



**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 | 1.0 | |
| Completion date of this monitoring report | 27/08/2015 | |
| 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: 27,104 tCO ₂ e 3RL CPA No.02: 16,474 tCO ₂ e |

CDM-PoA-MR-FORM

| | | |
|--|--|---------------------------------------------|
| | | 3RL CPA No.03: 10,449 tCO ₂ e |
|--|--|---------------------------------------------|

| | | |
|--|--|---------------------------------------|
| | | Total: 54,027 tCO₂e |
|--|--|---------------------------------------|

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 CDM Programme Activity Design Documents (CPA-DD) 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, the 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 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 will 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 this 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 is captured on electronic handheld devices and uploaded to the monitoring database. This database is maintained locally in Zambia and backed-up securely offsite. A hardcopy back-up of the emissions rights acknowledgement is 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 will be conducted at the PoA-level to determine the emissions reductions generated by the stoves during every monitoring period. This will be 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 will replace wood-fired, 3-rock fires only. The stoves will help recipient households reduce their non-renewable wood use, protect standing forests, and will help limit valuable time spent gathering fuel wood. Greenhouse gases will be 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 will help significantly reduce Zambia's greenhouse gas emissions over its lifetime
- The PoA will help 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 will need to be 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 will be 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 will help 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 will bring employment benefits to Zambia and jobs will be 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 – 30/10/2020 (Renewable) | Yes |

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

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 sole PoA CME. 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 sole CME for every CPA included in the PoA. The 3RL Board assesses the competencies of individuals responsible for each of the roles stated above.

