



**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	Fuel Efficient Stoves in Zambia		
UNFCCC reference number of the PoA	6864		
Version numbers of the PoA-DD applicable to this monitoring report	Version 6.2		
Version number of this monitoring report	2.0		
Completion date of this monitoring report	27/06/2018		
Monitoring period number	3		
Duration of this monitoring period	28/01/2017 – 27/01/2018 (both days inclusive)		
Monitoring report number for this monitoring period	1		
Coordinating/managing entity	3 Rocks Ltd. (3RL)		
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)	
	Zambia	Yes	
Sectoral scopes	3 : Energy demand		
Applied methodologies and standardized baselines	AMS-II.G. ver. 3 - Energy efficiency measures in thermal applications of non-renewable biomass		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013	
	0	CPA Number	Volume
		6864-0001	20,211
		6864-0002	19,495
		6864-0003	12,556
Total	52,262		
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	122,052		

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

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Policy/measure or stated goal of the PoA

The goal of the PoA is to install fuel efficient cooking stoves by 3 Rocks Ltd. (3RL) in households in Zambia. The stoves replace wood-fired, 3-rock traditional fires as traditionally, majority of Zambian families cook on an open fire, utilizing the 'three rocks' method for heating pots. This method is inefficient and leads to the unsustainable use of non-renewable biomass in the process. Their replacement by fuel-efficient stove help recipient households reduce their non-renewable wood use and help limit valuable time spent gathering fuel wood. Greenhouse gases are mitigated by reducing the harvesting of non-renewable biomass.

The efficient stoves are based on a design commissioned by 3RL and are installed by 3RL for recipient households in exchange for certain labour and materials during installation. The stove design was tested independently in accordance with the "Stove Manufacturers Emissions & Performance Test Protocol (EPTP)¹" and certified by the Engines and Energy Conversion Laboratory at Colorado State University for thermal efficiency.

General implementation framework of the PoA

3RL has the overall operational and management responsibility for the implementation and monitoring of the PoA and is the PoA's CME. All three CPAs under the PoA have been implemented by 3RL.

Recipient households sign an agreement acknowledging that 3RL is the owner of the rights to the emissions reductions generated by the stove and agreeing for the stove to be included in the PoA. Installation teams are appointed to install the stoves according to a uniform installation process and they are trained to build each stove to a pre-determined design, eliminating variation in performance. Installers are also trained to capture monitoring data during the installation process identifying each stove by owner name and/or government identification number, address or location, and GPS location reference. Each stove will be assigned a unique reference number in an electronic data management system (monitoring database).

Refer section B.1 for more details on implemented management system.

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
Fuel Efficient Stoves in Zambia (3RL CPA No.XX)	Version 6.2	3 : Energy demand	AMS-II.G. ver. 3 - Energy efficiency measures in thermal applications of non-renewable biomass

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)
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¹ Stove Manufacturers Emissions & Performance Test Protocol (EPTP): A protocol for testing stove fuel efficiency and emissions and a standard for improved stoves; Defoort, L'Orange, Kreutzer (EECL), Lorenz (Envirofit), Kamping (Philips) 2009

Fuel Efficient Stoves in Zambia (3RL CPA No.01) 6864-0001	Fuel Efficient Stoves in Zambia (3RL CPA No.XX)	Version 6.2	28/01/2013 – 27/01/2020 (Renewable)	Yes
Fuel Efficient Stoves in Zambia (3RL CPA No.02) 6864-0002	Fuel Efficient Stoves in Zambia (3RL CPA No.XX)	Version 6.2	25/10/2013 – 23/10/2020 (Renewable)	Yes
Fuel Efficient Stoves in Zambia (3RL CPA No.03) 6864-0003	Fuel Efficient Stoves in Zambia (3RL CPA No.XX)	Version 6.2	01/11/2013 – 31/10/2020 (Renewable)	Yes

A.2. Coordinating/managing entity

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3 Rocks Limited is the CME of the PoA

Contact: Dave Allen

Email: dave@icecapltd.com

Person/entity responsible for completing the CDM-MR-FORM

Organization: Climate-Secure Services

Contact: Rohit Lohia

Email: rohit.lohia@climate-secure.com

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

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3RL has the overall operational and management responsibility for the implementation and monitoring of the PoA and is the PoA's CME. All three CPAs under the PoA have been implemented by 3RL. 3RL is responsible for the following operational and management activities for the PoA:

