



**Monitoring report form for CDM programme of activities
(Version 02.0)**

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	5.0	
Completion date of this monitoring report	06/12/2018	
Monitoring period number	Third Monitoring Period	
Duration of this monitoring period	01/11/2016 – 31/10/2017	
Monitoring report number for this monitoring period	1.0	
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
Sectoral scopes	Sectoral Scope 3: Energy Demand	
Applied methodologies and standardized baselines	AMS-II.G: "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" (Version 05.0)	
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	141,975 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	217,277 tCO ₂ e	

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PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

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The PoA is located in the Republic of Uganda and involves the distribution of highly efficient biomass fired Improved Cookstoves (ICS). ICSs replace the traditional biomass fired stoves with lesser efficiency. The PoA supports the intended goals of reducing fuel consumption, improving health, and reducing deforestation in Uganda.

This PoA targets residential and institutional users of biomass fuels in traditional stoves. In Uganda the majority of users across rural regions use traditional wood stoves whereas traditional charcoal stoves are more commonly found in urban areas. A 2010 national household survey conducted by the Ugandan government found that over 90% of households use biomass as a primary cooking fuel, and that 91% of these biomass users cooked on traditional or conventional stoves.

Uganda is considered by the UN to be a Least Developed Country. The target areas are all regions of Uganda 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 household income and time through fuel collection and purchase. Fuel harvest leads to deforestation and erosion and threatens habitat 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.

The PoA at the program level provides the organizational, financial and methodological framework for the emissions reductions at the level of the "CDM program activities" (CPAs).

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 burning ICS that reduce wood and charcoal consumption. Several greenhouse gases (GHG), including carbon dioxide, are produced as a result of the combustion of non-renewable biomass as used in cooking stoves. ICS improve heat transfer efficiency thereby reducing the amount of fuel used by households and the emission of GHGs.

The PoA intends to provide the following benefits:

- Environmental benefits

The PoA reduces the demand for biomass required for cooking stoves thus reducing the rate of deforestation connected to wood and charcoal consumption. In addition, the reduction in use of these inefficient stoves yields a reduction in emissions from fuel combustion thus improving air quality and reducing the emission of harmful gases that contribute to climate change.

- Social and economic benefits

PoA beneficiaries using the ICS reduce their biomass consumption. The reduction in fuel needs also saves project beneficiaries' time and income. This means that biomass users who gather biomass see a significant reduction in the amount that they have to collect, leaving that time available for other activities. Biomass users that purchase their fuel be able to direct more of their income to other needs. From the economic perspective, the project contributes to the scale-up of local businesses and organizations, with the potential to create jobs in retail, marketing and distribution.

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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	Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Crediting period type and duration	Covered in this monitoring report? (yes/no)
Up Energy Improved Cookstoves Programme, Uganda – CPA No 001 9956-0001	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	Version: 04	22/07/2014 – 21/07/2021 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 002 9956-0002	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	Version: 04	17/03/2015 – 16/03/2022 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 003 9956-0003	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	Version: 04	17/04/2015 – 16/04/2022 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 004 9956-0004	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	Version: 04	17/04/2015 – 16/04/2022 (Renewable)	Yes
Up Energy Improved Cookstoves Programme, Uganda – CPA No 005 9956-0005	Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II	Version: 04	01/01/ 2017 – 31/12/2023 (Renewable)	Yes
<u>Up Energy Improved Cookstoves Programme, Uganda – CPA No 006 9956-0006</u>	<u>Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II</u>	<u>Version: 04</u>	<u>01/01/ 2017 – 31/12/2023 (Renewable)</u>	<u>No</u>
<u>Up Energy Improved Cookstoves Programme, Uganda – CPA No 007 9956-0007</u>	<u>Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II</u>	<u>Version: 04</u>	<u>01/01/ 2017 – 31/12/2023 (Renewable)</u>	<u>No</u>
<u>Up Energy Improved Cookstoves Programme, Uganda – CPA No 008 9956-0008</u>	<u>Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II</u>	<u>Version: 04</u>	<u>01/01/ 2017 – 31/12/2023 (Renewable)</u>	<u>No</u>
<u>Up Energy Improved Cookstoves Programme, Uganda – CPA No 009 9956-0009</u>	<u>Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014</u>	<u>Version: 04</u>	<u>15/07/ 2017 – 14/07/2024 (Renewable)</u>	<u>No</u>

