



**Monitoring report form  
(Version 03.2)**

**MONITORING REPORT**

<b>Title of the Project Activity</b>	PoA: Improved Cook Stoves for East Africa (ICSEA) CPA: International Lifeline Fund Uganda (ILFUg1)
<b>Reference number of the Project Activity</b>	PoA: 7014 CPA: 7014-0001
<b>Version number of the monitoring report</b>	2.0
<b>Completion date of the monitoring report</b>	08/07/2014
<b>Registration date of the Project Activity</b>	17/08/2012
<b>Monitoring period number and duration of this monitoring period</b>	1 <sup>st</sup> Monitoring Period. 15/09/2012 – 14/03/2013 (It includes the first and last day of the monitoring period)
<b>Project participant(s)</b>	Improved Cook Stoves for East Africa (ICSEA) Limited
<b>Host Party (ies)</b>	Uganda
<b>Sectoral scope(s) and applied methodology (ies)</b>	3: Energy demand AMS-II.G Version 03, “Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass”
<b>Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD</b>	23,244 tonnes of CO <sub>2</sub> e (for 12 months). Pro-rata for the first Monitoring Period of 181 days (15/09/2012 – 14/03/2013 inclusive) = 11,526 tonnes of CO <sub>2</sub> e.
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period</b>	4,052 tonnes of CO <sub>2</sub> e (for 6 months)
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)</b>	2,193 tonnes of CO <sub>2</sub> e
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).</b>	1,859 tonnes of CO <sub>2</sub> e

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity****(a) Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks**

The purpose of this small-scale Programme of Activities (PoA) is to stimulate the dissemination of improved cook stoves (ICS) by the provision of access to carbon finance from the creation and sale of Certified Emission Reductions (CERs). The International Lifeline Fund Uganda CPA 1 (ILFUg1) has been active in the production, marketing, distribution, sales and after-sales of the "Okelo Kuc" brand of portable domestic charcoal improved cook stoves (ICS).

**(b) Brief description of the installed technology and equipment**

The "Okelo Kuc" ICS are more efficient in transferring heat to the cooking pots than traditional stoves, thus the Okelo Kuc require less fuel to prepare the same meal. The Okelo Kuc stoves are produced in small, medium, large and extra large sizes solely for domestic cooking. The efficiency is translated into fuel savings when compared to the traditional stoves used in Uganda. By reducing fuel consumption, the CPA reduces greenhouse gas emissions from the use of fuel. This reduction in fuel consumption is measured, and corresponding CO<sub>2</sub> emission reductions are calculated from these savings.

**(c) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.);**

Starting date of the project activity: 01/04/2011  
 Inclusion date: 17/08/2012  
 Start date of the crediting period: 15/09/2012  
 Start date of the monitoring period: 15/09/2012  
 End date of the monitoring period: 14/03/2013

**(d) Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period**

The total GHG emission reductions achieved in this monitoring period is 4,052 tonnes of CO<sub>2</sub>e