1. CPA household identification

- A process for identifying households is managed by 3RL local logistics managers. This involves working with local community leaders and other partners to help identify recipient households suitable (i.e. those utilizing wood-fired, three rock fires) for the installation of a stove;
- 3RL pre-installation teams visit recipient households in each CPA and ensure recipients understand and sign the emissions rights acknowledgement; this acts as the "order" for each stove.
- Each stove is assigned a unique installation number chronologically;

2. Installation

- Local 3RL logistics managers identify local installation partners and train stove installation teams to undertake installations as per the standardized design and installation procedure
- Local partners and installers coordinate the receipt of stove components in the distribution process

3. Installation Data Capture

- A post-installation team checks the quality of installation work
- If the work is satisfactory, installation data is collected by the post-installation team, which includes:
 - A GPS location reference

- The household family name and address/physical location (i.e. village) and/or Zambian government identification number of the stove recipient
- Date and time of installation
- Data is collected by the post-installation team electronically and uploaded automatically to the monitoring automatically generating a unique reference number for each stove

4. Monitoring

- Monitoring activities are conducted as follows:
 - Surveys are completed in the field by trained 3RL local monitoring teams
 - Data captured by the monitoring teams is passed to 3RL data administration team
 - Data is checked for completeness, consistency and accuracy
 - Monitoring report is prepared by experienced resource (internal / outsourced)

A procedure to avoid double counting

Double-counting of emissions reductions is avoided by the unique referencing of stoves included in each CPA. This is done through:

- **GPS references:** each stove has a unique GPS-referenced location.
- **Name, location and/or ID number:** an additional check of double-counting is made against the household name, location and/or Zambian government ID number of the stove recipient ascribed to each stove.
- **Unique reference numbers:** each stove also has a unique reference number in the monitoring database. Only one stove is installed per household.

All records are securely maintained and backed-up by 3RL.

B.2. Post-registration changes to PoA

B.2.1. Corrections

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Not applicable.

B.2.2. Inclusion of monitoring plan

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Not applicable.

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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Not applicable.

B.2.4. Changes to programme design

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Not applicable.

PART II Monitoring of CPAs

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

SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

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a) Purpose of the specific-case CPAs and the measures taken for GHG emission reductions or net GHG removals by sinks

Each CPA involves the distribution of fuel-efficient stoves by 3 Rocks Ltd. (3RL) in individual households in Zambia. The CPAs replace cooking stoves using woodfuel with more efficient stoves using woodfuel. The project ICS are more efficient in transferring heat from the fuel to the pot, thus saving fuel compared to the baseline stoves which would have been used in the absence of the project activity. Furthermore, the ICSs applied in these CPAs have been designed not only to increase heat transfer, but also to match traditional utensils and cooking habits of people in Zambia.

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

The efficient stoves are based on a design commissioned by 3RL and are installed by 3RL for recipient households in exchange for certain labour and materials during installation. The stove design was tested independently in accordance with the “*Stove Manufacturers Emissions & Performance Test Protocol (EPTP)*” and certified by the Engines and Energy Conversion Laboratory at Colorado State University to determine its thermal efficiency

3RL employs manufacturers to produce the components for the installation of each stove. These components are then distributed to the CPA via a central location, where installation teams are responsible for the assembly of each stove. Each installation team is trained to build each stove, in partnership with the stove recipient, to a uniform design and is responsible for ensuring that data is captured at installation to ensure the accurate monitoring of emissions reductions during each monitoring period.

The technology described is state-of-the-art and designed as a bespoke solution for Zambia. The stove design is shown in

The following table details the implementation status of the CPAs along with technology involved:

CPA	Type of Project stoves eligible	Stove models installed	Total number of stoves installed
6864-0001	Wood fuel	Z3000	15,638
6864-0002	Wood fuel	Z3000	15,084
6864-0003	Wood fuel	Z3000	9,715

below.