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	<u>Part II</u>			
<u>Up Energy Improved Cookstoves Programme, Uganda – CPA No 010 9956-0010</u>	<u>Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II</u>	<u>Version: 04</u>	<u>20/08/ 2017 – 19/08/2024 (Renewable)</u>	<u>No</u>
<u>Up Energy Improved Cookstoves Programme, Uganda – CPA No 011 9956-0011</u>	<u>Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II</u>	<u>Version: 04</u>	<u>25/09/ 2017 – 24/09/2024 (Renewable)</u>	<u>No</u>
<u>Up Energy Improved Cookstoves Programme, Uganda – CPA No 012 9956-0012</u>	<u>Up Energy Improved Cookstove Programme, Uganda Date: 30/06/2014 Part II</u>	<u>Version: 04</u>	<u>21/10/ 2017 – 20/10/2024 (Renewable)</u>	<u>No</u>

A.2. Coordinating/managing entity

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Mr. Erik Wurster

Up Energy Uganda Ltd. (CME)

Email: erik@upenergygroup.com

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

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The management system is comprised of the following elements:

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

UpEnergy Group as a CME to the PoA has managed the relevant activities prior and post registration of the PoA. The compliance check on the new proposed CPAs were conducted by CME to ensure that the CPAs meets all requirements and eligibility criteria before inclusion in the PoA. The compliance check was conducted by staff experienced with CDM projects.

b) Records of arrangements for training and capacity development for personnel

The CME trained all staff involved in distribution 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 are 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 UpEnergy Group, the CME. The Program Director of UpEnergy 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 of the registered PoA. The documentation was reviewed and approved by the Program Director of UpEnergy.

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)

Each ICS registered under the PoA is identified by a unique combination of customer / partner name and geographical location and serial number. With the combination of the parameters mentioned above, each ICS recorded in the project database is unique.

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The quality control and quality assurance procedures avoid the double counting cases. As each CPA has its own database, using the functions available in Microsoft Excel, any duplicate entry within the CPA or between the CPAs was identified and removed from database. In addition, each CPA was cross-checked with other CPAs in this SSC-PoA and with CPAs in any other SSC-PoA or in other CDM project activities operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary carbon schemes website information to ensure that the CPAs were not included in any other SSC-PoA, CDM project activity or voluntary carbon project activity.

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

An ICS database for the CPAs is maintained continuously. The following information is captured in the Registration Card which is in line with PoA requirements:

- i. Unique identification of stove (stove serial number)
- ii. Partner organization name, address and telephone
- iii. Date of sale and model/type of project technology sold
- iv. Quantity of project technology sold

The information collected is then transferred to a server which serves as the electronic project database. The server is updated regularly and shared with the CME. The database is backed up by CME in Excel spreadsheet. Each CPA has its own database with number of registered ICSs limited to the maximum units allowed under the CPA (equivalent to 180GWh_{th} annual energy savings).

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

f) Measures for continuous improvements of the SSC-PoA management system

CME is engaged in continuous review and improvement of the overall SSC-PoA management system. CME is satisfied with the overall performance of the CPA implementer and database maintenance.

B.2. Post-registration changes to PoA

B.2.1. Corrections

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N/A

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 applied standards or tools

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N/A

B.2.4. Changes to programme design

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N/A

PART II Monitoring of CPAs

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This Monitoring Report covers five CPAs in Uganda, as included in the concerned monitoring period. These CPAs have the same project boundary and follow a common generic CPA as identified in section A.1.1, Part I of this monitoring report. The following sections therefore represent all these five CPAs.

SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

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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 installation of Ezy Stove, SHS Stove and AES Stove (portable) in Uganda for use by residential households. The ICS disseminated through this programme replacing the conventional inefficient biomass stove (3-stone fire)/traditional stoves with Stoves which combust biomass more efficiently and improve heat transfer to pots, hence saving fuel and lowering greenhouse gas emissions.

Measures taken: The CPAs 9956-0001, 9956-0002, 9956-0003, 9956-0004, and 9956-0005 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 ICS distributed under these CPAs is as follows:

S.No.	CPAs	Number of ICS Distributed
1	CPA 9956-0001	13,293
2	CPA 9956-0002	16,995
3	CPA 9956-0003	17,000
4	CPA 9956-0004	17,000
5	CPA 9956-0005	10,691
Total		74,979

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 SHS and AES 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 stove is assembled locally in Uganda according to specific design parameters and dimensions, providing for uniform performance between units. These ICSs are illustrated below:



Figure 1 Photo of the stoves used in the SSC-CPAs in Uganda (EZY, SHS and AES resp.)

Stove Type	Efficiency	Size/Weight
Ezy Stove (portable)	23.39%	13"Ø x 12" high; 33cm Ø x 30.5cm high 6.2lbs./2.8kgs.
SmartHome Charcoal Stove (portable)	24.90%	11"Ø x 10.2" high; 28 cm Ø x 26 cm high 24.3 lbs/11 kgs
AES Stove (portable)	24.28%	9.0" Ø x 7.9" high; 23 cm Ø x 20 cm high; 19.8 lbs/9kgs

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

CPA	9956-0001	9956-0002	9956-0003	9956-0004	9956-0005
CPA Start Date (as per registered PDD)	02/01/2013	09/05/2014	02/04/2015	03/04/2015	04/05/2016
Crediting Period Start Date	22/07/2014 – 21/07/2021	17/03/2015 – 16/03/2022	17/04/2015 – 16/04/2022	17/04/2015 – 16/04/2022	01/01/2017 – 31/12/2023
Date of first stove sold under the CPA	02/01/2013	09/05/2014	02/04/2015	03/04/2015	04/05/2016

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 CPA is as follows:

S.No.	CPA	GHG Emission Reductions (tCO ₂)
1	9956-0001	30,616
2	9956-0002	37,120
3	9956-0003	34,320
4	9956-0004	33,265
5	9956-0005	6,654
	Total	141,975

Each stove has a unique identification number. The same is recorded to trace the stove later and avoid double counting. Further, for each stove included under each CPA, information on the location of the stove has been collected by collecting addresses. 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 on each stove along with its location serves toward avoiding double counting of stoves amongst various CPAs.

C.2. Location of CPAs

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The geographical boundaries of all the 5 CPAs is the national borders of Uganda, which is same as the boundary of the PoA.



Figure 5 - The physical/geographical boundary of the SSC-PoA: Uganda

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

- Host Party = Uganda
- Region/state/province = All the regions of Uganda
- City/town/community = All the cities of Uganda
- 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 or standardized baselines

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N/A

C.3.2. Corrections

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The following corrections have been made to 9956-0005

- Several typographic corrections have been made.
- Appendix 3 of CPA-DD: Applicability of the selected methodology(ies) has been added to Appendix 3 of the revised CPA-DDs in light of change in the CPA-DD template.
- Reference to Section and Figure numbers are corrected according to latest version (v 08.1) of the CDM-CPA-DD-FORM.
- To comply with the requirement of latest version (v 08.1) of the CDM-CPA-DD-FORM, few Sections have been improved.

No corrections in this monitoring period have been made to CPA 9956-0001, CPA 9956-0002, CPA 9956-0003 and CPA 9956-0004.

The aforesaid corrections were approved on 03 Dec 2018:
<https://cdm.unfccc.int/PRCContainer/DB/prcp827754113/view>

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

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N/A

C.3.4. Inclusion of monitoring plan

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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 applied standards or tools

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The following changes to the included monitoring plan of the CPA 9956-0005 has been made.

