019 Ref No.: 9956-P1-0014-CP1		Date: 30/06/2014 Part II		
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0015 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0015-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0016 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0016-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0017 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0017-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0018 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0018-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0019 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0019-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0020 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0020-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0021 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0021-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0022 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0022-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0023 Version 02 dated 22/11/2019 Ref No.: 9956-P1-0023-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	05/12/ 2019 – 04/12/2026 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0024 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0024-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020– 06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0025 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0025-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020– 06/01/2027 (Renewable)	No

Up Energy Improved Cookstoves Programme, Uganda – CPA No 0026 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0026-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0027 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0027-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0028 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0028-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0029 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0029-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0030 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0030-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0031 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0031-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0032 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0032-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0033 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0033-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0034 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0034-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0035 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0035-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No

Up Energy Improved Cookstoves Programme, Uganda – CPA No 0036 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0036-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0037 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0037-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0038 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0038-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0039 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0039-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0040 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0040-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0041 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0041-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0042 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0042-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0043 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0043-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0044 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0044-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No
Up Energy Improved Cookstoves Programme, Uganda – CPA No 0045 supported by Republic of Korea Version 2.1 dated 09/12/2019 Ref No.: 9956-P1-0045-CP1	Version: 04	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	07/01/ 2020–06/01/2027 (Renewable)	No

A.2. Coordinating/managing entity

>>

Mr. Erik Wurster
UpEnergy Group (CME)
Email: erik@upenergygroup.com

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

>>

UpEnergy is the Coordinating/Managing Entity (CME) for the PoA and the CPA Implementer of the CPAs covered in this MR. The Implementation of the PoA followed the following management system.

1. The CME / CPA implementer (CPAI) provided guidance / training / instructions to local sales and distribution partner (SDP) to collect requisite sales / installation data. The SDP sales staff compiled the list of units installed / distributed along with other required information and transferred the same to the electronic database management system at regular intervals managed by CME / CPAI.

2. The CPAI operated and managed the electronic database with information on units installed / distributed under the CPAs, as received from the sales staff. The electronic database contains the following information for each installation / distribution:
   - CPA Identifier
   - Location (Name and address of user, contract details, if available)
   - Unique serial number of the unit installed/distributed
   - Stove model and quantity
   - Date of installation / distribution

3. The CME / CPAI ensured that end users are aware of, and have agreed, that their unit is being subscribed to the PoA through warranty cards/sales receipt clearly stating the same.

4. The CME / CPAI ensured that there is no double counting of any unit in the electronic database by means of unique serial number associated with each unit.

5. The CME / CPAI coordinated all ex-post monitoring activities in the PoA. The CME / CPAI:
   - Implemented the monitoring plan,
   - Determined the sample size as per sampling plan and identified the samples to be monitored (a single sampling plan has been applied to CPA 9956-P1-0001-CP1 to 9956-P1-0023-CP1 as detailed in section E.3 below), if applicable
   - Provided monitoring templates and training for field monitoring

6. The monitoring team recorded the following key parameters in a CPA Monitoring Record as per templates provided by CME /CPAI. Key monitored parameters were:
   - Operational Status of sampled ICS (in use / out of use)
   - Presence of baseline stoves and extent of their usage relative to project stove in sampled beneficiaries, if any
   - Thermal efficiency of project ICS

7. The CME / CPAI, with support from external experts, checked and reviewed the monitoring data and calculated the emission reductions based on precision / reliability levels achieved for the monitored parameters.

8. The CME / CPAI, with support from external experts, calculate emission reductions based on distribution data and monitoring data collected and prepared the emission reduction calculator and monitoring report.

B.2. Post-registration changes to PoA

B.2.1. Corrections

>>
N/A

B.2.2. Inclusion of monitoring plan

>>
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

>>
N/A

B.2.4. Changes to programme design

>>
N/A

B.2.5. Changes specific to afforestation or reforestation activities

>>
N/A

PART II Monitoring of CPAs

>>
This Monitoring Report covers twenty-three CPAs under the PoA, as listed in section A.1.2 above. These 23 CPAs are deemed homogeneous due to the following:

1. Have the same project boundary/country (i.e. Uganda)
2. Follow same generic CPA-DD, as listed in section A.1.1 above
3. Implement the same technology / measure (i.e. improved ICS).

Thus, these CPAs have been sub-grouped for monitoring purposes. The following sections of the monitoring report present information pertaining to these 23 CPAs.

SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

>>

a) Purpose of the CPA(s) and the measures taken for GHG emission reductions or net GHG removals by sinks –

Purpose: The CPAs involve the promotion and distribution of improved biomass cookstoves in Uganda for use by households. The ICS disseminated through this programme replace the conventional inefficient biomass stove (3-stone fire)/traditional charcoal stoves with ICS which combust biomass more efficiently and improve heat transfer to pots, hence reducing use of non-renewable fuel and equivalent greenhouse gas emissions.

Measures taken: The CPAs involve marketing, distribution, and creating awareness for improved cook stoves for low-income households in Uganda. The ICSs provide clean, renewable power for cooking. The total number of ICSs included under these CPAs are as follows:

S.No.	CPA Reference No.	Number of ICS Distributed
1	9956-P1-0001-CP1	11,279

2	9956-P1-0002-CP1	18,000
3	9956-P1-0003-CP1	18,000
4	9956-P1-0004-CP1	18,000
5	9956-P1-0005-CP1	18,000
6	9956-P1-0006-CP1	18,000
7	9956-P1-0007-CP1	18,000
8	9956-P1-0008-CP1	18,000
9	9956-P1-0009-CP1	18,000
10	9956-P1-0010-CP1	18,000
11	9956-P1-0011-CP1	18,000
12	9956-P1-0012-CP1	18,000
13	9956-P1-0013-CP1	15,000
14	9956-P1-0014-CP1	15,000
15	9956-P1-0015-CP1	15,000
16	9956-P1-0016-CP1	15,000
17	9956-P1-0017-CP1	15,000
18	9956-P1-0018-CP1	15,000
19	9956-P1-0019-CP1	15,000
20	9956-P1-0020-CP1	15,000
21	9956-P1-0021-CP1	7,000
22	9956-P1-0022-CP1	7,000
23	9956-P1-0023-CP1	6,839
Total		**350,118**

b) Description of the technology employed and installed equipment and/or infrastructure, including information requested by the eligibility criteria