**A.2. Location of project activity**

**(a) Host Party(ies):** Uganda

**(b) Region/State/Province, etc.**

Northern Uganda

**(c) City/Town/Community, etc.**

Lira District

**(d) Physical/Geographical location**

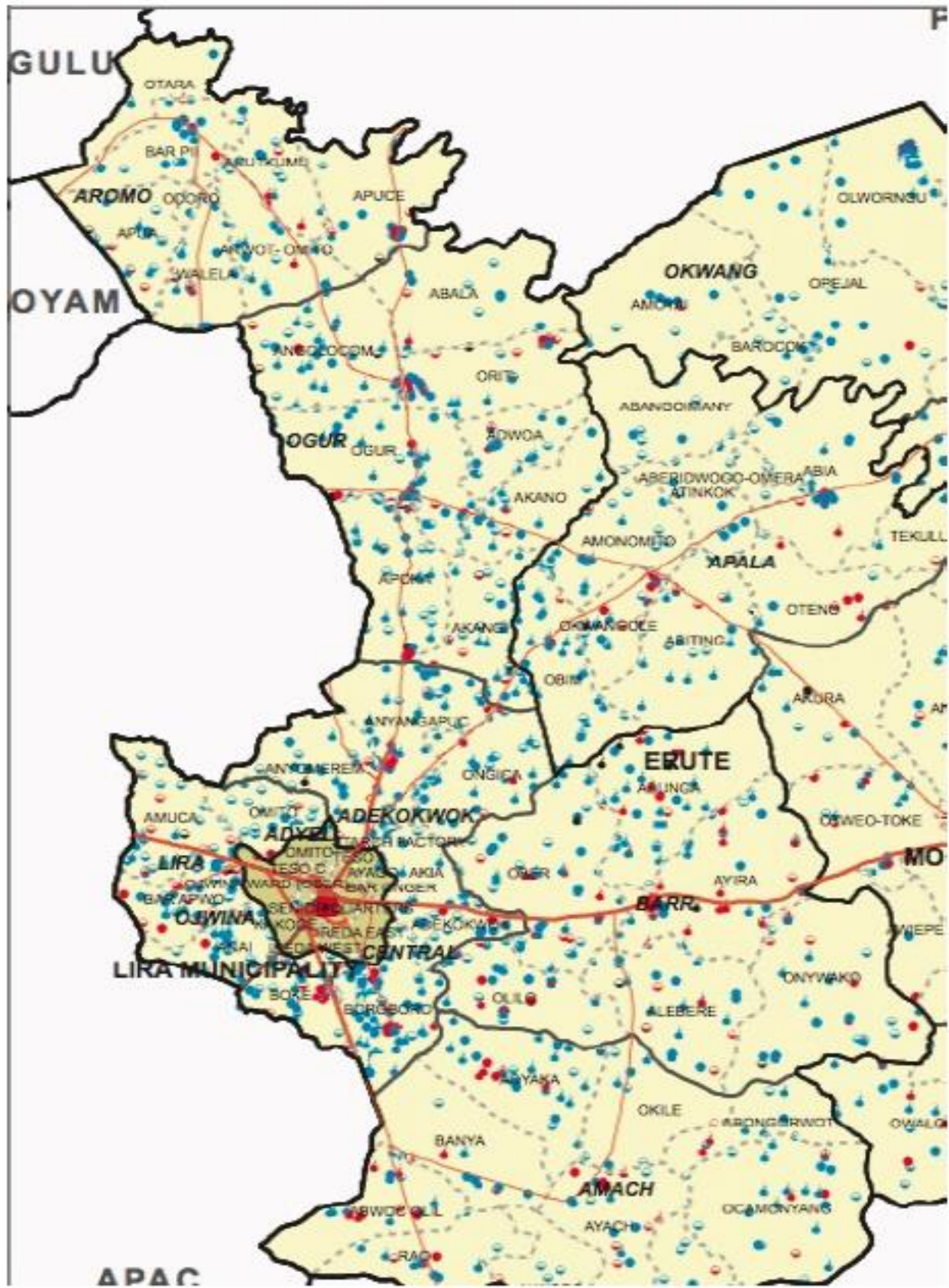
Uganda's geographical coordinates are:

Latitude: 4°12' N - 1°29' S

Longitude: 29°34' E - 35°0' E

Lira District headquarters' geographical coordinates are 2°20' N, 33°66' E

**Lira District Sub-Counties & Divisions**



A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity (ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Uganda (host)	Improved Cook Stoves for East Africa (ICSEA) Limited (private)	No

**A.4. Reference of applied methodology**

AMS-II.G Version 03, "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass"

**A.5. Crediting period of project activity**

Renewable. The first crediting period is 7 years.

Start of crediting period: 15/09/2012

End of crediting period: 14/09/2019

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity****Implementation status of the project activity during the monitoring period**

The CPA implementer and its supply chain are responsible for the sale and after-sales service of small, medium, large and extra large sizes of 'Okelo Kuc' ICS and any arrangements for the distribution of carbon revenues. The ICS user carries out the operation of the ICS, while the CPA provides training or instructions on how to operate and care for the ICS.