The following table details the implementation status of the CPAs along with technology involved:

CPA	Type of Project stoves eligible	Stove models installed	Total number of stoves installed
6864-0001	Wood fuel	Z3000	15,638
6864-0002	Wood fuel	Z3000	15,084
6864-0003	Wood fuel	Z3000	9,715

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

Description	6864-0001	6864-0002	6864-0003	Reference
Start Date	22 Dec 2010	22 Dec 2010	30 Sep 2012	Respective CPA-DD
Date of first stove distribution	06 Jun 2011	28 Oct 2011	28 Feb 2013	PoA / CPA distribution database

d) Total GHG emission reductions or net GHG removals by sinks achieved in this monitoring period for the specific-case CPAs,

CPA	Total GHG ER achieved
6864-0001	20,211
6864-0002	19,495
6864-0003	12,556
Total	52,262

C.2. Location of CPAs

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Host Party(ies): The host party for the PoA is Zambia

Region/state/province: All across Zambia

City/town/community: All across Zambia

Physical/geographical location:

The geographical boundary for the CPAs in the PoA is the country of Zambia (Figure 1). The Republic of Zambia, lies within the latitude and longitude of 15° 00 S and 30° 00 E². The approximate GPS coordinates derived from Google Earth for the furthest extremities of the Zambian border are:

North (border with Tanzania and DRC):	08°12'11.83" S & 30°46'22.26" E (-8.233237° & 30.736313°)
South (border with Zimbabwe):	18°04'34.03" S & 26°41'47.24" E (-18.075368° & 26.690855°)
East (border with Malawi):	10°33'43.01" S & 33°42'08.00" E (-14.392118° & 21.992912°)
West (border with Angola):	14°33'34.57" S & 21°59'58.74" E (-10.552622° & 33.693352°)

a.² <http://wwp.greenwichmeantime.co.uk/time-zone/africa/zambia/map.html>



Figure 1: Geographical boundary of Zambia

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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Not Applicable

C.3.2. Corrections

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Not Applicable

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

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Not Applicable

C.3.4. Inclusion of monitoring plan

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Not Applicable

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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Not Applicable

C.3.6. Changes to project design

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Not Applicable

SECTION D. Description of monitoring system of CPAs

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Stoves were installed by 3RL trained local partners. At the CPA level, these partners ensured that necessary data was correctly obtained from the customer firstly to avoid double counting and secondly to enable tracking of the ICS for monitoring purposes. This data captured included:

- a. GPS location of the stove
- b. Name of customer, Address / location of the customer
- c. Date of installation
- d. Stove unique serial ID number
- e. Type of old stove which the ICS replaced, i.e. the fuel type used in the old / baseline stove (in this case woodfuel)

All other monitoring activities have been carried out at the PoA level using single stage sampling plan.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

(Copy this table for each data or parameter.)

Data/Parameter	B_{old}
Unit	Tonnes per annum
Description	Quantity of biomass used in absence of the project activity
Source of data	Registered PoA-DD / CPA-DDs
Value(s) applied	4.1
Choice of data or measurement methods and procedures	Fixed ex-ante for the entire PoA
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/parameter	$f_{NRB,y}$
Unit	Fraction
Description	Non-renewable biomass usage in Zambia, as a proportion of total biomass usage
Source of data	Registered PoA-DD / CPA-DDs
Value(s) applied	0.81
Choice of data or measurement methods and procedures	Fixed ex-ante for the entire PoA
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	η_{old}
Unit	Fraction
Description	Efficiency of 3-rock fire cooking method (system being replaced)
Source of data	Methodology Default
Value(s) applied	0.10
Choice of data or measurement methods and procedures	AMS II.G, version 3
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	$NCV_{biomass}$
Unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted
Source of data	IPCC Default
Value(s) applied	0.015

Choice of data or measurement methods and procedures	AMS II.G, version 3
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	$EF_{projected_fossilfuel}$
Unit	tCO ₂ /TJ
Description	Emission factor: substitution of non-renewable biomass by similar consumers
Source of data	Methodology Default
Value(s) applied	81.6
Choice of data or measurement methods and procedures	AMS II.G, version 3
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	L_y
Unit	Fraction
Description	Leakage
Source of data	Methodology Default
Value(s) applied	0.95
Choice of data or measurement methods and procedures	AMS II.G, version 3
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	DRB
Unit	Tonnes
Description	Demonstrably renewable biomass
Source of data	Non renewable biomass fraction $f_{NRB,y}$ baseline study
Value(s) applied	1,278,025
Choice of data or measurement methods and procedures	See POA-DD
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

E.2. Data and parameters monitored

(Copy this table for each data or parameter.)