Deleted: ¹

1. Revision of Ex-ante parameter value for B_{old} (Quantity of woody biomass used in the absence of the project activity in tonnes per household, tonnes wood/ HH-year)

The CPAs define B_{old} value as follows:

Description	9956-0005
Ex-ante parameter value for B _{old} (tonne wood /HH-year) specified in included CPA-DD	7.02 for urban population
Proposed Revision in revised CPA-DD	4.97 for entire CPA population
Conservative Justification	<p>1. The "Appendix - 2 Baseline Study Up Energy Uganda CPA No 001", submitted at the time of PoA registration to CDM-EB and available at: https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/1TX2IRHF0B5VGDQPWSC4MUJKLEAZ63/view, page 7, mentions 85% Ugandan population as rural.</p> <p>2. The latest Ugandan census 2014, table 2.7, page 12, http://uganda.unfpa.org/sites/default/files/pub-pdf/CENSUS%202014%20Final%20Results_0.pdf gives the rural population as 78.5% (total Urban population = 7,425,864, total rural population = 27,208,786)</p> <p>CPA 05 population is primarily Urban. However, in light of some samples from earlier CPAs (02, 03 and 04) reporting themselves as rural in previous monitoring period, the PP decided to revise the B_{old} value to the most conservative value possible i.e. 4.97 tonnes/HH-year for 100% CPA population instead.</p> <p>Hence the revised B_{old} value of 4.97 tonnes/HH-year for 100% entire CPA population is deemed conservative.</p>
Compliance with applied methodology (para 266 of VVS for PoA, v1.0)	Yes - The Ex-ante parameter value for B _{old} is in compliance with AMS II.G. version 5.0. (the methodology allows 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 as provided in CPA-DD Appendix 3.
Reduction in accuracy of monitoring compared to requirements contained in registered monitoring plan (para 266 of VVS for PoA, v1.0)	No - The revision in the ex-ante parameter value does not reduce the accuracy of the monitoring compared to monitoring requirements contained in registered monitored plan. The proposed revision applies the lower of the two values for B _{old} to entire CPA population irrespective of their category (urban / rural) as a conservative measure
Reduction in the accuracy of the calculation of GHG emission reductions or net anthropogenic	No - The revision in the ex-ante parameter value does not reduce the accuracy of ER calculations. The proposed revision applies the lower of the two values for B _{old} to entire CPA population irrespective of their category (urban / rural) as a most conservative measure / assumption.

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GHG removals (para 267 of VVS for PoA, v1.0)	
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The CPA description does not limit the CPA to Urban / Rural population and only refer to residential users. Thus, the CPA by virtue of the description in section A.1 (General description of CPA), A.3 (Technologies/measures) and F (Eligibility for inclusion) are open to all residential users alike (i.e. urban or rural) hence the aforesaid is not deemed as changes to project design.

Also, although the ex-ante parameter value is being revised, it is not deemed a permanent correction as the change is not attributed to mistake but is being revised as a conservative measure.

2. Changes to the sampling plan in light of above, to remove reference to urban / rural users.

The CPAs define sampling plan as follows:

Description	9956-0005
Sampling frame defined in included CPA-DD	Sampling Frame for CPA is: Uganda-Urban / Smart Home Charcoal / Residential Different sample groups could be formed to ensure sample populations were homogenous
Proposed Revision in revised CPA-DD	Sampling Frame for CPA is: Uganda / ICS Type / Residential
Compliance with applied methodology (para 266 of VVS for PoA, v1.0)	Yes - The revised approach follows the confidence / precision requirements prescribed by the methodology for annual / biennial monitoring / sampling.
Reduction in accuracy of monitoring compared to requirements contained in registered monitoring plan (para 266 of VVS for PoA, v1.0)	No - The proposed revision eliminates the variation in the CPA population on the basis of region (baseline consumption 7.02 tonnes/HH-year for urban and 4.97 tonnes/HH-year for rural) by prescribing a single value of 4.97 tonnes/HH-year for entire CPA population. The CPA population no more remains heterogeneous on the basis of region and becomes homogenous wrt to region (wrt the associated baseline consumption). This removes the need for separate sampling frames for Urban and Rural regions as a common baseline is now applicable to both the regions alike. Hence any reduction in accuracy is not deemed effected and the proposed revision is deemed conservative in light of application of rural population weightage of 100% for B _{old} .
Reduction in the accuracy of the calculation of GHG emission reductions or net anthropogenic GHG removals (para 267 of VVS for PoA, v1.0)	No - The revision in the sampling approach will not reduce the accuracy of ER calculations. The proposed revision eliminates the variation in the CPA population on the basis of region (baseline consumption 7.02 tonnes/HH-year for urban and 4.97 ton/HH-year for rural) by prescribing a single value of 4.97 tonnes/HH-year for entire CPA population. Thus, irrespective of the region, the same B _{old} value will be applied for ER calculations for both regions alike.

The aforesaid changes were approved on 03 Dec 2018:
<https://cdm.unfccc.int/PRCContainer/DB/prcp827754113/view>

C.3.6. Changes to project design

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N/A

SECTION D. Description of monitoring system of CPAs

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All the 5 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 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. Unique identification of stove (stove serial number)
 - b. Partner organization name, address and telephone
 - c. Date of sale and model/type of project technology sold
 - d. Quantity of project technology sold

Frequency: Continuous

2. **Project Database:** [Parameter N_y] Each CPA have a specific Project Database that records each ICS crediting in the corresponding CPA. Every ICS listed in the Total Sales Record is transferred into the Project Database of requisite CPA as needed, limited to the maximum threshold for this CPA is reached. In addition to the information provided in the Total Sales Record, the CPA-specific Project Database records user details (enough for end-user identification and follow-up) for all, or a subset of all, appliances deployed. End-user details recorded are:
 - a. Name
 - b. Government, department, village, telephone, or address (as available)
 - c. Mode of use (to be categorised under a baseline scenario)
 - d. Type of stove and fuel the ICS is replacing: Example – traditional or improved baseline stoves, or wood or charcoal fuel.

Frequency: Continuous

3. Continued use of displaced traditional stoves

Methodology AMS II.G V5: The replaced low efficiency devices are disposed of and not used within the boundary or within the region;

Monitoring surveys conducted on households using ICS investigated the extent to which baseline traditional stoves are 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 usage of baseline stove is determined and is considered in ER calculations to ensure that the fuel-wood consumption of baseline stoves is excluded from B_{old}.

4. 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: <ul style="list-style-type: none">▪ Experience conducting surveys/tests

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	<ul style="list-style-type: none"> ▪ 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
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SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

Following parameters are same for all the 5 CPAs included in the monitoring report

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 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	Efficiency of the systems replaced for residential biomass users was determined through local survey conducted by a third party and commissioned for the purpose of this program activity. Details of the study are provided in CPA-DD Appendix 3.
Value(s) applied	10%
Choice of data or measurement methods and procedures	Default value as provided in AMS-II.G Version 5.0 (10%)
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	Percentage
Description	Leakage Factor is multiplied by a net to gross adjustment factor to account for leakages
Source of data	Default Value

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Value(s) applied	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	Percent
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	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	η_{specified}
Unit	Percentage
Description	Efficiency of the system being deployed at the time of CPA inclusion

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Source of data	Manufactures specifications or independent testing
Value(s) applied	EZY = 27.1% SHS = 26.0% AES = 25.3%
Choice of data or measurement methods and procedures	The thermal efficiency report provided by the manufacturer establishes the efficiency of Ezy Stove. A thermal efficiency report provided by a qualified third party establishes the efficiency of each SHS and AES stoves.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	Note that $\eta_{\text{specified}}$ 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	0.537
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Annually
Calculation method (if applicable)	The μ_{old} was calculated by asking end user household how much fuel they burn in traditional stoves 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 $B_{y,\text{saving}}$

