



**Monitoring report form for CDM programme of activities
(version 01.0)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form for CDM programme of activities" at the end of this form.

MONITORING REPORT

Title of the programme of activities (PoA)	Fuel Efficient Stoves in Zambia	
UNFCCC reference number of the PoA	PoA 6864 CPA Reference Numbers 6864-0001 (3RL CPA No.01) 6864-0002 (3RL CPA No.02) 6864-0003 (3RL CPA No.03)	
Version number(s) of the PoA-DD(s) applicable to this monitoring report	Version 6.2	
Coordinating/managing entity (CME)	3 Rocks Ltd. (3RL)	
Version number of this monitoring report	3.0	
Completion date of this monitoring report	06/01/2016	
Monitoring period number and dates covered by this monitoring report	Monitoring Period 1 Duration of Monitoring Report 28/01/2013 to 27/01/2015 (inclusive of these dates)	
Monitoring report number for this monitoring period	1	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no)
	Zambia	Yes
Sectoral scope(s)	3 : Energy demand	
Selected methodology(ies)	AMS-II.G. ver. 3 - Energy efficiency measures in thermal applications of non-renewable biomass	
Selected standardized baseline(s)	No standardized baseline has been used.	
Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case CPAs in the PoA covered in this monitoring report	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	-	3RL CPA No.01: 27,302

CDM-PoA-MR-FORM

		tCO ₂ e 3RL CPA No.02: 16,594 tCO ₂ e 3RL CPA No.03: 10,525 tCO ₂ e Total: 54,421 tCO₂e
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PART I - Programme of activities

SECTION A. Description of PoA

A.1. Brief description of the PoA

General operating and implementing framework of PoA

The small scale PoA involves the distribution of fuel-efficient stoves by 3 Rocks Ltd. (3RL) in individual households in Zambia, as described in each of the PoA's Component Project Activity's and according to the requirements of the appropriate small scale methodology: AMS II.G *Energy efficiency measures in thermal applications of non-renewable biomass, Version 3*. 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 to determine its thermal efficiency.

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. The replacement by fuel-efficient stove will lead to a reduction in the annual usage of biomass for users by approximately 66%. The majority of Zambians do not have access to the market for fuel-efficient cooking stoves, mainly for economic reasons. Utilizing carbon finance, the proposed PoA aims to overcome this barrier to market entry for households, substituting three rock fires for fuel- efficient stoves.

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 monitoring programme as described in the PoA-DD and the relevant CPA-DD. The benefits of the stove and various user commitments are clearly explained to prospective users during communication events at the CPA implementation stage.

The stove "liner" consists of a standardized, alloy metal combustion chamber, with an insulating layer surrounding it. Stove liners are manufactured, imported and distributed to local Zambian teams responsible for stove installations within each CPA. The installation teams then build a brick enclosure to secure the liner *in situ*. Materials, such as those required for the brick enclosure, are manufactured locally to each CPA and household recipients are involved in the construction process by advising on the preferred location of the stove and providing certain materials for its installation.

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 from 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, or monitoring database.

Data collected during the installation process stoves was captured on electronic handheld devices and uploaded to the monitoring database. This database was maintained locally in Zambia and backed-up securely offsite. A hardcopy back-up of the emissions rights acknowledgement was also collected at the installation phase.

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

3RL completed stakeholder consultations at the PoA level, including national awareness raising meetings, regional meetings and user trials of prototype stoves. It is, furthermore, the intention of 3RL to run an ongoing, post-registration programme of awareness-raising of the optimal usage of the stove, allowing a further mechanism for feedback on its performance from recipients.

A monitoring programme is conducted at the PoA-level to determine the emissions reductions generated by the stoves during every monitoring period. This is summarized in a monitoring report, including the emissions reduction calculations.

Policy/measure or stated goal of the PoA

The goal of the PoA is to install fuel efficient cooking stoves throughout Zambia. The stoves replace wood-fired, 3-rock fires only. The stoves help recipient households reduce their non-renewable wood use, protect standing forests, and help limit valuable time spent gathering fuel wood. Greenhouse gases are mitigated by reducing the harvesting of non-renewable biomass for use in cooking purposes.

Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

This PoA is a voluntary action, which is implemented by 3RL. There is no law or policy in Zambia that mandates the use of fuel-efficient stoves.

Contribution to sustainable development

The PoA contributes to the sustainable development of the Zambian economy in a number of ways:

Environmental

- The PoA helps significantly reduce Zambia's greenhouse gas emissions over its lifetime
- The PoA helps reduce the use of non-renewable biomass from Zambian forests, assisting the maintenance of existing forest stock, protecting natural forest eco-systems and wildlife habitats²
- The protection of standing forests will ensure the maintenance of watersheds that regulate water table levels and prevent flash flooding³

Social

- Considerably less time is spent collecting wood fuel for the family home thereby reducing the work burden on families and presenting alternative opportunities for economic development
- Cooking and heating with solid fuels on open fires or traditional stoves results in high levels of indoor air pollution. Indoor smoke contains a range of health-damaging pollutants, such as small particles and carbon monoxide⁴. Less carbon dioxide, carbon monoxide and particulates are emitted by the fuel-efficient stove due to the decrease in total biomass burned, the increase in the efficiency of biomass burning and an increased fire temperature.
- The stove provides a safer method for combusting biomass for cooking, helping to reduce burn injuries, especially for children, in the family home

Economic

- The PoA helps develop a section of the Zambian economy; in the installation of the stoves (including certain materials production; e.g. bricks and mortar) and monitoring activities.
- The PoA brings employment benefits to Zambia and jobs have been created for its administration

² http://www.illegal-logging.info/approach.php?a_id=54

³ http://www.meted.ucar.edu/hazwarnsys/ffewserg/FF_EWS.Chap.2.pdf

⁴ <http://www.who.int/indoorair/en/>

A.1.1. Generic CPA(s)

Title, identification/reference number and/or version number of the generic CPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
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. Specific-case CPA(s) covered in this monitoring report

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period	Title, identification/reference number and version number of the generic CPA to which the specific-case CPA applies	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
6864-0001	Fuel Efficient Stoves in Zambia (3RL CPA No.01) Version 6.2	28/01/2013 – 27/01/2020 (Renewable)	Yes
6864-0002	Fuel Efficient Stoves in Zambia (3RL CPA No.02) Version 2.1	25/10/2013 – 23/10/2020 (Renewable)	Yes
6864-0003	Fuel Efficient Stoves in Zambia (3RL CPA No.03) Version 2.1	01/11/2013 – 31/10/2020 (Renewable)	Yes

A.2. Contact information of the coordinating/managing entity (CME) and/or responsible persons(s)/entity(ies)

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

Organization: Carbon Africa Ltd.