The Ezy Stove contains a metal construction consisting of a cylindrical combustion chamber and surrounded by an outer body. The overall design is small and portable, enabling it to be easily transported. The AES, SHS, SHS-GBE, SHS-BOLD, SHS-ILF, Lugwana, SpendSmart, Energy Empire, BME and FSL stoves consist of a metal frame (called cladding) with perforated interior ceramic liner that allows ash to fall to the collection chamber at the base. A thin layer of cement is placed between the cladding and the liner to bind the two. During use, a single pot rests at the top the stove. The materials used in the stoves are from readily available local materials requiring limited tools and training to the manufacture. The stoves are assembled locally in Uganda according to specific design parameters and dimensions, providing for uniform performance between units.

Specifications of ICSs included in the CPAs is as follows:

Stove Type	Type of Fuel	Type of stove	Service Level	Grate /Chimney	Thermal Efficiency
EZY	Wood	Portable	Domestic	Grate	27.10%
SHS	Charcoal	Portable	Domestic	Grate	26.00%
AES	Charcoal	Portable	Domestic	Grate	25.30%
SHS-GBE	Charcoal	Portable	Domestic	Grate	30.00%
SHS-BOLD	Charcoal	Portable	Domestic	Grate	37.30%
SHS-ILF	Charcoal	Portable	Domestic	Grate	38.00%
Lugwana	Charcoal	Portable	Domestic	Grate	34.75%
SpendSmart	Charcoal	Portable	Domestic	Grate	36.35%
Energy Empire	Charcoal	Portable	Domestic	Grate	33.00%
BME	Charcoal	Portable	Domestic	Grate	31.00%
FSL	Charcoal	Portable	Domestic	Grate	35.70%

Distribution of ICSs included in the CPAs is as follows:

CPA	AES	BME	ENERGY EMPIRE	EZY	FSL	Lugwana	SHS	SHS-BOLD	SHS-GBE	SHS-ILF	SpendSmart	Grand Total
9956-P1-0001-CP1	0	0	0	11279	0	0	0	0	0	0	0	**11279**
9956-P1-0002-CP1	1286	0	385	0	0	816	12128	1104	1106	863	312	**18000**
9956-P1-0003-CP1	2013	0	827	0	0	335	12599	1427	90	641	68	**18000**
9956-P1-0004-CP1	2232	0	599	0	0	437	11642	2032	39	805	214	**18000**
9956-P1-0005-CP1	637	0	14	0	0	48	8773	676	6928	886	38	**18000**
9956-P1-0006-CP1	772	0	488	0	0	2004	0	1343	10985	2308	100	**18000**
9956-P1-0007-CP1	157	0	3006	0	0	2719	0	2374	6943	2268	533	**18000**
9956-P1-0008-CP1	0	0	5057	0	0	2051	0	2785	5168	2102	837	**18000**
9956-P1-0009-CP1	0	0	4447	0	451	1908	0	5113	3393	1831	857	**18000**
9956-P1-0010-CP1	0	0	880	0	1585	2586	0	9701	11	2750	487	**18000**
9956-P1-0011-CP1	0	980	56	0	1977	1097	0	10256	2	3198	434	**18000**
9956-P1-0012-CP1	0	2266	270	0	0	435	0	9546	30	4241	1212	**18000**
9956-P1-0013-CP1	0	0	2618	0	0	815	0	5170	1253	2092	3052	**15000**
9956-P1-0014-CP1	0	1	1772	0	0	343	0	5251	141	2931	4561	**15000**
9956-P1-0015-CP1	0	634	772	0	167	82	0	9169	89	3414	673	**15000**
9956-P1-0016-CP1	0	2839	301	0	126	955	0	6059	3	3353	1364	**15000**
9956-P1-0017-CP1	0	2647	127	0	142	822	0	5687	6	4877	692	**15000**
9956-P1-0018-CP1	0	2733	153	0	1	359	0	5691	0	5030	1033	**15000**
9956-P1-0019-CP1	0	3108	105	0	0	373	187	5455	0	4907	865	**15000**
9956-P1-0020-CP1	0	2875	114	0	0	465	0	6076	0	4650	820	**15000**
9956-P1-0021-CP1	0	1276	23	0	0	408	0	4022	0	1185	86	**7000**
9956-P1-0022-CP1	0	956	0	0	0	0	0	5142	0	902	0	**7000**
9956-P1-0023-CP1	319	1492	1	0	0	1	0	3928	0	1097	1	**6839**
Grand Total	**7416**	**21807**	**22015**	**11279**	**4449**	**19059**	**45329**	**108007**	**36187**	**56331**	**18239**	**350118**

c)Relevant dates for the CPA(s) (e.g. construction, commissioning, continued operation periods, etc.);

S.No.	CPA Reference No.	CPA Start Date (as per registered CPA-DD)	Crediting Period Start Date
1	9956-P1-0001-CP1	02/01/2013	22/07/2014
2	9956-P1-0002-CP1	09/05/2014	17/03/2015
3	9956-P1-0003-CP1	02/04/2015	17/04/2015
4	9956-P1-0004-CP1	02/04/2015	17/04/2015
5	9956-P1-0005-CP1	04/05/2016	01/01/2017
6	9956-P1-0006-CP1	07/06/2016	01/01/2017
7	9956-P1-0007-CP1	05/07/2016	01/01/2017
8	9956-P1-0008-CP1	09/08/2016	01/01/2017
9	9956-P1-0009-CP1	20/06/2017	15/07/2017
10	9956-P1-0010-CP1	20/07/2017	20/08/2017
11	9956-P1-0011-CP1	22/08/2017	25/09/2017