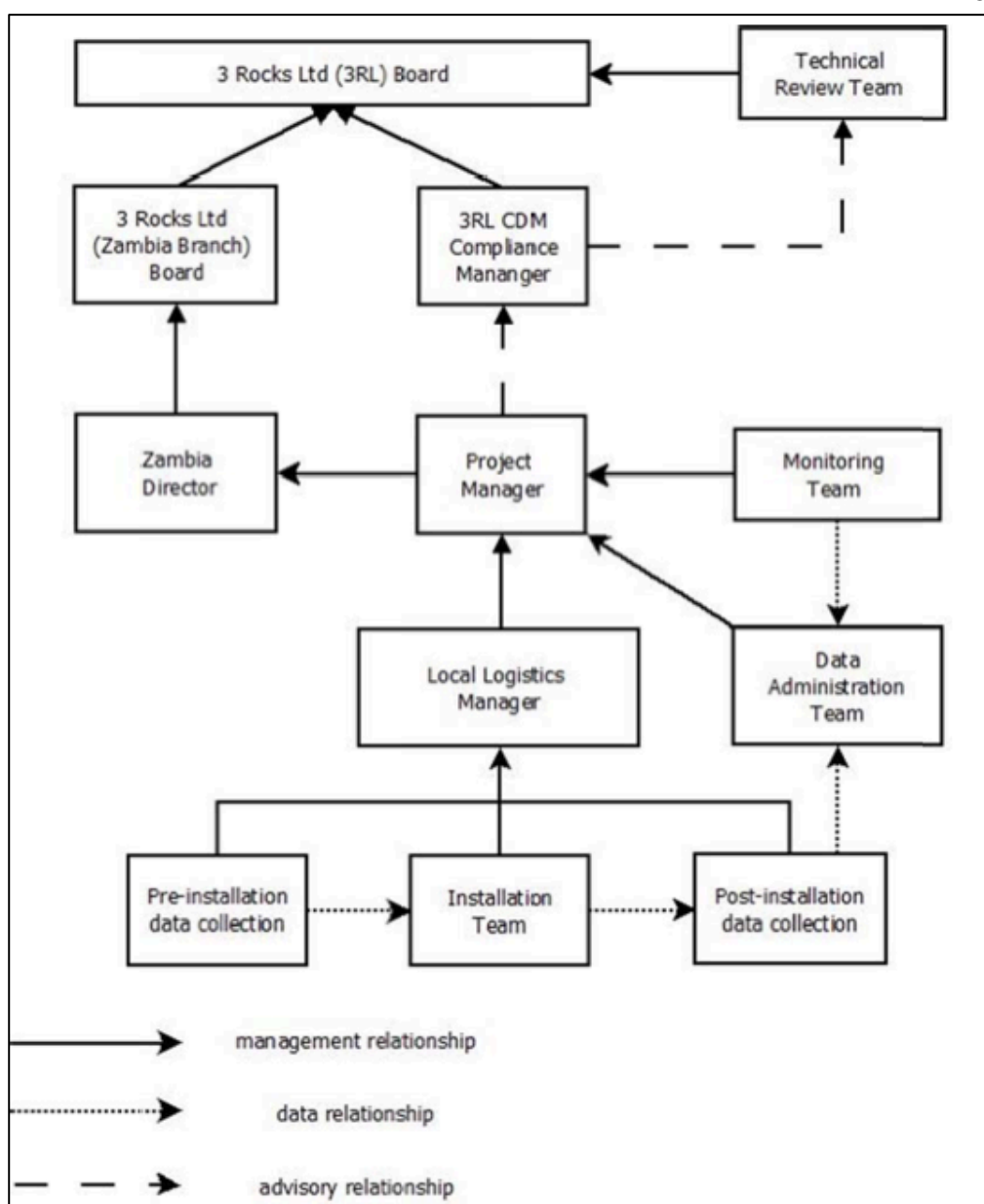


Figure 1: Organizational Chart for 3RL

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 every CPA included in the PoA is responsible for managing the record and documentation system for each CPA under the PoA. 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 is the Managing Entity of the PoA and has overall responsibility for managing and operating each of the CPAs. Therefore, those operating the CPAs are legally contracted to 3RL and are fully aware of, and have agreed that, their activity is being subscribed to the PoA. 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 will be homogenous in nature, as they are applying a common technology and the technology will have 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

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

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.

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.

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 categorize 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

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

| 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 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. The 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, 235 stoves were found to be still in operation. This yielded a stove usage rate of 63.17%. The precision achieved for this parameter was 7.72% whereas the desired precision is 5%. As the desired precision was not attained, the lower bound value of 58.29% 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 3.09 calculated for B_{new} met the precision requirements and thus was used as calculated.

Efficiency of the stove η_{new}

A sample of 14 was achieved for $SESG_{2011-2012}$ and a sample of 18 for $SESG_{2012-2013}$. The efficiency results from the two groups were tested for homogeneity using ANOVA analysis. 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 | 63.17% | | 7.72% | Yes | 58.29% |
| B_{new} | 372 | 3.09 t/yr | 0.51 | 1.66% | No | 3.09 |
| 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

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)

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)

These CPAs included in this PoA are grouped together as they are homogenous in nature. The CPAs 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).

The CPAs are homogenous and there is homogeneity related to parameters of interest, as described below:

- 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
- 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, as described in each of the PoA's CDM Programme Activity Design Documents (CPA-DD) 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)⁸" and certified by the Engines and Energy Conversion Laboratory at Colorado State University to determine its thermal efficiency

⁸ 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

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 04/11/2008⁹). 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 as described in the PDD. 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.

⁹ http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_VIIC5MTUUWR9PRPJL0EXOT3G2CKSFQ



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 efficiency¹⁰.

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 are distributed under this CPA. The exact installation dates are provided in the Emission Reduction Calculation Sheet

3RL CPA No.02

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

15,084 stoves are 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 implemented from 28/02/2013 to 16/05/2013.

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

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:

¹⁰ See PoA-DD, pg 7

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 E¹¹. 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 (E -10.552622 & 33.693352) |



Figure 3: Geographical boundary of Zambia

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 | 27,104 |
| 6864-0002 | 15,084 | 16,474 |
| 6864-0003 | 9,715 | 10,449 |

Avoidance of double counting

Double counting of emissions was avoided by using :

- **GPS references:** each stove has a unique GPS-referenced location;

¹¹ <http://www.greenwichmeantime.co.uk/time-zone/africa/zambia/map.html>

- **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.