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	<table border="1"> <thead> <tr> <th>Stove Model</th><th>Average Efficiency</th></tr> </thead> <tbody> <tr> <td>AES</td><td>24.28%</td></tr> <tr> <td>EZY</td><td>23.39%</td></tr> <tr> <td>SHS</td><td>24.90%</td></tr> </tbody> </table> <p>Weighted average efficiency considering stove deployment date: 24.49% For detail refer "WBT Summary" Worksheet in ER calculator</p>	Stove Model	Average Efficiency	AES	24.28%	EZY	23.39%	SHS	24.90%
Stove Model	Average Efficiency								
AES	24.28%								
EZY	23.39%								
SHS	24.90%								
Monitoring equipment	The tests were conducted following WBT protocol by trained field personnel by third party.								
Measuring/reading/recording frequency	Annual								

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Calculation method (if applicable)	The WBTs were carried out in accordance with WBT protocol 4.2.3. Since the monitoring period includes 3 stove types, the 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 monitoring equipment used by the surveyor were calibrated as per manufacturer guidance to ensure quality/accuracy in results. 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. 95/10 confidence/precision was applied on the sampling parameters for WBT.
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 database
Value(s) of monitored parameter	9956-0001= 13,293 9956-0002= 16,995 9956-0003= 17,000 9956-0004= 17,000 9956-0005= 10,691
Monitoring equipment	Sales database
Measuring/reading/recording frequency	Continuously
Calculation method (if applicable)	Aggregated from sales database
QA/QC procedures	Each SSC-CPA partner organization maintains a project database of sales to calculate this parameter. CME's electronic records will be 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	Data is transparent

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 conducted by third party CIRCODU.
Value(s) of monitored parameter	92.11%
Monitoring equipment	Usage Survey
Measuring/reading/recording frequency	Annual
Calculation method (if applicable)	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.

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QA/QC procedures	The survey conducted by experienced team having conducted many surveys previously 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

All the 5 CPAs 9956-0001, 9956-0002, 9956-0003, 9956-0004 and 9956-0005 were covered in the single sampling plan.

CPA#	AES	EZY	SHS	Grand Total
CPA-01	0	13,293	0	13,293
CPA-02	1,918	0	15,077	16,995
CPA-03	3,017	0	13,983	17,000
CPA-04	3,267	0	13,733	17,000
CPA-05	763	0	9,928	10,691
Grand Total	8,965	13,293	52,721	74,979

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 SSC-PoA-wide Sampling Plan (by grouping and sampling across CPAs). 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. Drop-off of technologies in use per year: 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.

iv. Sampling Frame

The target population is the stove distributed and recorded. Since all the models of stoves distributed under the PoA were distributed to homogenous end users (i.e. domestic households), it was decided that one single sampling frame would be appropriate for two parameters i.e. Usage Rate (U_y) and Quantity of woody biomass used in the project activity by traditional stoves (μ_{old}). Following the provision in the registered PoA-DD, the population is deemed homogeneous according to the following conditions;

- End users: all stoves are for domestic (household) usage as per their design.
- Geographical area of the project: all models are being distributed in the same geographical area, Uganda.

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For the thermal efficiency of the stoves (η_{new}), it was decided to have three sampling frames, one for each stove model.

v. Sampling Method

Simple Random Sampling was applied across the ICS population. Random numbers were generated using the random excel function. The ICS distribution data was arranged by date of distribution, and the samples corresponding to the random numbers obtained were picked for sampling.

vi. Sampling Size

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 confidence/precision for annual sampling. In order to calculate the sample size estimates, values for the proportions, mean values, and standard deviations are required. For this monitoring period, the CME considered that the most updated knowledge about the expected values of the parameters are based on the project developer's knowledge and experience as per the requirements of para 12 (b) & (c) of the standard "Sampling and surveys for CDM project activities and programme of activities". The requirements of para 12 (a) of the standard are met in the application of different equations for type of parameter for calculation of sampling size which is described below.