12	9956-P1-0012-CP1	25/09/2017	21/10/2017
13	9956-P1-0013-CP1	16/08/2018	05/12/2019
14	9956-P1-0014-CP1	16/08/2018	05/12/2019
15	9956-P1-0015-CP1	16/08/2018	05/12/2019
16	9956-P1-0016-CP1	16/08/2018	05/12/2019
17	9956-P1-0017-CP1	16/08/2018	05/12/2019
18	9956-P1-0018-CP1	16/08/2018	05/12/2019
19	9956-P1-0019-CP1	16/08/2018	05/12/2019
20	9956-P1-0020-CP1	16/08/2018	05/12/2019
21	9956-P1-0021-CP1	16/08/2018	05/12/2019
22	9956-P1-0022-CP1	16/08/2018	05/12/2019
23	9956-P1-0023-CP1	16/08/2018	05/12/2019

d) Total GHG emission reductions achieved in this monitoring period for the CPA, including information on how double counting is avoided

The total GHG emission reductions achieved in this monitoring period for the CPAs are as follows:

S.No.	CPA Reference No.	GHG Emission Reductions (tCO_2)
1	9956-P1-0001-CP1	13,135
2	9956-P1-0002-CP1	20,962
3	9956-P1-0003-CP1	20,962
4	9956-P1-0004-CP1	20,962
5	9956-P1-0005-CP1	20,962
6	9956-P1-0006-CP1	20,962
7	9956-P1-0007-CP1	20,962
8	9956-P1-0008-CP1	20,962
9	9956-P1-0009-CP1	20,962
10	9956-P1-0010-CP1	20,962
11	9956-P1-0011-CP1	20,962
12	9956-P1-0012-CP1	20,962
13	9956-P1-0013-CP1	16,324
14	9956-P1-0014-CP1	16,324
15	9956-P1-0015-CP1	16,324
16	9956-P1-0016-CP1	16,324
17	9956-P1-0017-CP1	16,324
18	9956-P1-0018-CP1	16,324
19	9956-P1-0019-CP1	16,324
20	9956-P1-0020-CP1	16,324
21	9956-P1-0021-CP1	7,268
22	9956-P1-0022-CP1	5,910
23	9956-P1-0023-CP1	2,817
	Total	**390,304**

Each stove has a unique identification number. The same is recorded to trace the stove ex-post and avoid double counting. Further, for each stove included under each CPAs, information on the location of the stove is collected by recording end user information (name, address, contact detail etc. as available). Please refer the sales database in which the sales information i.e. Stove unit details and the end user / partner information for stove is mentioned. The system of recording the unique serial number on each stove along with its location serves toward avoiding double counting of stoves amongst various CPAs.

C.2. Location of CPAs

>>

The geographical boundaries of all the 23 CPAs covered in the monitoring report is the national borders of Uganda, which is same as the boundary of the PoA.

The GPS Co-ordinates and location of CPAs are as follows:

a.Host Party = Uganda
b.Region/state/province = All the regions of Uganda
c.City/town/community = All the cities of Uganda
d.Latitude and Longitude

Boundary	Latitude	Longitude
Northern	4.228950	33.989650
Eastern	1.925300	35.044333
Southern	-1.481383	29.915233
Western	-1.186633	29.572667

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

>>
N/A

C.3.2. Corrections

>>

Corrections that have been notified to the secretariat as applicable from the period prior to this monitoring period;

CPA number	9956-P1-0001-CP1 to 9956-P1-0004-CP1	CPA 9956-P1-0005-CP1	CPA 9956-P1-0006-CP1 to CPA 9956-P1-0012-CP1
Route	**Issuance Track**	**Prior Approval**	**Prior Approval**
Link	https://cdm.unfccc.int/PoAIssuance/iss_db/poaiss960826622/view	https://cdm.unfccc.int/PRCContainer/DB/prcp827754113/view	https://cdm.unfccc.int/PRCContainer/DB/prcp614688312/view
Approval date	06/09/2018	03/12/2018	17/09/2019

No corrections in this monitoring period have been made to CPA 9956-P1-0001-CP1 to CPA 9956-P1-0023-CP1.

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

>>

Permanent Changes that have been notified to the secretariat as applicable from the period prior to this monitoring period;

CPA number	9956-P1-0001-CP1 to 9956-P1-0004-CP1	CPA 9956-P1-0005-CP1	CPA 9956-P1-0006-CP1 to CPA 9956-P1-0012-CP1
Route	**Issuance Track**	**Prior Approval**	**Prior Approval**
Link	https://cdm.unfccc.int/PoAIssuance/iss_db/poaiss960826622/view	https://cdm.unfccc.int/PRCContainer/DB/prcp827754113/view	https://cdm.unfccc.int/PRCContainer/DB/prcp614688312/view
Approval date	06/09/2018	03/12/2018	17/09/2019

No Permanent Changes in this monitoring period have been made to CPA 9956-P1-0001-CP1 to CPA 9956-P1-0023-CP1.

C.3.6. Changes to project design

>>
N/A

C.3.7. Changes specific to afforestation or reforestation CPA

>>
N/A

SECTION D. Description of monitoring system of CPAs

>>
All the 23 CPAs apply the same monitoring system. The monitoring system applied involves a number of key elements to ensure that the CME and CPA-Implementer have high-quality, unbiased and reliable information regarding the performance of the project.

Monitored Systems

1. **Total Sales Record:** The total sales record documents the information listed below for the technologies implemented. A sales receipt/carbon waiver including a warranty card has been distributed with the ICSs sold. The CME makes every effort to retrieve this information (paper form or electronically (i.e. SMS) but cannot guarantee the collection of information for waivers and warranties with every stove due to challenges such as high rates of illiteracy and logistical challenges. The total sales record has been kept electronically and with supporting evidence from paper records, and/or SMS tracking records. The Total Sales Record contains:
    a. Model of project technology sold
    b. Quantity of units sold
    c. Unique identification of units sold (stove serial number)
    d. Date of installation / distribution
    e. End user contact details (name, address, phone number if available)

Frequency: Continuous

Every ICS listed in the Total Sales Record is transferred into the Project Database as needed, limited to the maximum threshold for each CPA is reached. In addition to the information provided

in the Total Sales Record, the CPA-specific Project Database records user details for all, or a subset of all, appliances deployed.