Contact: Martha Jepkirui

Email: martha@carbonafrica.co.ke

SECTION B. Implementation of PoA**B.1. Implementation of the management system of the PoA**

The management system validated in the registered PoA has been implemented in accordance with the applicable provisions on the implementation of the management system in the Project Standard⁵.

⁵ Standard: Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities Version 03.0, Para. 19

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, in accordance with the Guidance in EB 69, Annex 4, for the following operational and management activities related to each CPA included in the PoA:

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

The roles and responsibilities for the management of the PoA are:

- *3RL Board & Zambia Branch Board*: oversight of management system & sign-off on CPA inclusions and monitoring reports, review of competencies of team members
- *Technical review team*: technical review of process and documentation; proposal of CPA-DDs and monitoring reports to 3RL board.
- *CDM Compliance Manager*: writing PDDs & monitoring reports, ensuring compliance with CDM rules
- *Zambia Directors*: oversee operation of distribution centres and head office; execution of set up activities; works with project manager on all planning; reports to 3RL Board.
- *Project Manager*: project planning and management; issue and risk management; execution of set up activities such as recruitment and training; reporting of monitoring data;
- *Logistics Manager*: planning; identification of target households; contractor management; overall day to day management of installation staff; weekly and monthly reporting.
- *Data administrators*: monitoring database management; accounting; data reconciliations; monthly reporting;
- *Pre- & Post-installation data collection team*: conveying project messages; selling the project; signing up householders wanting a stove; sign up data capture; installation data capture
- *Installation team*: management of installation process; ensuring quality stove installations;
- *Monitoring team*: gathering compliance monitoring data; gathering marketing data; data input

The Organizational structure for the management of the PoA is shown in Figure 1. Overall responsibility for the roles and responsibilities and associated processes lies with the 3RL Board and 3RL is the CME for every CPA included in the PoA. The 3RL Board assesses the competencies of individuals responsible for each of the roles stated above.

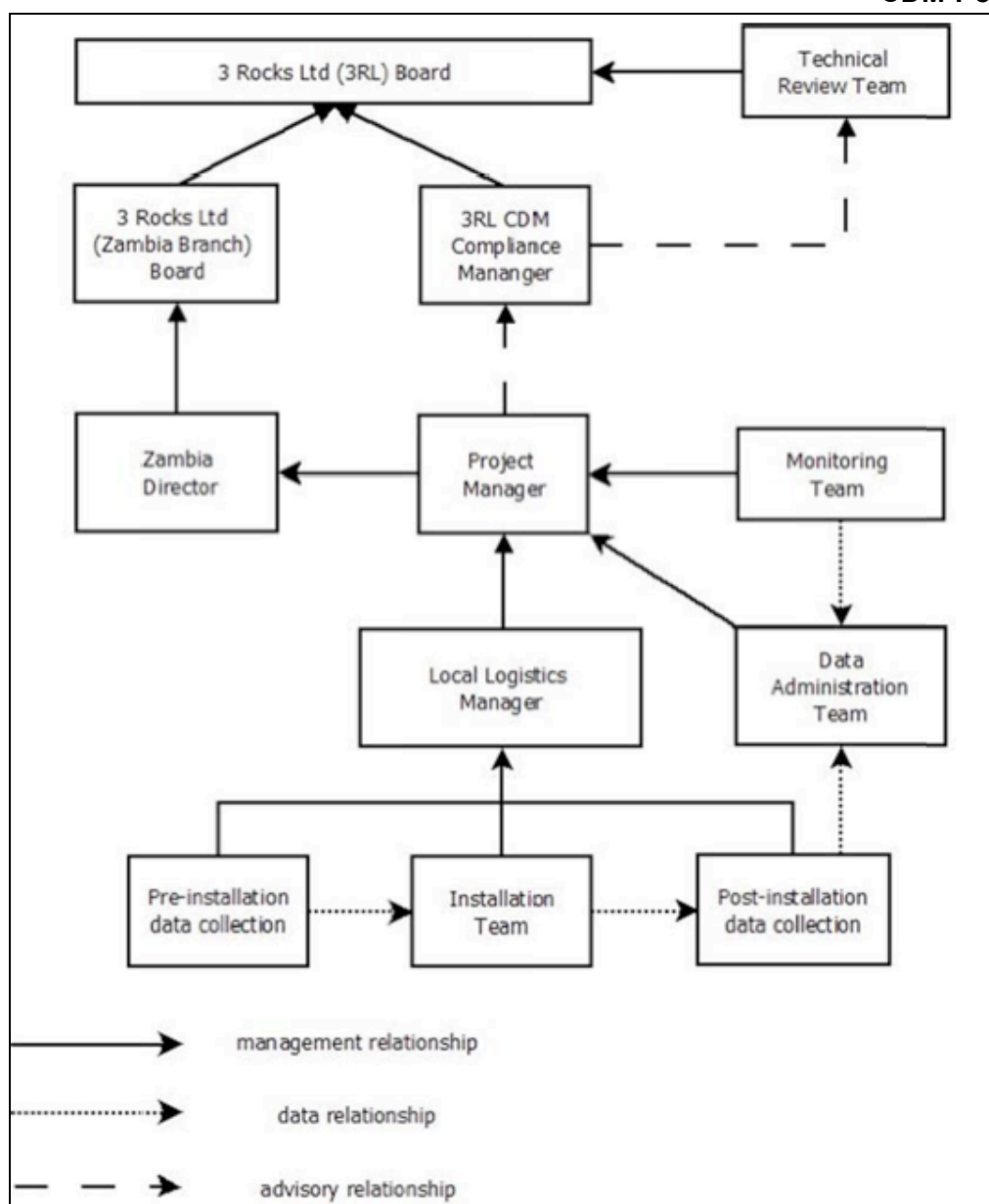


Figure 1: Organizational Chart for 3RL

Responsibilities of 3RL as the CME are:

- **Manufacturing and logistics**

Overall responsibility for manufacturing and logistics lies with the Zambian Directors and Project Manager. The process is as follows:

- Components for the stoves are manufactured (some imported into Zambia, others produced locally) by 3RL's project partners
- Components are distributed to warehouses within each CPA
- Regional logistics managers coordinate the distribution of components to recipient households for installation

- **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;
- In partnership with community leaders, NGOs and other local organizations, 3RL local logistics managers initiates a communication process to ensure that households understand the benefits of the stoves, that cultural issues are

addressed and that users are trained in the optimal use and performance of the stove;

- 3RL pre-installation teams visit recipient households in each CPA and ensure recipients understand and sign the emissions rights acknowledgement; this will act as the “order” for each stove.
- Each stove is assigned a unique installation number chronologically; this is used to determine the CPA into which the stove is included

• **Installation**

- Local 3RL logistics managers identify local installation partners and train stove installation teams to undertake installations within each CPA
- Local partners and installers coordinate the receipt of stove components in the distribution process
- Each installer will be trained in the installation of the stove to a standardized design and installation procedure
- Each installer will be responsible for physically installing the stoves in partnership with the stove recipient

• **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 database
- The database will automatically generate a unique reference number for each stove

• **CPA Inclusion**

- CPA inclusions are the overall responsibility of the CDM Compliance Manager.
 - Data from each CPA is provided by the Zambia Project Manager to the CDM Compliance Manager.
 - The CDM Compliance Manager writes each CPA-DD
 - The CDM Compliance Manager submits to the 3RL technical team for technical review
 - The technical team proposes the CPA inclusion to the 3RL Board for approval

• **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
 - Project manager summarizes data in a report to the 3RL CDM compliance manager
 - CDM compliance manager writes monitoring reports for each monitoring period of the PoA
 - Technical review by in-house technical team
 - 3RL board sign-off
 - Submission of issuance request to CDM Executive Board

Records of arrangements for training and capacity development for personnel

3RL conducts an ongoing programme of training and capacity development for key personnel. This training is based on documentation that includes:

- Management Information Systems & Data Capture Process
- Stove Installation Guidelines
- Records of training and capacity development will be kept by 3RL on each member of staff's file.

A procedure for technical review of inclusion of CPAs;

The technical review of CPA inclusions is undertaken at 3RL board level by an in-house technical team. This review is undertaken in accordance with the eligibility criteria outlined in the PoA-DD and the most recent guidance issued by the CDM Executive Board. Following review, the technical team is to affirm the CPA's compliance with the eligibility criteria and recommend its inclusion in the PoA to the 3RL board. The proposed inclusion is then either approved or rejected by the 3RL board.

A procedure to avoid double counting

Double-counting of emissions reductions will be 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 may be 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 will also have a unique reference number in the monitoring database. Only one stove will be installed per household.

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

3RL as the CME for the PoA is responsible for managing the record and documentation system for each CPA. In most cases, the data is collected electronically and uploaded directly to the monitoring database. Where data is collected by hand, it is collated by the 3RL Data Administration Team.

Installation data is collected from each CPA by the post-installation team and uploaded into the PoA monitoring database. This ensures that each stove is individually referenced and logged for monitoring and verification purposes.

Monitoring data is collected by the monitoring team responsible and passed to 3RL administration for collation. Periodic monitoring reports and emissions reduction calculations are generated from this data.

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

Measures for continuous improvements of the PoA management system¹

Periodic reviews of the procedures in the management system are conducted at the behest of the 3RL board.

Any other relevant elements

Provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA

3RL as the CME has the responsibility for managing and operating each of the CPAs. In the case where those operating the CPAs were not the same entity as the CME then they were going to be legally contracted and be fully aware, and agree that their activity is being subscribed to the PoA. However, for this monitoring period the CME was the implementer of the three CPAs. Component manufacturers and installation team members have specific contracts specifying this. There are also emissions rights acknowledgements between each stove recipient and 3RL that confirm the user's involvement in the PoA.

B.2. Implementation of single sampling plan(s)

A single sampling plan that was validated at registration has been implemented for all CPAs under this PoA for this monitoring period.

List of CPAs to which the single sampling was applied

The CPAs for which the single sampling plan was implemented are:

- 6864-0001 : Fuel Efficient Stoves in Zambia (3RL CPA No.01)
- 6864-0002: Fuel Efficient Stoves in Zambia (3RL CPA No.02)
- 6864-0003 : Fuel Efficient Stoves in Zambia (3RL CPA No.03)

Description of implemented single sampling design

CPAs included in this PoA are homogenous in nature, as they are applying a common technology and the technology has common usage patterns. The commonality of usage patterns was demonstrated during the baseline surveys of woodfuel usage and the technology is a specific response to this usage (i.e. biomass fuel utilized on a 3 stone fire solely for household purposes).

In accordance with EB69 Annex 4 Guidance: Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities; sampling activities were undertaken at the PoA-level. To comply with the guidelines and the methodology, samples will be calculated on either on a 95/5 confidence/precision basis for biennial surveys or 95/10 for annual surveys, to comply with monitoring requirements for a group of CPAs (EB69, Annex 4).