Data/parameter	NS
Unit	Number
Description	Number of stoves still operation during the monitoring period
Measured/calculated/default	Calculated
Source of data	Activity Sample Group (ASG) Household Survey

Value(s) of monitored parameter	CPA	Toal number of stoves installed	Stove operation rate	NS
	CPA 6864-0001	15,638	0.8725	13,645
	CPA 6864-0002	15,084	0.8725	13,162
	CPA 6864-0003	9,715	0.8725	8,477
Monitoring equipment	Survey Questionnaire			
Measuring/reading/recording frequency	annually			
Calculation method (if applicable)	<p>Stoves in operation in the Activity Sample Group (ASG) were counted during the monitoring period to derive an retained usage rate (expressed as a percentage)</p> <p>The usage rate was then multiplied by the total number of stoves installed in each CPA to obtain the number of stoves still in operation during the monitoring period</p>			
QA/QC procedures	<p>The sample was selected based on a 95% level of confidence and 10% precision.</p> <p>Data was collected by the survey questionnaire and the information was cross-checked through observation by the monitoring teams</p> <p>The installation data was also cross checked with data collected from the ASG to ensure the exact stoves sampled were surveyed.</p> <p>The usage rate was tested to determine if the desired precision was met.</p>			
Purpose of data/parameter	Calculation of baseline emissions			
Additional comments	-			

Data/parameter	<i>OD</i>		
Unit	Days		
Description	Total stove operating days in monitoring period		
Measured/calculated/default	Calculated		
Source of data	Installation and monitoring survey data in 3RL Monitoring database		
Value(s) of monitored parameter	CPA	OD	
	CPA 6864-0001	4,980,396	
	CPA 6864-0002	4,803,958	
	CPA 6864-0003	3,094,037	
Monitoring equipment	Monitoring database and survey		
Measuring/reading/recording frequency	annually		
Calculation method (if applicable)	This number is calculated by multiplying the average stove operation days for each CPA by the number of stoves still operating during the monitoring period (from the table above).		
QA/QC procedures	<p>The date of installation from the 3RL PoA Monitoring databse was used to determine the portion of the monitoring period that each stove has been in operation.</p> <p>The operating days for each stove was divided by 365 to determine the emission reductions achieved by each stove</p>		
Purpose of data/parameter	Calculation of baseline emissions		
Additional comments	-		

Data/parameter	η_{new}
Unit	Fraction
Description	Thermal efficiency of the stove
Measured/calculated/default	Measured
Source of data	Water Boiling Tests (WBT)
Value(s) of monitored	Equipment make: CAMRY Weighing Scales

parameter	<p>Model: ACS PCS Capacity: 30 kg Accuracy : 1/3000 Full Scale Units used: 2 Date of purchase: 16 March 2018</p> <p>Equipment make: Liquid in glass lab Thermometer Measurement range: -10^o C to 110^oC Accuracy: : + / - 0.1^oC Unit used: 2 Date of purchase: 16 March 2018</p> <p>Equipment make: CONTROL Moisture Meter Model: Hydro-Tec Serial number: 17031866 Accuracy: : upto ±1.5% Units used: 1 Date of purchase: 15 March 2018</p> <table border="1"> <thead> <tr> <th>CPA</th> <th>η_{new}</th> </tr> </thead> <tbody> <tr> <td>CPA 6864-0001</td> <td rowspan="3">23.23%</td> </tr> <tr> <td>CPA 6864-0002</td> </tr> <tr> <td>CPA 6864-0003</td> </tr> </tbody> </table>	CPA	η_{new}	CPA 6864-0001	23.23%	CPA 6864-0002	CPA 6864-0003
CPA	η_{new}						
CPA 6864-0001	23.23%						
CPA 6864-0002							
CPA 6864-0003							
Monitoring equipment	New equipment (digital weighing scales, moisture meter and thermometres) were used to carry out the WBT hence did not require any calibration as they had not been used before.						
Measuring/reading/recording frequency	annually						
Calculation method (if applicable)	WBTs were carried out on 13 stoves following the WBT protocol.						
QA/QC procedures	The sample was selected based on a 95% level of confidence and 10% precision required for annual surveys in line with the sampling plan in the registered PoA-DD.						
Purpose of data/parameter	Calculation of baseline emissions						
Additional comments	-						