2.Ex-post sample-based monitoring

Monitoring surveys conducted on households to check the usage rate and thermal efficiency of project ICS. The households found using project ICS, were also investigated for the extent to which baseline traditional stoves, if available were still in use. If it is found that a traditional stove is still used, even in a secondary role, the HHs are encouraged to discard their traditional stove through the Disposal Policy. Besides, the relative usage of baseline stove with respect to to project stove is determined and is considered in ER calculations to ensure that the fuel-wood consumption of baseline stoves is excluded from B_{old}.

3.Organizational structure of monitoring and inclusions

Person	Role
CME database administrator	The database administrator is responsible for updating and maintaining all electronic databases and inclusions. Required competencies include experience with data management systems (e.g. Excel, STATA, or SPSS), minimum 2 years working experience in a similar field, and at minimum a bachelor's degree from an institution of higher education.
Monitoring team	The monitoring team will be assigned by the CME to conduct the user interviews and appliance tests during the periodic sampling and reports the results to the database administrator. The skills and experience required for the data collection activities include: ▪ Experience conducting surveys/tests ▪ Experience conducting door-to-door surveys of biomass consumption ▪ Local language skills (especially important for input to questionnaire design and interviewing of end users) ▪ English language skills ▪ Cultural awareness ▪ Numerical proficiency ▪ Data entry skills

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

Data/Parameter	B_{old}
Unit	ton wood/ HH-year
Description	Quantity of woody biomass used in the absence of the project activity in tonnes per household
Source of data	Baseline for residential biomass stove users was determined through local survey conducted by a third party and commissioned for the purpose of this program activity. Details of the study were provided in CPA-DD 01 Appendix 3
Value(s) applied	For Residential: 4.97 tonnes wood-eq/HH-yr.
Choice of data or measurement methods and procedures	AMS-II.G. V5 allows for the use of historical data or survey of local usage to define relevant baseline appliance types as described in the baseline scenario. The CPAs utilize a survey of local usage to establish B_{old} for the target user group "Residential" biomass stove users. Details of the measurement method and sampling approach are provided in CPA-DD 01 Appendix 3.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	-

Data/Parameter	η_{old}
Unit	Percentage
Description	Efficiency of the system being replaced, measured using representative sampling methods or based on referenced literature values (percent)
Source of data	Registered CPA-DD
Value(s) applied	10% for CPA 01 to CPA 12 11.43% for CPA 13 to CPA 23
Choice of data or measurement methods and procedures	Based on default value as per AMS II.G.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	Applicable because CPA uses η_{old} to determine $B_{y,savings}$. During ICS dissemination, the type of baseline cookstove (traditional or improved) replaced is recorded and emission reductions is accounted only for the cases when ICS replaces traditional, unimproved cookstoves.

Data/Parameter	L_y
Unit	Fraction
Description	B_{old} is multiplied by a net to gross adjustment factor to account for leakages
Source of data	Default Value
Value(s) applied	0.95
Choice of data or measurement methods and procedures	Default value deemed valid as per the CDM methodology. As per the methodology AMS II.G V5, a default value can be optionally used to account for leakages, in which case surveys are not required.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	None

Data/Parameter	$NCV_{biomass}$
Unit	TJ/tonne
Description	Net calorific value for biomass
Source of data	IPCC default value for wood fuel
Value(s) applied	0.015
Choice of data or measurement methods and procedures	Value of 0.015 TJ/tonne has been used as stipulated in AMS-II.G V5. Reference: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html
Purpose of data/parameter	Calculation of baseline emission
Additional comments	None

Data/Parameter	$EF_{projected\_fossil\_fuel}$
Unit	tCO_2/TJ
Description	Emission factor for the substitution of non-renewable woody biomass by similar consumers.
Source of data	Default value
Value(s) applied	81.60
Choice of data or measurement methods and procedures	Value of 81.6 tCO_2/TJ has been used as stipulated in the methodology AMS-II.G V5.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	None

Data/Parameter	$f_{NRB,y}$
Unit	Fraction
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
Source of data	Study
Value(s) applied	0.82
Choice of data or measurement methods and procedures	The CDM Executive Board, at its sixty-seventh meeting, approved the approach to calculate the values of fraction of non-renewable biomass (f_{NRB}) for least developed countries (LDC) and small island developing states (SIDs) and Parties with 10 or less registered CDM project activities as of 31 December 2010. Default values are contained in annex 22, Table 2 of the meeting report
Purpose of data/parameter	Calculation of baseline emission
Additional comments	None

Data/Parameter	$\eta_{specified}$
Unit	Percentage
Description	Efficiency of the system being deployed at the time of CPA inclusion
Source of data	Manufactures specifications or independent testing
Value(s) applied	**Stove Type** / **Thermal Efficiency** AES 25.30% BME 31.00% Energy Empire 33.00% EZY 27.10% FSL 35.70% Lugwana 34.75% SHS 26.00% SHS-BOLD 37.30% SHS-GBE 30.00% SHS-ILF 38.00% SpendSmart 36.35%
Choice of data or measurement methods and procedures	The thermal efficiency report provided by the manufacturer / certified by and ISO certified third party lab establishes the efficiency of ICS models.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	Note that $\eta_{specified}$ is the efficiency as per manufacturer specification for fulfilling eligibility criteria of the PoA. This value will not be used for ex-post calculation of emission reductions since η_{new} is a monitored parameter to reflect possible changes in efficiency during the lifetime of the ICS.