Parameter	Total population (N)	Expected results	Reliability	Sample Size (n) required ²	Samples covered during monitoring
η_{new} (AES)	8,965	25.0% (mean); 2.5% (SD)	95/10	7	12
η_{new} (EZY)	13,293	24.0% (mean); 2.4% (SD)	95/10	7	10
η_{new} (SHS)	52,721	25.0% (mean); 2.5% (SD)	95/10	7	12
U_y	74,979	0.90 (proportion)	95/10	43	76
μ_{old}	67,481	500 kg/year (mean); 50.0 (SD)	95/10	7	18

- The parameter U_y is a proportional value, therefore the sample size has been calculated according to the following equations³:

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

Where:

$$V = \frac{p \cdot (1-p)}{p^2}$$

- The parameters μ_{old} and $\eta_{\text{new},y}$ are mean values, therefore the sample size has been calculated according to the following equations⁴:

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

Where:

$$V = \left(\frac{SD}{\text{mean}} \right)^2$$

² In case of mean parameters, the 'sample size required' mentioned above is the Student T-distribution adjusted sample size, as the initially calculated sample size was less than 30. This is in accordance with para 13 of Sampling and surveys for CDM project activities and programmes of activities, Version 07.0

³ Refer Equation 1 & 2 of Annex 05 of registered PoA-DD (Page 61)

⁴ Refer Equation 1 & 3 of Annex 05 of registered PoA-DD (Page 61)

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

Data was collected using surveys done by "Center for Integrated Research and Community Development Uganda (CIRCODU)". The method of collecting data is field surveys. 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 (as mentioned in the table above) 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 as available on GACC website. The monitoring was conducted during August 2017 – September 2017.

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.

Parameter	Result
U_y	92.11%
μ_{old}	0.537 tonnes
$\eta_{new,y,i}$ (EZY)	23.39%
$\eta_{new,y,i}$ (SHS)	24.90%
$\eta_{new,y,i}$ (AES)	24.28%

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

$\eta_{new,y,i}$ – EZY	23.39%	%	Calculated
Population size	13,293	Number	Calculated
Sample size	10	Number	Calculated
Mean	23.39	%	Calculated
Standard deviation	0.67	%	Calculated
Standard error of mean	0.002		Calculated
Precision	1.94%	%	Calculated – Refer to WBT Sheet
Result	Ok, Acceptable	--	Calculated

$\eta_{new,y,i}$ – SHS	24.90	%	Calculated
Population size	52,721	Number	Calculated
Sample size	12	Number	Calculated
Mean	24.90	%	Calculated
Standard deviation	1.10	%	Calculated
Standard error of mean	0.003		Calculated
Precision	2.73	%	Calculated – Refer to WBT Sheet
Result	Ok, Acceptable	--	Calculated

$\eta_{new,y,i}$ – AES	24.28%	%	Calculated
Population size	8,965	Number	Calculated
Sample size	12	Number	Calculated
Mean	24.28	%	Calculated
Standard deviation	0.70	%	Calculated
Standard error of mean	0.002		Calculated
Precision	1.78	%	Calculated – Refer to WBT Sheet
Result	Ok, Acceptable	--	Calculated

U_y	92.11%	%
Population size	74,969	Number
Sample size	76	number
Proportion for Usage rate	0.921	Fraction
Standard error of proportion	0.031	
Precision	6.58%	%
Result	Ok, Acceptable	--

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μ_{old}	0.537	tonnes/year
Population size	69,060	Number
Sample size	18	Number
Mean	4.60	Kg/day
Standard Deviation	2.26	Kg/day
Standard error of mean	0.533	
Precision	24.45	%
Result	Use upper bound value	--