In accordance with the Sampling Standard⁶ the parameter values for (1) the stove usage rate, and (2) the stove efficiency are estimated by sampling in accordance with the requirements in the applied methodology using a single sampling plan covering a group of CPAs, applying either a 95/10 for annual or 95/5 for biennial confidence/precision for the sample size calculation. A single sampling plan covering a group of CPAs is justified when either the homogeneity of included CPAs relative to the parameters of interest can be demonstrated or the differences among the included CPAs is taken into account in the sample size calculation

As per Section A.4.4.2 of the registered PoA-DD and the CDM standard on “Sampling and surveys for CDM project activities and programme of activities”, a simple random sampling design was implemented for the PoA.

Selecting the Sample Groups

Sample groups were selected on a simple random sample basis from the monitoring database of installed stoves. These sample groups were selected with the required level of precision/accuracy, according to the methodology *AMS II.G. Ver03, Para. 22* and guidance from EB69, Annex 4.

The individual participants in the survey were selected by a random selection process run on the PoA monitoring database. The sampling frame consisted of installed stoves and the samples were generated from this population.

Activity monitoring

The activity sample group (ASG) was selected based on a 95% level of confidence. The margin of error used was 5% for biennial surveys, in accordance with the registered PoA-DD and the methodology used⁷. For the ASG, an expected proportion of 80% was selected based on the project developer’s experience with the project stoves in Katete, Zambia.

⁶ Standard for sampling and surveys for CDM project activities and programme of activities, EB69 Annex 4, para 20 (including footnote 18)

⁷ [AMS-II.G. ver. 3](#) - Energy efficiency measures in thermal applications of non-renewable biomass ,Para. 22

The parameters monitored by the ASG were:

- **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.

Monitoring teams surveyed the usage of 3-rock fires for domestic cooking and water heating purposes only.

The following monitoring activities 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)

Stove efficiency monitoring

A sample of installed stoves was selected on a simple random sample basis to test the ongoing efficiency of the stoves, utilizing the WBT protocol that was used in the baseline efficiency test.

This stove efficiency sample group (SESG) was selected based on a 95% level of confidence. The margin of error used was 5% for biennial surveys, in accordance with the registered PoA-DD. An expected mean of 29.5% and an expected standard deviation of 2.8% was used for the sample size calculation, these values are based on the baseline test for the project stoves as given in the registered PoA-DD.

Parameter monitored under the SESG was:

- **Efficiency of stove (η_{new})** – to determine the ongoing average efficiency of each stove installed.

In summary, the sampling plan in the registered PoA-DD required monitoring the following parameters

Parameter	Description	Sampling Group
NS	Number of Stoves	ASG
B_{new}	Quantity of biomass saved per annum	ASG
η_{new}	Efficiency of the stove	SESG

The sample groups were selected from the entire population of 40,437 stoves installed under the PoA using simple random sampling approach. Following the provision in the registered PoA-DD where it is required that the monitoring report will show the correlation between stove efficiency and the year (or 'vintage') of installation, two sampling frames for the selection of the SESG were selected. The sampling frames categorized the installation dates according to the time period in which a stove was installed the time period being 365 days.

The initial sample sizes were as follows

Sampling Group	Total Population	Expected Results	Reliability	Sample Size
ASG	40,437	80%	95/5	381
SESG ₂₀₁₁₋₂₀₁₂	23,980	29.5%	95/5	17
SESG ₂₀₁₂₋₂₀₁₃	16,457	29.5%	95/5	17

Based on “ Standard: Sampling and surveys for CDM project activities and programme of activities Version 04.1 Para. 12, Footnote 10” oversampling was carried out for the ASG to minimise the need to carry out additional sampling in the case that reliability was not met with the first sample. The resultant sample sizes were as follows

Sampling Group	Reliability	Initial Sample Size	Final sample size
ASG	95/5	381	533
SESG ₂₀₁₁₋₂₀₁₂	95/5	17	17
SESG ₂₀₁₂₋₂₀₁₃	95/5	17	17

Collected data

Data for NS and B_{new} was collected using a household survey form designed to collect information on stove usage. The survey form ensured that the monitoring staff conducted observational checks for the presence and use of the installed stoves for domestic purposes as well as any residual use of the 3-rock fire in households. The survey form also ensured the validity of the data from the monitoring database and collected other information required for the emission reduction calculations.

The monitoring exercise yielded a total of 372 household surveys which was lower than the expected 533 surveys due to non responses and failure to locate some of the households in the selected sample. There were 28 non responses came about due to various factors such as

- Relocation of households where stoves had been installed to different locations.
- Stove owners or respondents being unwilling to participate in the monitoring survey; or
- The stove owners not being present at the household during the time of the survey

For the Stove Efficiency Sample Group selected, only 32 tests were carried out instead of the expected 34 tests. There was a high rate of non-response resulting from

- Refusal by stove owners to have their stoves tested;
- Relocation of households; or
- Some of the stoves in the sample were no longer operational

Analysis of collected data and demonstration of whether the required confidence/precision has been met

Number of stoves still in operation.

The number of stoves still in operation was determined from information collected by observation by the survey team and confirmation by the stove owner. From the 372 valid surveys, 236 stoves were found to be still in operation. This yielded a stove usage rate of 63.44%. The precision achieved for this parameter was 7.68% whereas the desired precision is 5%. As the desired precision was not attained, the lower bound value of 58.57% for this parameter was used following the provision in *AMS II.G. Ver03, Para. 22*.

Quantity of biomass saved per annum (B_{new})

The monitoring for B_{new} 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. An average proportion of usage of 3 rock fires was calculated across the ASG and a deduction made to B_{old} and the result checked for precision attained. A value 3.10 calculated for B_{new} achieved a precision of 1.63% which is within the precision requirements of 5% and thus was used as calculated.