E.2. Data and parameters monitored

Data/Parameter	μ_{old}
Unit	tonnes wood/ year
Description	Quantity of woody biomass used in the project activity by traditional stoves
Measured/calculated/ default	Measured
Source of data	Monitoring survey records
Value(s) of monitored parameter	0.63
Monitoring equipment	-
Measuring/reading/recording frequency	Annually

Calculation method (if applicable)	The μ_{old} was calculated by asking end user no. of times per week, they used traditional stoves vs. number of times per week project stove is used during field survey by a dedicated team. All data is kept for 2 years following the crediting period or the last issuance of the CERs of the project activity.
QA/QC procedures	To conduct the survey, independent surveyor/third party was appointed; The survey results is stored in an electronic database and for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	It is used to calculate $B_{y,saving}$

Data/Parameter	**η_{new}**
Unit	Percentage %
Description	Efficiency of the system being deployed as part of the project activity (percentage), as determined using the Water Boiling Test (WBT) protocol
Measured/calculated/ default	Measured and calculated
Source of data	Water boiling test records
Value(s) of monitored parameter	**Stove Model** / **Average Thermal Efficiency** **AES** 22.82% **BME** 30.48% **Energy Empire** 31.79% **EZY** 21.24% **FSL** 34.37% **Lugwana** 33.95% **SHS** 22.84% **SHS-BOLD** 35.52% **SHS-GBE** 28.66% **SHS-ILF** 36.10% **SpendSmart** 35.13% Weighted average efficiency considering stove deployment date is calculated as 31.83%. For detail refer “WBT Summary” Worksheet in ER calculator
Monitoring equipment	The tests were conducted following WBT protocol by trained field personnel by third party.
Measuring/reading/recording frequency	Annual
Calculation method (if applicable)	The WBTs were carried out in accordance with WBT protocol 4.2.3. A weighted average mean efficiency based on sales of each stove type is used across the CPAs.
QA/QC procedures	The reliability calculation was conducted to ensure that the result obtained from the survey meets the precision required. The calculation and measurements are based on internationally accepted WBT protocol 4.2.3. The equipment was either externally calibrated or were newly purchased at the time of use so measurements were done with the necessary guarantees. The results of the WBT are stored in an electronic database for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**N_y**
Unit	Number of appliances
Description	Number of appliances deployed during period as part of the SSC-CPA
Measured/calculated/ default	Measured

Source of data	Project Sales database
Value(s) of monitored parameter	350,118
Monitoring equipment	-
Measuring/reading/recording frequency	Continuously
Calculation method (if applicable)	Aggregated from Sales Records
QA/QC procedures	Each SSC-CPA partner organization maintains a project database of sales to calculate this parameter. CME's electronic records were cross-checked against a representative sample of paper and/or SMS records from distribution transactions made by the partner organizations.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	At the point of inclusion of a project ICS in a CPA, the presence of existing project stove with the concerned user, if any, is checked in the Sales database. Subsequent (secondary) project ICS, if any, is not included in the CPA database. Also, the presence of additional project ICS per household is further cross-checked on sampling basis during the Ex-post monitoring survey. The total ICS population is discounted by the fraction of sampled household found using more than one project ICS. In the current monitoring no sample with more than one project ICS was found.

Data/Parameter	**U_y**
Unit	%
Description	Average usage rate of appliance type being deployed during as part of the SSC-CPA.
Measured/calculated/ default	Measured
Source of data	Usage Survey records
Value(s) of monitored parameter	82.54
Monitoring equipment	-
Measuring/reading/recording frequency	Annual
Calculation method (if applicable)	Sampling Survey has been done to determine the number of appliances still in operation by field survey by a dedicated team. All data is kept for 2 years following the crediting period or the last issuance of the CERs of the project activity.
QA/QC procedures	The survey conducted by experienced team having prior experience of conducting surveys for various other carbon projects.
Purpose of data/parameter	Calculation of Baseline Emissions.
Additional comments	All data is transparent and verifiable.

E.3. Implementation of sampling plan

>>

A single sampling plan was carried out across all specific-case CPAs covered in this monitoring report.

a. List of CPAs to which the single sampling was applied

CPA 9956-P1-0001-CP1 to CPA 9956-P1-0023-CP1 were covered in the single sampling plan.

b. Description of implemented single sampling design

i. Sampling Design
Due to the large number of ICS envisioned to be distributed as part of the CPAs to be included in the SSC-PoA, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling has been undertaken as part of a PoA-wide Sampling Plan (by grouping the CPAs' population). The Sampling is based on 95/10 confidence/precision.

ii. Objectives and Reliability Requirements
The objective was to obtain an unbiased and reliable estimate of the proportion or mean value of the following parameters over the course of the monitoring period, and with 95/10 confidence/precision for annual sampling across CPAs.
1. Thermal Efficiency of operational ICS: $\eta_{new,y,i}$
2. Average usage rate of ICS: U_y
3. Quantity of woody biomass used in the project activity by traditional stoves: μ_{old}

iii. Target Population
The target population for the three parameters stated above are all ICS recorded in the project database (350,118 units).

iv. Sampling Frame
For the parameters Stove Efficiency ($\eta_{new,y,i}$) and Stove Usage rate (U_y), the ICS population was stratified based on stove models (AES, EZY, SHS, SHS-GBE, SHS-BOLD, SHS-ILF, Lugwana, Energy Empire, BM ESE, FSL and SpendSmart). For monitoring the quantity of woody biomass used in the project activity by traditional stove (μ_{old}) the ICS were stratified based on the year of distribution/installation (2013-2020). The stratified sampling approach is in line with page 57 of the registered PoA-DD.

v. Sampling Method
The sampling was conducted using stratified random sampling technique over the aforesaid sampling frames created. The ICS population in each stratum was arranged by date of distribution, assigning them a sampling serial number. Random numbers were generated using the online random number generator ranging from 1 to total number of ICS in a given stratum and the samples corresponding to the random numbers obtained, were picked for sampling. This approach ensured that each ICS listed in the database has an equal chance of being selected. A slightly higher number of samples were picked than that needed to be monitored to cover for non-responses.

vi. Sampling Size
The required sample sizes were derived using equation (1), (2), (3), (4) and (9) of Appendix 3 of the Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 04.0 for monitoring parameter as follows:

$$n \geq \frac{z^2 * N * V}{(N-1) * precision^2 + z^2 * V}$$

Where,

n = number of ICS to be sampled

N = Total number of ICS in the population

z = Constant referring to level of confidence (1.96 for 95 % confidence)

Precision = Required precision (e.g. 10% = 0.1)