Data/parameter	B_{new}						
Unit	Tonnes per annum						
Description	Quantity of biomass saved per stove per annum						
Measured/calculated/default	Calculated						
Source of data	ASG Household Survey						
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>CPA</th> <th>B_{new}</th> </tr> </thead> <tbody> <tr> <td>CPA 6864-0001</td> <td rowspan="3">2.76</td> </tr> <tr> <td>CPA 6864-0002</td> </tr> <tr> <td>CPA 6864-0003</td> </tr> </tbody> </table>	CPA	B_{new}	CPA 6864-0001	2.76	CPA 6864-0002	CPA 6864-0003
CPA	B_{new}						
CPA 6864-0001	2.76						
CPA 6864-0002							
CPA 6864-0003							
Monitoring equipment	Survey Questionnaire						
Measuring/reading/recording frequency	annually						
Calculation method (if applicable)	<p>The sample for the survey was selected based on a 95% level of confidence and 10% precision required for annal surveys in line with the sampling plan in the registered PoA-DD.</p> <p>The ASG Household survey checked the presence of domestic 3-rock fires in the household of stove recipients and the survey questionnaire was used to ascertain the patterns of usage of each appliance. A proportion of usage of 3 rock fires was calculated across the ASG and a deduction made to B_{old}, to determine B_{new}. The average of B_{new} was then determined across the ASG.</p>						

QA/QC procedures	CME provides guidance and training to enumerators for conducting surveys. The value obtained was tested to determine if the desired precision was met. The survey result met the expected 95/10 precision.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

E.3. Implementation of sampling plan

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A single sampling plan has been implemented for all CPAs under this PoA for this monitoring period.

List of CPAs to which the single sampling was applied

CPA	Scale	Type of Project stove included in the CPA	Total number of stoves in the CPA	CPA monitoring period covered under this PoA monitoring period
6864-0001	Small	Z3000	15,638	28/01/2017 to 27/01/2018
6864-0002	Small	Z3000	15,084	28/01/2017 to 27/01/2018
6864-0003	Small	Z3000	9,715	28/01/2017 to 27/01/2018

a. Description of implemented single sampling design

All the three CPAs apply a common technology (fuelwood stoves, Z3000 stove model) with common usage patterns (domestic usage) and same geographical coverage (Zambia) hence the entire population under the PoA is deemed homogeneous. While the stoves in the CPAs have been installed in different years and have different age, however homogeneity of this stove population (wrt age) was demonstrated in the first monitoring period using statistical analysis tool ANOVA (refer page 12 of the monitoring report for MP#1, available at: http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/YC9QEKSX8NPJ5BFIDLWZ0M3RVGUA2/vi ew).

There has been no change in the population since then, (no additional stoves have been installed) hence the population was deemed homogenous for sampling purposes. *The sample size was calculated based on the considerations mentioned below.*

Category	Description	Parameters monitored by the ASG	Method used for assessment	Target Population / Sampling Frame
<i>Activity monitoring</i>	The activity sample group (ASG) was selected based on a 95% level of confidence, 10% precision, using simple random sampling.	<ul style="list-style-type: none"> Number of Stoves (NS) – to determine the number of stoves still operation during the monitoring period, as compared to the baseline installed number of stoves. Quantity of biomass saved per annum (B_{new}) – to determine the average deduction per stove from the baseline parameter B_{old}. This monitors any residual use of the baseline appliance. 	Users' interview through questionnaire based monitoring survey	40,437
<i>Stove</i>	This stove	<ul style="list-style-type: none"> Efficiency of stove (η_{new}) 	Water boiling	40,437

<i>efficiency monitoring</i>	efficiency sample group (SESG) was selected based on a 95% level of confidence, 10% precision, using simple random sampling.) – to determine the ongoing average efficiency of each stove installed.	tests	
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Sample sizes calculated for the different parameters is as shown in the table below. Refer ER calculator for more details on calculation of sample size for each parameter. The expected parameter values (mean, standard deviation and proportion) were determined based on project developer’s knowledge and experience as per para 12(b) and 12(c) of the Sampling and surveys for CDM project activities and programmes of activities, Version 07.0

In case the sample size calculations returned a value of less than 30 for a mean value parameter, based on the Standard: *Sampling and surveys for CDM project activities and programme of activities version 07.0 paragraph 13* which states that ‘If the parameter of interest is a numeric mean value (i.e. not a proportion or percentage) the Student’s t-distribution shall be used if the resulting sample size is less than 30.’ Therefore, student t-distribution was applied to determine the final sample size.