The CPA follows the CME's monitoring plan and procedures for identifying ICS sold during the course of the project and those that are still in use, so the appropriate number of emission reductions can be claimed. To facilitate this process, the CPA keeps traceable information used by the CME to monitor back to each individual ICS manufactured and sold.

The CPA follows the CME's Free, Prior and Informed Consent (FPIC) and Fair Trade ethos which stipulates that by signing the Sales Agreement/Logbook, the ICS buyer agrees to transfer all ownership of their stream of CERs to ILF, in exchange for a selection of benefits that include, but are not limited to:

1. an initial reduced price,
2. free yearly ICS maintenance, and
3. a community benefit (e.g. fixing the community borehole/water point)

At the point of sale of each ICS, and to ensure transparency in every transaction, the transfer of carbon credit ownership is clearly described by the CPA and its distributors, with the reciprocal benefits provided by the CPA to the stove users in return for their carbon credits. Proof that end users are aware of and are willing to give up their rights to the emission reductions is also provided with the clear language in the Sales Agreement/Logbooks.

To correctly assess the number of CERs corresponding to the CPA, the commissioning date and stove model and size allows the CERs to be calculated in the current monitoring period.

The following table lists the number of 'Okelo Kuc' ICSs sold in Lira District since the starting date of the project activity and as recorded in the ILF sales records Excel database at the end of the monitoring period.

MONTH	ICS SOLD	MONTH	ICS SOLD
April 2011	67	April 2012	113
May 2011	54	May 2012	75
June 2011	79	June 2012	104
July 2011	98	July 2012	130
August 2011	107	August 2012	136
September 2011	150	September 2012	114
October 2011	110	October 2012	91
November 2011	132	November 2012	146
December 2011	144	December 2012	262
January 2012	141	January 2013	154
February 2012	199	February 2013	168
March 2012	106	March 2013	164
		<b>ICS TOTAL</b>	<b>3044</b>

### Description of the installed technology, technical processes and equipment

The ILF 'Okelo Kuc' brand of portable domestic charcoal ICS (small, medium, large and extra large) are 100% locally manufactured in Uganda in various sizes (small, medium, large and extra large). See appendix 1. Compared to the traditional stove, the efficiency improvement for the ICS comes from the better insulation and increase in heat intensity. The ICS was tested and initially rated at an ICSEA-accredited laboratory using the ICSEA Water Boiling Test protocol, and proved to have an efficiency above 20% for the small, medium and large size ICS, as required by the CDM methodology.

### Information on single or two monitoring reports for the monitoring period

A single monitoring report is prepared for the monitoring period.

#### B.2. Post registration changes

##### B.2.1. Temporary deviations from registered monitoring plan or applied methodology

No temporary deviations from the registered monitoring plan or the applied methodology have been applied during this monitoring period.

##### B.2.2. Corrections

There are no corrections to project information or parameters fixed at validation that have been approved during this monitoring period or submitted with this monitoring report.

##### B.2.3. Permanent changes from registered monitoring plan or applied methodology

No permanent changes from the registered monitoring plan or applied methodologies have been approved during this monitoring period or submitted with this monitoring report.

##### B.2.4. Changes to project design of registered project activity

No changes to the project design of the project activity have been approved during this monitoring period or submitted with this monitoring report.

##### B.2.5. Changes to start date of crediting period

No changes to the start date of the crediting period have been approved during this monitoring period or submitted with this monitoring report.

##### B.2.6. Types of changes specific to afforestation or reforestation project activity

Not applicable.