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

Where (for proportion parameters):

$$SD^2 = \frac{\sum_{i=1}^{k} g_i * p_i * (1 - p_i)}{N}$$

$$\overline{p} = \frac{\sum_{i=1}^{k} g_i * p_i}{N}$$

Where,

g_i = weight of strata i in the population

p_i = expected proportion of strata i in the population

k = total number of strata in the population

and Where (for mean parameters):

$$SD^2 = \frac{\sum_{i=1}^{k} g_i * SD_i^{\,2}}{N}$$

$$Mean = \frac{\sum_{i=1}^{k} g_i * m_i}{N}$$

Where,

SD_i = expected standard deviation of strata i in the population

mi = expected mean of strata i in the population

Stratified Random Sampling was applied by dividing the population into various strata. The expected parameter values were determined based on project developer's knowledge and experience as per para 12(b) and 12(c) of the "Standard: Sampling and surveys for CDM project activities and programmes of activities"

The CPA sub-group population was arranged chronologically for each stratum. The ICS were selected by randomly assigning, in corresponding stratum, a number to each stove and sorting in increasing order from lower to higher number. Random numbers were generated using online random number generator for each stratum and the numbers obtained were used to identify the samples from the stratum population. A slightly higher number of samples were identified than that required to cover for outliers / non-response and ensure that the desired precision / confidence is achieved. The following tables demonstrate the same size determined:

Stove Thermal Efficiency η_{new}				
Stove Model (Sampling Frame)	Total Sales (Sampling Frame Size)	Expected Mean Efficiency(%)	Expected SD(%)	Calculated Sample Size (n)
AES	7416	23.00%	2.30%	2
BME	21807	31.00%	3.10%	2
ENERGY EMPIRE	22015	32.00%	3.20%	2
EZY	11279	21.50%	2.15%	2
FSL	4449	35.00%	3.50%	2
Lugwana	19059	34.50%	3.45%	2
SHS	45329	23.00%	2.30%	2
SHS-BOLD	108007	36.00%	3.60%	3
SHS-GBE	36187	29.00%	2.90%	2
SHS-ILF	56331	37.00%	3.70%	2
SpendSmart	18239	35.50%	3.55%	2
Sample size determination				
Estimated efficiency (mean)				32.33%
Estimated Standard Deviation of efficiency (SD)				3.27%
$V_{mean} = (SD/mean)^2$				0.01
Minimum Sample Size required (efficiency)				4
tDistribution sample size adjustment			Iteration 1	11
			Iteration 2	6
			Iteration 3	7
			Iteration 4	7
			Iteration 5	7
			Iteration 6	7

Usage Rate (Uy)			
Stove Model (Sampling Frame)	Total Sales (Sampling Frame Size)	Usage Rate (U_y) (%)	Calculated Sample Size (n)
AES	7416	75%	2
BME	21807	95%	3
ENERGY EMPIRE	22015	86%	3
EZY	11279	75%	2
FSL	4449	95%	2
Lugwana	19059	90%	3
SHS	45329	80%	7
SHS-BOLD	108007	90%	15
SHS-GBE	36187	90%	5
SHS-ILF	56331	94%	8
SpendSmart	18239	95%	3
Sample size determination			
Estimated Uy (p)			88.93%
Estimated Standard Deviation of Uy (SD)			30.88%
$V_{Uy} = (SD/p)^2$			0.12
Sample Size required (Uy)			47

use of baseline stove per vintage				
Stove Model (Sampling Frame)	Total Sales (Sampling Frame Size)	Expected Mean value (tonnes per year)	Expected SD	Calculated Sample Size (n)
2013	2447	1.0	0.10	2
2014	8296	0.9	0.09	2
2015	18521	0.8	0.08	2
2016	13250	0.7	0.07	2
2017	36506	0.6	0.06	2
2018	90748	0.5	0.05	2
2019	159434	0.4	0.04	4
2020	20916	0.2	0.02	2
Sample size determination				
Estimated (p)				0.48
Estimated Standard Deviation (SD)				0.05
$V_{mean} = (SD/p)^2$				0.01
Minimum Sample Size required				5
tDistribution sample size adjustment			Iteration 1	9
			Iteration 2	6
			Iteration 3	8
			Iteration 4	7
			Iteration 5	7
			Iteration 6	7

c. Collected data (electronic spreadsheets may be attached and referenced)

Data was collected using surveys / WBTs done by external third party. The data collected from the surveys were compiled into the Excel spreadsheet. In order to achieve the 95/10 reliability level for cross-CPA sampling few additional stoves were sampled from the database than that required to cover for non-responses, if any. As for the thermal efficiency of the stoves, water

boiling tests were conducted using WBT protocol by PCIA/GACC as available on GACC website. The monitoring (surveys and WBTs) were conducted during August 2020 – October 2020.

d. Analysis of the collected data

Data obtained from the samples were used to estimate proportions and mean values for the parameters described above. The values were then being factored into the emissions reduction calculations.

Sampling Constants	Values
Monitoring period start	01/02/2020
Monitoring period end	31/07/2020
Monitoring frequency (years)	1
Level of sampling	PoA
Confidence (%) (90 or 95)	95%
Margin of Error (%)	10%
Z value	1.96

Parameter	Result	Reliability / precision
U_y	82.54%	achieved
μ_{old}	0.63 tonnes/year	achieved
$\eta_{new,y,i}$	31.87%	achieved

e. Demonstration of whether the required confidence/precision has been met

The following tables demonstrate the status of precision/confidence for each of the monitored parameters:

Stove Thermal Efficiency η_{new}				
Stove Model (Sampling Frame)	Sampling frame size	Monitored Sample Size	Monitored Efficiency (%)	Monitored Standard Deviation
AES	7416	2	22.82%	0.07%
BME	21807	2	30.48%	0.05%
ENERGY EMPIRE	22015	3	31.79%	0.03%
EZY	11279	2	21.24%	0.07%
FSL	4449	2	34.37%	0.13%
Lugwana	19059	3	33.95%	0.08%
SHS	45329	3	22.84%	0.10%
SHS-BOLD	108007	3	35.52%	0.07%
SHS-GBE	36187	2	28.66%	0.05%
SHS-ILF	56331	3	36.10%	0.05%
SpendSmart	18239	2	35.13%	0.04%
Reliability Check				
Samples Monitored				27
Mean Efficiency				31.87%
Standard error of mean				0.02%
Relative precision (Margin of error) (%)				0.11%
Result				Ok, acceptable
Lower Bound confidence value				not applicable