Efficiency of the stove η_{new}

A sample of 14 was achieved for SESG₂₀₁₁₋₂₀₁₂ and a sample of 18 for SESG₂₀₁₂₋₂₀₁₃. The efficiency results from the two groups were tested for homogeneity using ANOVA analysis. Analysis of variance (ANOVA) tests the hypothesis that the means of two or more samples are equal and

represent a homogenous population. The procedure uses variances to determine whether the means are different. The procedure works by comparing the variance between group means versus the variance within groups as a way of determining whether the groups are all part of one larger population or separate populations with different characteristics. The hypothesis of interest that is tested is that there is no difference in the mean values from the different groups. The test statistic is the F value for which the critical value can be found in a table of probability values for F distribution. The ANOVA analysis for the two vintage groups was carried out using in-built functions in MS Excel⁸.

The F value obtained was 1.78 which is less than the $F_{critical}$ value (4.17) for the data thus implying that the two age groups are similar. Based on this assumption, the two data sets were combined to obtain an average thermal efficiency of 22.17% applicable to all the stoves in the PoA regardless of the date of installation. The thermal efficiency result did not meet the precision requirements of 5% and the lower bound value of 20.43% was used following the provision in *AMS II.G. Ver03, Para. 22*

The following table summarizes the results for each sampled parameter:

Parameter	Sample size (n)	Result	Standard Deviation	Precision Attained	Lower bound Applicable	Value used
NS	372	63.44%		7.68%	Yes	58.57%
B_{new}	372	3.10 t/yr	0.50	1.63%	No	3.10
η_{new}	32	22.17%	5.02%	7.85%	Yes	20.43%

Each sample was selected randomly from the entire population of stoves installed under the PoA as recorded in the monitoring database.

SECTION C. Post-registration changes to the PoA (including the generic CPA(s))

C.1. Corrections

No corrections have been made during this monitoring period

C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), if a monitoring plan was not included at the time of registration

No monitoring plan has been included to the registered PoA-DD for this monitoring period. A monitoring plan was included at the time of registration.

C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

There are no permanent changes from the registered monitoring plan.

C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA

⁸ <http://www.excel-easy.com/examples/anova.html>

There are no changes to the programme design.

C.5. Types of changes specific to afforestation and reforestation activities

N/A

PART II - Specific-case component project activity(ies)

SECTION D. Description of specific-case CPA(s)

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D.1. Brief description of implemented specific-case CPA(s)

The specific case CPAs implemented have the following reference numbers:

- 6864-0001 : Fuel Efficient Stoves in Zambia (3RL CPA No.01)
- 6864-0002: Fuel Efficient Stoves in Zambia (3RL CPA No.02)
- 6864-0003 : Fuel Efficient Stoves in Zambia (3RL CPA No.03)

The CPAs included in this PoA are considered homogenous according to the Guidelines on Sampling and surveys for CDM project activities and programmes of activities because they apply a common technology and the technology has common usage patterns. The commonality of usage patterns was demonstrated during the baseline surveys of woodfuel usage and the technology is a specific response to this usage (i.e. biomass fuel utilized on a 3 stone fire solely for household purposes). These CPAs are therefore grouped together as they are homogenous in nature.

Furthermore, the CPAs are considered homogenous with regard to parameters of interest and in accordance to the guidelines⁹⁹ as described below:

- Every CPA has the same stove technology user profile (i.e. domestic households)
- The baseline survey shows that household usage of fuel wood and cooking technology (i.e. 'three rocks' method) in Zambia is homogenous across regions
- Every CPA employs the same stove technology
- Each final constructed stove is robust, manufactured to identical standards and with no moving parts, and therefore efficiency is designed to remain constant over time
- Every CPA applies the same stove installation process and therefore each stove is an exact replica of all the others in similar (i.e. domestic household) locations
- Every CPA has the same Implementing Entity, meaning each stove is installed and monitored in the same manner

Therefore as the technology and construction of each stove is homogenous, every CPA is homogenous.

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, according to the requirements of the appropriate small scale methodology: *AMS II.G Energy efficiency measures in thermal applications of non-renewable biomass, Version 3*. 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

⁹⁹ Guideline: Sampling and surveys for CDM project activities and programmes of activities Version 04.0, Appendix 2

design was tested independently in accordance with the “*Stove Manufacturers Emissions & Performance Test Protocol (EPTP)*”¹⁰ and certified by the Engines and Energy Conversion Laboratory at Colorado State University to determine its thermal efficiency

Each CPA involves the installation of a maximum of 180GWh of stove thermal savings in recipient households (this is the AMS IIG limit as clarified by the SSC WG on 04/11/2008¹¹). The efficient stoves replace traditional wood-fired, three rock fires in households where they are present. The CPAs are not limited geographically to individual villages or towns. Each CPA comprises the manufacture, installation and monitoring of the stoves over the CPA crediting period.

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.

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 monitoring programme. Installation data is captured and recipient households then receive an installed stove and training on its use.

The CPAs will provide energy efficient cooking stoves based on the ‘rocket stove’ design. This technology ensures an improved thermal efficiency against the 10% methodology default for the traditional 3- rock fire.

Description of the technology employed and installed equipment

The stove consists of a durable metal alloy liner, with an insulating layer surrounding it. The liner and insulation are encased in a metal outer container, which is further attached to brick enclosure for protection and security. The liner is tapered at the top, where a galvanized cooking surface provides a rest for the cooking pot. The flame is directed onto the pot speeding up the flow of gases from the combustion chamber and the biomass fuel is supported using a metal grate to ensure adequate air flow to the fire. The whole stove is cemented to the floor ensuring the stove is largely protected from damage and theft.

The liner, insulation, pot rest and metal grate are manufactured in a specialist stove factory to ensure standardised production. All other components, including bricks and mortar, are produced locally in Zambia.