**SECTION C. Description of monitoring system**

The monitoring consisted of four stages:

1. (Continuous) Sales data collection and tracking by the CPA
2. (Continuous) Data monitoring by the CME
3. Sample surveys at the end of the monitoring period and prior to verification
4. Data compilation and analysis, quality control and writing of the Monitoring Report

**1. Sales data collection and tracking by the CPA**

The CPA is responsible for the marketing, sales and distribution of the ‘Okelo Kuc’ ICS through its network of CME trained vendors. These vendors collect the ICS information and buyers contact details into the physical Sales Agreement/Logbook documents. Duplicate copies of these documents were submitted to the CPA by the vendors. The CPA then used these documents to generate an Excel sales record. These documents were then sent to the CME at regular intervals for the purpose of internal verification as described in the CPA-DD page 15. Every ICS buyer acknowledges receipt of the ‘Okelo Kuc’ on the user’s copy of the Sales Agreement/Logbook. The following information was collected by the CPA:

- I. Customer name
- II. Unique stove serial number (and GPS coordinates if appropriate)
- III. Commissioning date (collected afterwards via phone call and survey)
- IV. Location - District and sub-county
- V. Telephone contacts
- VI. Stove model and size
- VII. Sales receipt number
- VIII. Signature of buyer
- IX. Vendor name
- X. Vendor Location
- XI. Sales date

The flow chart below shows stage 1 of the monitoring system

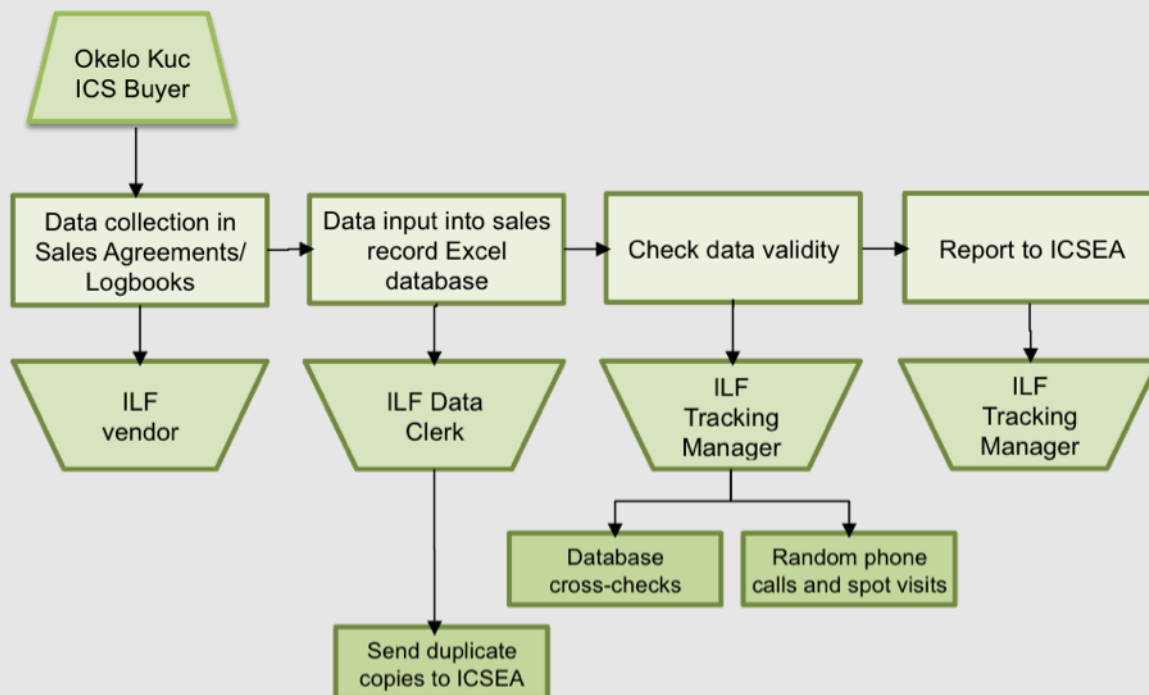


Diagram 1: CPA Data Tracking flow chart

**2. Data monitoring by the CME**

Monitoring activities were performed by the CME and have served to determine the total number of ‘Okelo Kuc’ ICS deployed in period  $y$  ( $N_{(i,y)}$ ). The number of appliances ( $N_{(i,i)}$ ) was determined as the fraction of days in a year in use for each ICS of the same model and cohort ( $t_{fraction.v.(i,i)}$ ), by the fraction of these ICS still in use per cohort and model of ICS. See the Excel spreadsheet “CPA CER Calculation for ILF v6”. The CME

randomly screened the records through spot-visits, crosschecks on ILF reports and logistics records to confirm that the sales records were authentic and that no double counting occurred. Audit corrections as necessary were visibly made to the records in green ink.