Usage Rate (Uy)			
Stove Model (Sampling Frame)	Sampling frame size	Monitored Sample Size	Monitored Usage
AES	7416	4	75%
BME	21807	5	100%
ENERGY EMPIRE	22015	5	80%
EZY	11279	5	60%
FSL	4449	4	75%
Lugwana	19059	5	80%
SHS	45329	10	60%
SHS-BOLD	108007	20	90%
SHS-GBE	36187	10	70%
SHS-ILF	56331	10	90%
SpendSmart	18239	5	100%
Reliability Check			
Samples Monitored			83
Monitored Uy (p)			82.54%
Standard Error of Uy			3.98%
Relative precision (Margin of error)			9.46%
Result			Ok, acceptable
Lower Bound confidence value			not applicable

use of baseline stove per vintage				
Stove Model (Sampling Frame)	Sampling frame size	Monitored Sample Size	Monitored Mean Value of use of baseline stove	Monitored Standard Deviation
2013	2447	2	1.82	0.23
2014	8296	2	1.45	0.29
2015	18521	2	2.07	0.59
2016	13250	2	1.86	0.88
2017	36506	3	2.04	0.42
2018	90748	4	1.82	0.19
2019	159434	7	1.69	0.25
2020	20916	2	1.33	0.47
Reliability Check				
Samples Monitored				24
Mean value				1.76
Standard error of mean				0.068
Relative precision (Margin of error) (%)				7.95%
Result				ok acceptable
Applicable Value				0.63

f. Demonstration of whether the samples were randomly selected and are representative of the population

The samples were randomly selected using Stratified Random Sampling across the CPA population. Random numbers were generated using online random number generator for each stratum and the ICS corresponding to the random numbers obtained, were selected as samples to be monitored. Under Stratified Random Sampling, the entire target population has an equal chance of being selected, thus the samples selected were deemed to be representative of population.

SECTION F. Calculation of emission reductions or net anthropogenic removals

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

>>

Emission reductions are calculated as follows:

As per the SSC-PoA-DD, emission reductions for the SSC-CPA (Same for all 23 CPAs) has been calculated according to the following formula:

$$\mathbf{ER_y = (B_{y,savings} * N_y * U_y) * (f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossil\ fuel})} \qquad \textbf{Equation (1)}$$

Where:

ER_y	Emission reductions during the period y in tCO2e
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossil\ fuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO2/TJ
N_y	Number of appliances of the type being deployed during period y as part of the SSC-CPA
U_y	Average usage rate (as opposite to drop-off) of appliances of type being deployed during period y as part of the SSC-CPA
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes per appliance.

$B_{y,savings,i}$ is estimated using option 2 of the methodology AMS II.G V5:

$$\mathbf{B_{y,savings} = [(B_{old} - \mu_{old}) * L] * (1 - \eta_{old}/\eta_{new})} \qquad \textbf{Equation 2}$$

$\mathbf{B_{old}}$	Quantity of biomass used in the absence of the project activity in tonnes/ year
$\boldsymbol{\mu_{old}}$	Quantity of woody biomass for the continued use of old stoves
$\boldsymbol{\eta_{old}}$	Weighted average value is used since the replaced systems are unimproved and improved baseline technologies.
$\boldsymbol{\eta_{new}}$	The result obtained from independent testing is used. Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average values if more than one type of system is being introduced by the project activity.
L	Leakage adjustment factor (fraction)

Description	Unit	9956-P1-0001-CP1	9956-P1-0002-CP1	9956-P1-0003-CP1	9956-P1-0004-CP1	9956-P1-0005-CP1	9956-P1-0006-CP1	9956-P1-0007-CP1	9956-P1-0008-CP1	9956-P1-0009-CP1	9956-P1-0010-CP1	9956-P1-0011-CP1
Stove installed under CPA (Ny)	number	11279	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
Year equivalent fraction	fraction	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497
B_{old}	tons wood-eq/HH-yr	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97
μ_{old}	tonnes wood/ year	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631
L_y	Percentage	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
η_{old}	Percentage	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
η_{new}	Percentage	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%
$B_{y,saving}$	tons wood-eq/HH-yr	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83
U_y	Percentage	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%
$f_{NRB,y}$	Percentage	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%
$NCV_{biomass}$	TJ/tonne	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
$EF_{projected\_fossil\_fuel}$	tCO_2/TJ	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60
ER_y	tCO_2	13135	20962	20962	20962	20962	20962	20962	20962	20962	20962	20962
Annual thermal energy savings achieved by the CPA	GWhth	109.63	174.96	174.96	174.96	174.96	174.96	174.96	174.96	174.96	174.96	174.96
Emission Reduction (ER)	**tCO_2e**	**13,135**	**20,962**	**20,962**	**20,962**	**20,962**	**20,962**	**20,962**	**20,962**	**20,962**	**20,962**	**20,962**