The stove is constructed according to a standardized design and construction procedure by Zambian installation teams. Teams responsible for the construction of stoves in each CPA are trained accordingly. The trained stove builders receive a stove kit that they assemble on site.

The technology described is state-of-the-art and designed as a bespoke solution for Zambia. The stove design is shown in Figure 2 below.

¹⁰ 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

¹¹ http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_VIIC5MTUJWR9PRPJL0EXOT3G2CKSFQ



Figure 2: Rocket stove design

The fuel-efficient cooking stove technology 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 for its thermal efficiency¹².

Relevant dates for the specific-case CPAs

The installation dates for stoves installed in each CPA are recorded in the monitoring database from the installation records

3RL CPA No.01

All stoves under this CPA were installed from 06/06/2011 to 28/10/2011.

15,638 stoves were distributed under this CPA. The exact installation dates are provided in the Emission Reduction Calculation Sheet

3RL CPA No.02

All stoves under this CPA were installed from 31/10/2011 to 27/10/2012.

15,084 stoves were distributed under this CPA. The exact installation dates are provided in the Emission Reduction Calculation Sheet

3RL CPA No.03

All stoves under this CPA were installed from 28/02/2013 to 16/05/2013.

9,715 stoves were distributed under this CPA. The exact installation dates are provided in the Emission Reduction Calculation Sheet

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

Monitoring Period: 28/01/2013 to 27/01/2015

CPA	Number of stoves distributed	Net GHG reductions achieved under this monitoring period (tCO ₂ e/yr)
6864-0001	15,638	27,302
6864-0002	15,084	16,594
6864-0003	9,715	10,525

Avoidance of double counting

¹² See PoA-DD, pg 7

Double counting of emissions was avoided by using :

- **GPS references:** each stove has a unique GPS-referenced location;
- **Name, location and/or ID number:** an additional check of double-counting was made against the household name, location and/or Zambian government ID number of the stove recipient ascribed to each stove; and

Unique reference numbers: each stove also has a unique reference number in the monitoring database.

D.2. Geographical references or other means of identification of the location of the specific-case CPA(s)

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 3). The Republic of Zambia, lies within the latitude and longitude of 15° 00 S and 30° 00 E¹³. 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°)



Figure 3: Geographical boundary of Zambia

¹³ <http://www.greenwichmeantime.co.uk/time-zone/africa/zambia/map.html>

SECTION E. Post-registration changes to specific-case CPA(s)**E.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

N/A. There are no temporary deviations from registered monitoring plan or applied methodology. Standardized baseline is not applicable to this POA

E.2. Corrections

No corrections have been made to project information or parameters fixed at validation

E.3. Changes to the start date of the crediting period of the specific-case CPA(s)

There is no change to the start date of the crediting period of any of the specific-case CPAs

E.4. Inclusion of a monitoring plan into the specific-case CPA(s) that was not included at registration

N/A. The monitoring plan was included at the time of registration of the specific-case CPAs

E.5. Permanent changes to the monitoring plan as described in the registered specific-case CPA-DD(s), applied methodology or standardized baseline

N/A. There are no permanent changes to the monitoring plan as described in the registered specific-case CPA-DDs, applied methodology(ies). Standardized baseline was not used under this PoA.

E.6. Changes to project design of the specific-case CPA(s)

There are no changes to the project design of the specific-case CPA's

E.7. Types of changes specific to afforestation and reforestation specific-case CPA(s)

N/A

SECTION F. Description of the monitoring system of specific-case CPA(s)

The monitoring activities for the specific CPAs are conducted at the PoA level. A single sampling plan covering a group of CPAs is justified when either the homogeneity of included CPAs relative to the parameters of interest can be demonstrated or the differences among the included CPAs is taken into account in the sample size calculation¹⁴.

¹⁴ Standard for sampling and surveys for CDM project activities and programme of activities, Version 04.1, Para 20 (including footnote 19)

A single sampling plan for the PoA is justified by the homogeneity of the parameters of interest for the specific CPAs as described below

Parameter of Interest	
Stove usage rate	<ul style="list-style-type: none"> • Every CPA has the same stove technology user profile (i.e. domestic households) • Every CPA employs the same stove technology • The baseline survey shows that household usage of fuel wood and cooking technology (i.e. ‘three rocks’ method) in Zambia is homogenous across regions
Stove efficiency	<ul style="list-style-type: none"> • Every CPA employs the same stove technology • Each final constructed stove is robust, manufactured to identical standards and with no moving parts, and therefore efficiency is designed to remain constant over time • Every CPA applies the same stove installation process and therefore each stove is an exact replica of all the others in similar (i.e. domestic household) locations • Every CPA has the same Implementing Entity, meaning each stove is installed and monitored in the same manner

Operational and management structure in place to implement the monitoring plan

The monitoring of the PoA is the responsibility of the CME, in this case 3RL. Monitoring for the PoA takes place within the organization structure presented in Figure 1.

The Monitoring team conducts the monitoring 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
- Project manager summarizes data in a report to the 3RL CDM compliance manager
- CDM compliance manager writes monitoring reports for each monitoring period of the PoA
- Technical review by in-house technical team
- 3RL board sign-off
- Submission of issuance request to CDM Executive Board

Responsibilities and institutional arrangements for data collection and archiving and provisions to ensure that data monitored and required for verification and issuance be kept and archived

Installation data will be collected from each CPA by the post-installation team and uploaded into the PoA monitoring database. This will ensure that each stove is individually referenced and logged for monitoring and verification purpose

Monitoring data is collected by the monitoring team responsible and passed to 3RL administration for collation.

The CME maintains a monitoring database for the entire PoA. All monitoring records will be securely maintained and backed-up by 3RL

Quality assurance and quality control (QA/QC) procedures

Data collection will be conducted by a dedicated 3RL Monitoring team of trained individuals utilizing survey questionnaires and instruments required for measurements.