Sample Size calculations

Category	Total population (N)	Expected results	Reliability	Required Sample Size (n)	Monitored samples
ASG	40,437	Proportion: 80%	95/10	96	102
SESG	40,437	Mean: 23%, SD: 2.3%	95/10	7	13

The stoves were selected by randomly assigning a number to each stove and sorting in increasing order from lower to higher number. Random numbers were generated using online random number generator and the numbers obtained were used to identify the samples from the population. A higher number of samples were monitored than that required to ensure that the desired precision / confidence is achieved as required for annual monitoring (95/10)

b. Collected data

The following assessment of the ASG were undertaken:

- Monitoring staff conducted an observational check to see that the stove was still located in the same place identified by the installation data and observed that it is still being used
- Monitoring staff asked users to confirm that the stove was being used for the recipient household’s domestic purposes
- Monitoring staff confirmed that the old appliance (3-rock fire) had been effectively disposed of, and, if not;
- Monitoring staff ascertained residual usage of the domestic 3-rock fire for cooking, water heating or space heating (i.e. those usages measured in the baseline survey)

The following assessment of the SESG were undertaken:

- The water boiling tests were conducted to assess the efficiency of the installed stoves.

The monitoring surveys and tests were conducted during 10 February 2018 – 30 March 2018

c. Analysis of collected data

Parameter	Samples Monitored	Survey/Test results	Unit
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NS ³	102	0.8725	fraction
B _{new}	66	2.76	tonnes / year
η _{new}	13	23.23	Fraction / %

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

For the different parameters, the precision achieved varied. The tables below show the precision achieved by the various parameters. In the event that the precision target was not met, as per applied methodology, paragraph 22, the parameter values were discounted to the lower bound of the confidence interval.

Precision attained for various parameters

Stove usage (NS)	0.8725	Fraction
Population Size	40,437	number
Monitored Sample Size	102	number
Monitored Proportion	0.8725	Fraction
Standard error of proportion	3.30%	
Monitred Precision	7.41%	%
Statistical Acceptance of Result	ok, acceptable	--

Bnew	2.76	tonnes/y
Population Size	26,165	number
Sample Size	66	number
Mean	2.76	tonnes/y
Standard Deviation	0.51	tonnes/y
Standard error of mean	0.06	
Precision	4.44%	%
Result	ok, acceptable	--

η_{new}	23.23%	Percentage
Population Size	40,437	number
Sample Size	13	number
Mean	23.23%	%
Standard Deviation	0.7%	%
Standard error of mean	0.00	
Precision	1.74%	%
Result	ok, acceptable	--

SECTION F. Calculation of emission reductions or net anthropogenic removals

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

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As per AMS II.G. Version 3, the emission reductions are calculated as

$$ER_y = B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected_fossilfuel}$$

And

$$B_{y,savings} = B_{new} * (1 - \eta_{old} / \eta_{new})$$

And

$$B_{new} = B_{old} * (1 - \text{fraction of baseline stove users} * \text{baseline stove usage rate})$$

Refer below for calculation of emission reductions.

³ The stove operation rate is monitored and then multiplied by the total number of stoves installed to determine the number of operational stoves (NS)

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

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As explained above, the methodology directly provides equation for emission reductions; without separate baseline, project or leakage emission reduction equations. Calculation of Emission Reductions has already been explained above as per the methodology. Thus, this section is not applicable

F.3. Calculation of leakage emissions

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As explained above, the methodology directly provides equation for emission reductions; without separate baseline, project or leakage emission reduction equations. Calculation of Emission Reductions has already been explained above as per the methodology. Thus, this section is not applicable

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
6864-0001	20,211	0	0	0	20,211	20,211
6864-0002	19,495	0	0	0	19,495	19,495
6864-0003	12,556	0	0	0	12,556	12,556
Total	52,262	0	0	0	52,262	52,262

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)
6864-0001	20,211	40,684
6864-0002	19,495	40,684
6864-0003	12,556	40,684
Total	52,262	122,052

F.6. Remarks on increase in achieved emission reductions

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The values of emission reductions achieved for this monitoring period for each CPA are lower than those in the ex-ante estimations.

Appendix 1: Person/entity responsible for completing the CDM-PoA-MR- FORM (additional)

Organization name	Climate Secure Services
Street/P.O. Box	Club Road, Paschim Vihar
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