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 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 calculation¹².

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 sole 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

¹² Standard for sampling and surveys for CDM project activities and programme of activities, Version 04.1, Para 20 (including footnote 19)

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 samples 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 | <i>B_{old}</i> |
| 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 | <i>f_{NRB,y}</i> |
| 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 | <i>DRB</i> |
| Unit | Tonnes |
| Description | Demonstrably renewable biomass |
| Source of data | $f_{NRB,y}$ 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 | <i>NS</i> | | | | | | |
| 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>9,116</td> </tr> <tr> <td>CPA 6864-0002</td> <td>8,793</td> </tr> <tr> <td>CPA 6864-0003</td> <td>5,663</td> </tr> </table> | CPA 6864-0001 | 9,116 | CPA 6864-0002 | 8,793 | CPA 6864-0003 | 5,663 |
| CPA 6864-0001 | 9,116 | | | | | | |
| CPA 6864-0002 | 8,793 | | | | | | |
| CPA 6864-0003 | 5,663 | | | | | | |
| 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 | <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 | <table border="1"> <tr> <td>CPA 6864-0001</td> <td>6,654,585</td> </tr> <tr> <td>CPA 6864-0002</td> <td>4,044,746</td> </tr> <tr> <td>CPA 6864-0003</td> <td>2,565,417</td> </tr> </table> | CPA 6864-0001 | 6,654,585 | CPA 6864-0002 | 4,044,746 | CPA 6864-0003 | 2,565,417 |
| CPA 6864-0001 | 6,654,585 | | | | | | |
| CPA 6864-0002 | 4,044,746 | | | | | | |
| CPA 6864-0003 | 2,565,417 | | | | | | |
| 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 database 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 | - | | | | | | |

| | |
|---------------------------------|---------------------------------|
| 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 | 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°C to 110°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 | |
| Measuring/reading/recording frequency | Biennially | | |
| Calculation method (if applicable) | WBTs were carried out for 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 | 3.09 |
| 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.

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

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

Where for the first crediting period for the entire PoA:

| Parameter | Value | Sources |
|------------------------------|-------------------------------|------------|
| $B_{y,savings}$ | 60,224 | 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 | 54,027 tCO₂ | |

For each CPA

| Parameter | 3RL CPA No.01 | 3RL CPA No.02 | 3RL CPA No.03 | Sources |
|------------------------------|-------------------------------|-------------------------------|-------------------------------|------------|
| $B_{y,savings}$ | 30,223 | 18,370 | 11,651 | 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 | 27,104 tCO₂ | 16,474 tCO₂ | 10,449 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 | 27,104 | - | - | | 27,104 | 27,104 |
| 6864-0002 | 16,474 | - | - | | 16,474 | 16,474 |
| 6864-0003 | 10,449 | - | - | | 10,449 | 10,449 |
| Total | 54,027 | - | - | | 54,027 | 54,027 |

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 | 40,684 | 27,104 |
| 6864-0002 | 40,684 | 16,474 |
| 6864-0003 | 40,684 | 10,449 |
| Total | 122,052 | 54,027 |

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 are lower than those in the ex-ante estimations.

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 | |

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

1. In accordance with section A.2 of Part I above, complete the table in Appendix I, with the following mandatory fields: Coordinating/managing entity and/or responsible person/ entity, Organization, Street/P.O. Box, City, Postcode, Country, Telephone, Fax, E-mail and Name of contact person. Copy and paste the table as needed.

Document information

| <i>Version</i> | <i>Date</i> | <i>Description</i> |
|----------------|--------------|----------------------|
| 01.0 | 1 April 2015 | Initial publication. |

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: monitoring report, programme of activities