In order to minimize non-sampling errors, such as non-responses and errors, the field team will practice over-sampling from the population to ensure a total number respondents that meets the required level of precision. This will ensure the integrity of the sample group and maintains the randomness of participant selection. All sample groups will be re-selected for each monitoring period / year, as appropriate for the parameter in question.

Where a survey may not be completed, or where there is a non-response, the reasons shall be clearly documented in the survey questionnaire.

SECTION G. Data and parameters

G.1. Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period

Data/parameter	B_{old}
Unit	Tonnes per annum
Description	Quantity of biomass used in absence of the project activity
Source of data	Baseline survey
Value(s) applied	$(4.1 * 15,938) = 65,345$
Choice of data or measurement methods and procedures	The baseline survey assessed the average domestic biomass usage for cooking and water heating per household per annum amongst users of traditional 3-rock fires. This data was gathered according to: General Guidelines For Sampling And Surveys For Small-Scale CDM Project Activities (Version 01); CDM EB50 Annex 30. This figure was then multiplied by 15,938, which is the total number of stoves allowable to be included in each CPA, according to the methodology threshold
Purpose of data	Calculation of baseline emissions
Additional comments	The value applies to one CPA

Data/parameter	$f_{NRB,y}$
Unit	Fraction
Description	Non-renewable biomass usage in Zambia, as a proportion of total biomass usage
Source of data	EB 67 country-specific default value for Zambia
Value(s) applied	0.81
Choice of data or measurement methods and procedures	EB 67, Annex 22 indicates a country-specific default value for Zambia at 0.81
Purpose of data	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	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	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	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	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	Calculation of baseline emissions
Additional comments	-

G.2. Data and parameters monitored

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	<table border="1"> <tr> <td>CPA 6864-0001</td> <td>9,159</td> </tr> <tr> <td>CPA 6864-0002</td> <td>8,835</td> </tr> <tr> <td>CPA 6864-0003</td> <td>5,690</td> </tr> </table>	CPA 6864-0001	9,159	CPA 6864-0002	8,835	CPA 6864-0003	5,690
CPA 6864-0001	9,159						
CPA 6864-0002	8,835						
CPA 6864-0003	5,690						
Monitoring equipment	Survey Questionnaire						
Measuring/reading/ recording frequency	Biennially						
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 5% precision required for biennial surveys in line with the sampling plan in the registered PoA-DD.</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. The survey result did not attain the expected 95/5 precision and therefore the lower bound of the 95% confidence level was chosen (<i>AMS II.G. ver. 3, Para. 22</i>)</p>						
Purpose of data	Calculation of baseline emissions						
Additional comments	-						

Data/parameter	OD						
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	<table border="1"> <tr> <td>CPA 6864-0001</td> <td>6,686,129</td> </tr> <tr> <td>CPA 6864-0002</td> <td>4,063,919</td> </tr> <tr> <td>CPA 6864-0003</td> <td>2,577,577</td> </tr> </table>	CPA 6864-0001	6,686,129	CPA 6864-0002	4,063,919	CPA 6864-0003	2,577,577
CPA 6864-0001	6,686,129						
CPA 6864-0002	4,063,919						
CPA 6864-0003	2,577,577						
Monitoring equipment	Monitoring database and survey						
Measuring/reading/ recording frequency	Biennially						
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	Calculation of baseline emissions						

Additional comments	-
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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 parameter	20.43%																																												
Monitoring equipment	<table border="1"> <thead> <tr> <th>Equipment/tool</th> <th>Use</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>ACS Series Digital scale</td> <td>For weighing</td> <td>Scale with a capacity of at least 6 kg and accuracy of ± 1 gram Make: Danghong</td> </tr> <tr> <td>Wooden board</td> <td>Protecting the scale</td> <td>Heat resistant material</td> </tr> <tr> <td>Digital thermometer</td> <td>Taking ambient air and water temperature measurements</td> <td>Accurate to 1/10 of a degree, with thermocouple probe suitable for immersion in liquids</td> </tr> <tr> <td>Thermometer</td> <td>Taking ambient air and water temperature measurements</td> <td>Range from 0^oC to 110^oC, accuracy of $\pm 0.5^{\circ}\text{C}$ Make: H- 9283</td> </tr> <tr> <td>Moisture meter (pin and search type)</td> <td>Taking moisture content of wood/logs to be used in the test</td> <td>Accuracy of $\pm 0.5\%$ Make: AMITTARI AM-128PS Serial No. : N721084</td> </tr> <tr> <td>Stop watch</td> <td>For noting time taken to run the tests</td> <td>Make: XL- 010</td> </tr> <tr> <td>Standard pot</td> <td>For boiling the water</td> <td>5litres water was used in all the tests</td> </tr> <tr> <td>Wood fixture</td> <td>For holding the thermometer in position in the water 5cm from the base of the pot</td> <td>The fixture was modified with a rubber cork to hold the thermometer firmly</td> </tr> <tr> <td>Spatula</td> <td>For removing the small and hot pieces of char from the stove</td> <td></td> </tr> <tr> <td>Tongs</td> <td>For removing the hot charcoal from the stove</td> <td></td> </tr> <tr> <td>Metal tray</td> <td>To hold the charcoal when weighing</td> <td></td> </tr> <tr> <td>Tape measure/ruler</td> <td>For measuring lengths of the wood/logs and also verifying the 5cm depth for the thermometer when placed in water</td> <td>Accuracy of $\pm 0.1\text{cm}$</td> </tr> <tr> <td>20 litre container</td> <td>For carrying water to be used for the tests</td> <td></td> </tr> </tbody> </table> <p>All equipment used to carry out the WBT were purchased as new and did not require any calibration as they had not been used before.</p>			Equipment/tool	Use	Notes	ACS Series Digital scale	For weighing	Scale with a capacity of at least 6 kg and accuracy of ± 1 gram Make: Danghong	Wooden board	Protecting the scale	Heat resistant material	Digital thermometer	Taking ambient air and water temperature measurements	Accurate to 1/10 of a degree, with thermocouple probe suitable for immersion in liquids	Thermometer	Taking ambient air and water temperature measurements	Range from 0 ^o C to 110 ^o C, accuracy of $\pm 0.5^{\circ}\text{C}$ Make: H- 9283	Moisture meter (pin and search type)	Taking moisture content of wood/logs to be used in the test	Accuracy of $\pm 0.5\%$ Make: AMITTARI AM-128PS Serial No. : N721084	Stop watch	For noting time taken to run the tests	Make: XL- 010	Standard pot	For boiling the water	5litres water was used in all the tests	Wood fixture	For holding the thermometer in position in the water 5cm from the base of the pot	The fixture was modified with a rubber cork to hold the thermometer firmly	Spatula	For removing the small and hot pieces of char from the stove		Tongs	For removing the hot charcoal from the stove		Metal tray	To hold the charcoal when weighing		Tape measure/ruler	For measuring lengths of the wood/logs and also verifying the 5cm depth for the thermometer when placed in water	Accuracy of $\pm 0.1\text{cm}$	20 litre container	For carrying water to be used for the tests	
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Measuring/reading/ recording frequency	Biennially																																												