The flow chart below shows the stage 2 of the monitoring system

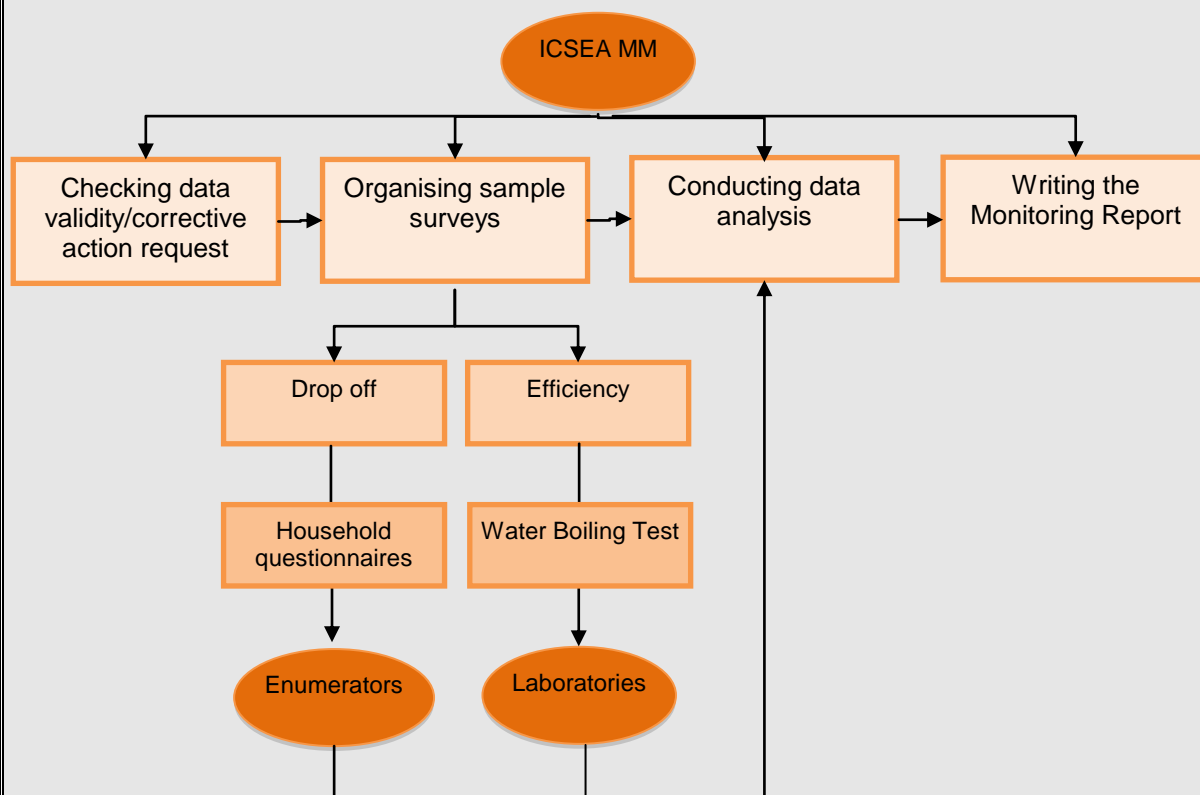


Diagram 2: CME Data Monitoring flow chart

### 3. Sample surveys

In accordance with Annex 4 (Monitoring Information) of the registered CPA-DD for the Sampling Plan Drop Off Check there are two different Approaches (Census or Sampling) that are described. Under the Sampling Approach there are 4 Options:

Option 1: Annual Inspection per CPA

Option 2: Annual Inspection of a Random Sample of CPAs from each Supplier Organisation (SO)

Option 3: Biennial Inspection per CPA

Option 4: Annual Inspection of a Random Sample of CPAs from CPAs using the same ICS Model

Option 1 has been chosen by this CPA.