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

The samples were randomly selected using Simple Random Sampling across the CPA population. Random numbers were generated using random excel function and the ICS corresponding to the random numbers obtained, were selected as samples to be monitored. Under Simple 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

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Emission reductions are calculated as follows:

As per the SSC-PoA-DD, emission reductions for the SSC-CPA (Same for all 5 CPAs) has been calculated according to the following formula:

$$ER_y = (B_{y,savings} * N_y * U_y) * (f_{NRB,y} * NCV_{biomass} * EF_{projected_fossil\ fuel}) \quad \text{Equation (1)}$$

Where:

ER_y	Emission reductions during the period y in tCO ₂ e
$f_{NRB,y}$	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, 0.0156 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 tCO ₂ /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:

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

B_{old}	Quantity of biomass used in the absence of the project activity in tonnes/ year
μ_{old}	Quantity of woody biomass for the continued use of old stoves
η_{old}	Weighted average value is used since the replaced systems are unimproved and improved baseline technologies.
η_{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)

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Description	Unit	CPA-01	CPA-02	CPA-03	CPA-04	CPA-05
Stove installed under CPA (Ny)	number	13293	16995	17000	17000	10691
Year equivalent fraction	fraction	1.0000	0.9483	0.8765	0.8496	0.2703
B _{add}	tons wood-eq/HH-yr	4.97	4.97	4.97	4.97	4.97
M _{add}	tonnes wood/ year	0.54	0.54	0.54	0.54	0.54
L _y	Percentage	95%	95%	95%	95%	95%
U _{add}	Percentage	10%	10%	10%	10%	10%
U _{new}	Percentage	24.49%	24.49%	24.49%	24.49%	24.49%
B _{y, saving}	tons wood-eq/HH-yr	2.49	2.49	2.49	2.49	2.49
N _y (adjusted for year equivalent fra	Number	13293	16117	14901	14443	2889
U _y	Percentage	92%	92%	92%	92%	92%
f _{NBS,y}	Percentage	82%	82%	82%	82%	82%
NCV _{woodmass}	TJ/tonne	0.015	0.015	0.015	0.015	0.015
EF _{projected forest fuel}	tCO ₂ /TJ	81.60	81.60	81.60	81.60	81.60
ER _y	tCO ₂	30616	37120	34320	33265	6654
annual thermal energy savings achieved during monitoring period	GWthh	127.10	154.10	142.48	138.10	27.63
Emission Reduction (ER)	tCO ₂ e	30,616	37,120	34,320	33,265	6,654

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

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N/A

F.3. Calculation of leakage emissions

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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 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
9956-0001	30,616	0	0	0	30,616	30,616
9956-0002	37,120	0	0	0	37,120	37,120
9956-0003	34,320	0	0	0	34,320	34,320
9956-0004	33,265	0	0	0	33,265	33,265
9956-0005	6,654	0	0	0	6,654	6,654
Total	141,975	0	0	0	141,975	141,975

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 (t CO ₂ e)
9956-0001	30,616	44,874
9956-0002	37,120	44,980
9956-0003	34,320	44,980
9956-0004	33,265	44,980
9956-0005	6,654	37,463
Total	141,975	217,277

F.6. Remarks on increase in achieved emission reductions

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

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CPA No.	Annual ER	Start Date	End Date	Days Monitored	Pro-rata calculation of ERs
9956-0001	44,874	01-11-2016	31-10-2017	365	44,874
9956-0002	44,980	01-11-2016	31-10-2017	365	44,980
9956-0003	44,980	01-11-2016	31-10-2017	365	44,980
9956-0004	44,980	01-11-2016	31-10-2017	365	44,980
9956-0005	44,980	01-01-2017	31-10-2017	304	37,463
Total					217,277

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
City	West Delhi
State/Region	Delhi
Postcode	110063
Country	India
E-mail	info@climate-secure.com
Website	www.climate-secure.com
Contact Person	Rohit Lohia

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Document information

Version	Date	Description
02.0	7 June 2017	Revision to: <ul style="list-style-type: none">• 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		