Calculation method (if applicable)	WBTs were carried out on 32 stoves following the WBT protocol. An average efficiency from all the tests was determined after carrying out an ANOVA for the two samples which showed that the two groups were similar and therefore homogenous with regard to stove efficiency.
QA/QC procedures	The sample was selected based on a 95% level of confidence and 5% precision required for biennial surveys in line with the sampling plan in the registered PoA-DD. The survey result does not attain the expected 95/5 precision and therefore the lower bound of the 95% confidence level was chosen (<i>AMS II.G. ver. 3, Para. 22</i>)
Purpose of data	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	3.10
Monitoring equipment	Survey Questionnaire
Measuring/reading/ recording frequency	Biennially
Calculation method (if applicable)	The sample for the survey was selected based on a 95% level of confidence and 5% precision required for biennial surveys in line with the sampling plan in the registered PoA-DD. 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.
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 95/5 precision.
Purpose of data	Calculation of baseline emissions
Additional comments	-

G.3. Implementation of specific-case CPA level sampling plan

The single sampling plan provided in section B.2 was applied for the entire PoA as the PoA involves CPAs that are homogenous and there is homogeneity related to parameters of interest.

SECTION H. Calculation of GHG emission reductions or net GHG removals by sinks

H.1. Calculation of baseline emissions or baseline net GHG removals by sinks

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

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

B_{new} was determined as a proportion of usage of 3 rock fires for each household in the ASG and a deduction made to B_{old} to determine B_{new} per household. The average of B_{new} was then determined across the ASG. The average of B_{new} for the entire ASG was determined as 3.10 tonne/yr. The precision attained for this parameter was 1.63% which was within the desired precision of 5%, and thus the calculated average value of 3.10 tonne/yr was used. More information on the calculation of B_{new} is available in the ER calculation spreadsheet.

Where for the first crediting period for the entire PoA:

Parameter	Value	Sources
$B_{y,savings}$	60,749	Calculated
$f_{NRB,y}$	0.81	Ex ante
$NCV_{biomass}$	0.015 TJ/tonne	Default
$EF_{projected\ fossilfuel}$	81.6 tCO ₂ /TJ	Default
ER_y	54,421 tCO₂	

For each CPA

Parameter	3RL CPA No.01	3RL CPA No.02	3RL CPA No.03	Sources
$B_{y,savings}$	30,476	18,524	11,749	Calculated
$f_{NRB,y}$	0.81	0.81	0.81	Ex ante
$NCV_{biomass}$	0.015 TJ/tonne	0.015 TJ/tonne	0.015 TJ/tonne	Default
$EF_{projected\ fossilfuel}$	81.6 tCO ₂ /TJ	81.6 tCO ₂ /TJ	81.6 tCO ₂ /TJ	Default
ER_y	27,302 tCO₂	16,594 tCO₂	10,525 tCO₂	

H.2. Calculation of project emissions or actual net GHG removals by sinks

N/A

H.3. Calculation of leakage

N/A

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

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	GHG emission reductions or net GHG removals by sinks (tCO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
6864-0001	27,302	-	-	-	27,302	27,302
6864-0002	16,594	-	-	-	16,594	16,594
6864-0003	10,525	-	-	-	10,525	10,525
Total	54,421	-	-	-	54,421	54,421

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

Specific-case CPA reference number	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
6864-0001	81,368	27,302
6864-0002	51,273	16,594
6864-0003	50,493	10,525
Total	183,134	54,421

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

The values of emission reductions achieved for this monitoring period for each CPA are lower than those in the ex-ante estimations. Each CPA was expected to yield an average emission reduction of 40,684 tCO₂e per year. The lower amount of emissions achieved can be attributed to the differences in the thermal efficiency and the stove retention rate which are all lower than anticipated and thus a lower amount of emission reductions achieved.

Appendix 1. Contact information of coordinating/managing entity and/or responsible persons/entities

Coordinating/managing entity and/or responsible person/entity	<input checked="" type="checkbox"/> Coordinating/managing entity <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	3 Rocks Limited
Street/P.O. Box	17a York St.
Building	
City	St. Helier
State/Region	Jersey
Postcode	JE2 3RQ
Country	United Kingdom
Telephone	+44 (0) 1534 601906
Fax	+44 (0) 1534 605037
E-mail	bobby@icecapltd.com
Website	
Contact person	
Title	Company Secretary
Salutation	Mr.
Last name	Minty
Middle name	
First name	Bobby
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Coordinating/managing entity and/or responsible person/entity	<input type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Carbon Africa Ltd.
Street/P.O. Box	PO Box 14938
Building	-
City	Nairobi
State/Region	-
Postcode	00800
Country	Kenya
Telephone	+254 731 851 754
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