At the end of the monitoring period, and prior to verification, sample surveys were conducted by the CME in order to determine the:

- statistically adjusted drop off of ICS in use from the total population of 'Okelo Kuc' in period y ( $U_{(i,i)}$ )
- adjustment factor for the continued use of baseline appliances by 'Okelo Kuc' users in period y
- average efficiency of the 'Okelo Kuc' being deployed ( $\eta_{new,(i,i)}$ )

#### Simple Random Sampling (SRS) Procedure for the Usage Survey

The Monitoring Manager of the CME drew a random sample from the internally verified Excel sales record database of 3,044 ICS. This was done by using a computerized random number generator from

<http://stattrek.com/statistics/random-number-generator.aspx>

By filling in the random numbers required (300), the minimum value (1) and maximum value (3,044) and clicking on the calculate button, the three hundred random numbers were automatically generated. See appendix 2. The numbers generated correspond to the entry numbers on the database. These numbers were then matched with the corresponding stove serial number on the database by using the Vlook up tool. This tool uses the column that has the random numbers generated to match the entry number and the corresponding stove serial number. Based on the generated stove details and a sample size of 55 (with oversampling for reliability of data), the usage questionnaires were submitted to the CME's team of enumerators. The team with the CME's Monitoring Manager conducted the household usage survey at the household locations. The purpose of the survey was to account for the continued use of baseline appliances and to determine the drop off rate as described in the CPA-DD pages 16 and 22 respectively. The survey also generated information about how the replaced low efficiency appliances were disposed of and were no longer in use within the boundary or within the region. 64% of replaced stoves were no longer in use (but were still at the households), and only 9% of replaced stoves were actually disposed of via scrap recyclers. The remainder (27%) were still in households in occasional use (see sheet "Baseline stove use" in the Excel spreadsheet "CPA CER Calculation for ILF v6").

#### Simple Random Sampling (SRS) Procedure for Efficiency Check

The Monitoring Manager of the CME drew a random sample from the internally verified Excel sales record database of 1,742 and 1,302 for 1 year and 2 year old ICS respectively. This was done by using a computerized random number generator from <http://stattrek.com/statistics/random-number-generator.aspx>

By filling in the random numbers required (300), the minimum value (1) and maximum value (1,742) for 1-year old ICS and clicking on the calculate button, the three hundred random numbers are automatically generated. See appendix 2. The numbers generated correspond to the entry numbers on the database. These numbers were then matched with the corresponding stove serial number on the database by using the Vlook up tool. This tool uses the column that has the random numbers generated to match the entry number and the corresponding stove serial number. Based on the generated stove details and a sample size of 32 (with oversampling for reliability of data), the stove data collection forms were submitted to the CME's team of enumerators. The team with the CME's Monitoring Manager conducted the stove collection exercise in each randomly selected household. In exchange for their stove, each household was provided with a brand new 'Okelo Kuc' ICS. All the collected 'Okelo Kuc' ICS were delivered to ICSEA's office in Kampala, and were later taken to ICSEA-authorized laboratories for efficiency testing. Prior to the testing of these stoves, five (5) control stoves from each cohort were sent three (3) accredited laboratories in Uganda to check for consistency in test results. The test results were consistent within the laboratories. The sample size for the efficiency test was determined using a sample size calculator (see sheet "Efficiency sample calc 1yr old"). The same procedure was carried out for the 2-year old stoves having 1,302 ICS and a sample size of 32 (see sheet "Efficiency sample calc 2yr old").

#### Data recording:

The CME's Monitoring Manager and the team of enumerators recorded the information from the household surveys on pre-printed questionnaires.

The ICSEA Project Manager collected all testing results from the authorized laboratories, and analysed and cross checked all the data, and recorded the information in the ICSEA efficiency testing calculations Excel spreadsheet.