Description	Unit	9956-P1-0012-CP1	9956-P1-0013-CP1	9956-P1-0014-CP1	9956-P1-0015-CP1	9956-P1-0016-CP1	9956-P1-0017-CP1	9956-P1-0018-CP1	9956-P1-0019-CP1	9956-P1-0020-CP1	9956-P1-0021-CP1	9956-P1-0022-CP1	9956-P1-0023-CP1
Stove installed under CPA (Ny)	number	18000	15000	15000	15000	15000	15000	15000	15000	15000	7000	7000	6839
Year equivalent fraction	fraction	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.497	0.474	0.386	0.188
B_{old}	tons wood-eq/HH-yr	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97
μ_{old}	tonnes wood/ year	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631	0.631
L_y	Percentage	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
η_{old}	Percentage	10.00%	11.43%	11.43%	11.43%	11.43%	11.43%	11.43%	11.43%	11.43%	11.43%	11.43%	11.43%
η_{new}	Percentage	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%	31.83%
$B_{y,saving}$	tons wood-eq/HH-yr	2.83	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64
U_y	Percentage	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%	82.54%
$f_{NRB,y}$	Percentage	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%
$NCV_{biomass}$	TJ/tonne	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
$EF_{projected\_fossil\_fuel}$	tCO_2/TJ	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60
ER_y	tCO_2	20962	16324	16324	16324	16324	16324	16324	16324	16324	7268	5910	2817
Annual thermal energy savings achieved by the CPA	GWhth	174.96	136.25	136.25	136.25	136.25	136.25	136.25	136.25	136.25	60.66	49.33	23.52
Emission Reduction (ER)	**tCO_2e**	**20,962**	**16,324**	**16,324**	**16,324**	**16,324**	**16,324**	**16,324**	**16,324**	**16,324**	**7,268**	**5,910**	**2,817**

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

>>
N/A

F.3. Calculation of leakage emissions

>>
N/A

F.4. Calculation of emission reductions or net anthropogenic removals

CPA UNFCCC reference number	Baseline GHG emissions or baseline net GHG removals ($t CO_2e$)	Project GHG emissions or actual net GHG removals ($t CO_2e$)	Leakage GHG emissions ($t CO_2e$)	GHG emission reductions or net anthropogenic GHG removals ($t CO_2e$)		
				Before 01/01/2013	From 01/01/2013	Total amount
9956-P1-0001-CP1	13,135	-	-	0	13,135	13,135
9956-P1-0002-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0003-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0004-CP1	20,962	-	-	0	20,962	20,962

9956-P1-0005-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0006-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0007-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0008-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0009-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0010-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0011-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0012-CP1	20,962	-	-	0	20,962	20,962
9956-P1-0013-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0014-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0015-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0016-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0017-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0018-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0019-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0020-CP1	16,324	-	-	0	16,324	16,324
9956-P1-0021-CP1	7,268	-	-	0	7,268	7,268
9956-P1-0022-CP1	5,910	-	-	0	5,910	5,910
9956-P1-0023-CP1	2,817	-	-	0	2,817	2,817
Total	**390,304**	**0**	**0**	**0**	**390,304**	**390,304**

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_2e)	Amount estimated ex ante (t CO_2e)
9956-P1-0001-CP1	13,135	22,314
9956-P1-0002-CP1	20,962	22,367
9956-P1-0003-CP1	20,962	22,367
9956-P1-0004-CP1	20,962	22,367
9956-P1-0004-CP1	20,962	22,367
9956-P1-0006-CP1	20,962	22,367
9956-P1-0007-CP1	20,962	22,367
9956-P1-0008-CP1	20,962	22,367
9956-P1-0009-CP1	20,962	22,367
9956-P1-0010-CP1	20,962	22,367
9956-P1-0011-CP1	20,962	22,367
9956-P1-0012-CP1	20,962	22,367
9956-P1-0013-CP1	16,324	20,480
9956-P1-0014-CP1	16,324	20,480
9956-P1-0015-CP1	16,324	20,480
9956-P1-0016-CP1	16,324	20,480
9956-P1-0017-CP1	16,324	20,480
9956-P1-0018-CP1	16,324	20,480
9956-P1-0019-CP1	16,324	20,480

9956-P1-0020-CP1	16,324	20,480
9956-P1-0021-CP1	7,268	20,480
9956-P1-0022-CP1	5,910	20,480
9956-P1-0023-CP1	2,817	20,480
Total	**390,304**	**4,93,638**

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

>>
The ex-ante estimate per CPA for the monitoring period has been calculated as follows:
= Ex-ante ER as per CPA-DD (Section B.4.3) * (Number of Days monitored / No. of days in a year)

For 9956-P1-0001-CP1
= 44,874 * (182[2]/366[3])
= 22,314

For 9956-P1-0002-CP1 to 9956-P1-0012-CP1
= 44,980 * (182/366)
= 22,367

For 9956-P1-0013-CP1 to 9956-P1-0023-CP1
= 41,186 * (182/366)
= 20,480

F.6. Remarks on increase in achieved emission reductions

>>
The emission reductions achieved in the monitoring period are less than the values estimated in ex-ante calculation.

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

>>
The energy saving of each CPA is less than the methodology threshold i.e. 180 GWh_{th}/year.

Description	Unit	9956-P1-0001-CP1	9956-P1-0002-CP1	9956-P1-0003-CP1	9956-P1-0004-CP1	9956-P1-0005-CP1	9956-P1-0006-CP1	9956-P1-0007-CP1	9956-P1-0008-CP1	9956-P1-0009-CP1	9956-P1-0010-CP1	9956-P1-0011-CP1
Annual thermal energy savings achieved by the CPA	GWhth	109.63	174.96	174.96	174.96	174.96	174.96	174.96	174.96	174.96	174.96	174.96

Description	Unit	9956-P1-0012-CP1	9956-P1-0013-CP1	9956-P1-0014-CP1	9956-P1-0015-CP1	9956-P1-0016-CP1	9956-P1-0017-CP1	9956-P1-0018-CP1	9956-P1-0019-CP1	9956-P1-0020-CP1	9956-P1-0021-CP1	9956-P1-0022-CP1	9956-P1-0023-CP1
Annual thermal energy savings achieved by the CPA	GWhth	174.96	136.25	136.25	136.25	136.25	136.25	136.25	136.25	136.25	60.66	49.33	23.52

[2] Number of monitoring days = Days (31-07-2020, 01-02-2020) +1 = 182

[3] Total Number of days in annual year = Days (31-01-2021, 01-02-2020) +1 = 366

Appendix 1: Contact information (Additional)

Entity responsible for completing the CDM-PoA-MR-FORM	
Organization name	Climate-Secure Services
Street/P.O. Box	Club Road
Building	Pragati Apartments
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State/Region	Delhi
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Document information

Version	*Date*	*Description*
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.

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