#### Data aggregation and reporting:

In the field the ICSEA Monitoring Manager checked all the collected information from the household questionnaires for inconsistencies and instructed the team of enumerators to take corrective action where necessary. The ICSEA Monitoring Manager aggregated the results of the survey, conducted the analyses and reported on the monitored parameters as written in the CPA-DD pages 16, 20-23. For the detailed information on the sampling plan used, please refer to Section D.3 of the CPA-DD.

#### 4. Data compilation

CME's Monitoring Manager finally transferred the values of the monitored parameters to the CPA CER Calculation for ILF Excel spreadsheet that contains the equations to calculate the emission reductions for the monitoring period. See the Excel spreadsheet "CPA CER Calculation for ILF v6". The achieved values were



reported in the Monitoring Report.

#### Roles and responsibilities of personnel:

Person	Role
ILF Data Clerk	Responsible for entering, updating and maintaining all data from Sales Agreements/Logbooks into the Excel Database.
ILF Tracking Manager	Responsible for supervising all work done by the ILF Data Clerk and delivering the updated database/reports to ICSEA
ICSEA Monitoring Manager	Responsible for training and organising enumerators' activities, supervising ILF, updating the drop off analysis and values of other parameters, and generating the CPA CER Calculation for ILF Excel spreadsheet.
ICSEA Enumerators	Conducting household interviews for drop off check and other parameters during periodic sampling, collecting ICS for efficiency check and reporting results to the ICSEA Monitoring Manager.
ICSEA Project Manager	Responsible for organising testing activities for efficiency checks, supervising authorised laboratories and coordinating the reports of the ICSEA's Monitoring Manager.

#### Security procedures for the monitoring system:

ICSEA and the CPA implemented a system of crosschecks to ensure data quality. There was a separation of roles for every step of the data generation, aggregation and recording, calculation and reporting between those who were responsible and those who were controlling the respective step, at both the CPA and at the CME level.

The ILF team was trained and supervised by ICSEA's Monitoring Manager on how to effectively handle all data entry and subsequent updates, both in the field and in the ILF offices. The ILF Data Clerk was responsible for sorting out Sales Agreements/Logbooks, filtering those with incomplete or incorrect data, entering the data of those correctly completed into the sales record Excel database, flagging any duplicates, following up on those with inconsistencies, and updating the sales record Excel database as households were contacted/phoned/visited throughout the year.

The ILF Tracking Manager checked the correctness and consistency between the information on the Sales Agreements/Logbooks and the corresponding sales records Excel database. In case inconsistencies were detected, ICSEA's Monitoring Manager instructed the CPA team to search for the error source. If the error source was found, the information was corrected accordingly; if the error source could not be found, the database record was quarantined in the sales records Excel database. In addition to checking done by the ILF Tracking Manager, the ICSEA's Monitoring Manager checked the correctness and consistency of all sampling data collected and processed in the Monitoring Period.

### SECTION D. Data and parameters

#### D.1. Data and parameters fixed ex ante or at renewal of crediting period

*(Copy this table for each piece of data and parameter.)*

<b>Data / Parameter:</b>	<b>NCV<sub>biomass</sub></b>
Unit:	TJ/tonne
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data:	IPCC default for wood fuel
Value(s) applied:	0.015

Purpose of data:	Baseline emission calculation
Additional comment:	

<b>Data / Parameter:</b>	$EF_{\text{projected-fossilfuel}}$
Unit:	tCO <sub>2</sub> /TJ
Description:	Emission factor for the substitution of non-renewable woody biomass by similar consumers.
Source of data:	IPCC
Value(s) applied:	81.6
Purpose of data:	Baseline emission calculation
Additional comment:	

<b>Data / Parameter:</b>	$C_{y,\text{fueltype,region,old}}$
Unit:	tonnes/year
Description:	Quantity of woody biomass used in the absence of the project activity in tonnes per type of ICS
Source of data:	Survey of local usage on regional level which could comprise a country
Value(s) applied:	Charcoal equivalent to 4.56 tonnes of wood/stove/year
Purpose of data:	Baseline emission calculation
Additional comment:	

<b>Data / Parameter:</b>	$\eta_{\text{old},i}$
Unit:	Fraction
Description :	Efficiency of the baseline appliance being replaced
Source of data:	Default value according to AMS-II.G Version 03
Value(s) applied:	0.1
Purpose of data:	Baseline emission calculation
Additional comment:	Option 2 from the PoA-DD has been taken to calculate $B_{y,\text{savings}}$

## D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

<b>Data / Parameter:</b>	$\eta_{\text{new},(i,j)}$
Unit:	Fraction
Description:	Efficiency of the ICS being deployed as part of the project activity.
Measured/ Calculated Default:	Calculated from sampled ICS
Source of data:	Water Boiling Tests (WBT)
Value(s) of monitored parameter:	0.4 for 1-year old ICS See sheet "Efficiency sample calc 1yr old" in the spreadsheet "CPA CER Calculation for ILF v6", and 0.37 for 2-year old ICS, see sheet "Efficiency sample calc 2yr old" in the spreadsheet "CPA CER Calculation for ILF v6".

Monitoring equipment:	<p><b>Makerere University College of Agricultural &amp; Environmental Sciences</b>  <u>Bomb Calorimeter</u>: Model: GALLENKAMP AUTOBOMB CALORIMETER. ID: SG96/02/536. Calibrated every four months. Last calibration was in November 2013 valid through March 2014. This was done at 95% confidence level.</p> <p><b>Chemiphar Laboratory</b>  <u>Weighing Balance</u>: Model: KERN 474-54. ID: CP/1/231. Capacity: 12000g by 1g. Calibrated every 12 months. Last calibration was in July 2013 valid through July 2014. This was done at 95% confidence level.</p> <p><u>Digital Thermometer</u>: Model: TESTO 925. ID: CP/1/080. Capacity: -20°C to 600°C. Calibrated every 12 months. Last calibration was in September 2013 valid through September 2014. This was done at 95% confidence level</p> <p><b>Centre for Research in Energy &amp; Energy Conservation (CREEC)</b>  <u>Weighing Balance</u>: Model: HIWEIGH WPS. ID: FZ1301017. Capacity: 30kg by 1g. Calibrated every 12 months. Last calibration was in May 2013 valid through May 2014. This was done at 95% confidence level.</p> <p><u>Weighing Balance</u>: Model: HIWEIGH WPS. ID: FZ1301035. Capacity: 30kg by 1g. Calibrated every 12 months. Last calibration was in May 2013 valid through May 2014. This was done at 95% confidence level.</p> <p><u>Digital Thermometer</u>: Model: VOLTCRAFT K101. ID: 101100737. Capacity: -200°C to 1370°C by 0.1°C. Calibrated every 12 months. Last calibration was in September 2013 valid through September 2014. This was done at 95% confidence level.</p> <p><u>Digital Thermometer</u>: Model: TME. ID: 2030. Capacity: -30°C to 50°C by 0.1°C. Calibrated every 12 months. Last calibration was in September 2013 valid through September 2014. This was done at 95% confidence level.</p> <p><b>Uganda National Bureau of Standards (UNBS)</b>  <u>Weighing Balance</u>: Model: ELE INTERNATIONAL LTD Double Beam. ID: BM/152. Capacity: 15kg by 1g. Calibrated every 12 months. Last calibration was in June 2013 valid through June 2014. This was done at 95% confidence level.</p> <p><u>Digital Thermometer</u>: Model: HANNA TYPE K THERMOCOUPLE. ID: 537954. Capacity: 1200°C. Calibrated every 12 months. Last calibration was in March 2013 valid through March 2014. This was done at 95% confidence level.</p>
Measuring/ Reading/ Recording frequency:	Every two years
Calculation method (if applicable):	See sheet "CPA CER Calculation for ILF" in spreadsheet "CPA CER Calculation for ILF v6".
QA/QC procedures:	Comparisons were made on the thermal efficiency results to check on laboratories' staff performance and consistency throughout. The results were all duly certified by the testing laboratories.
Purpose of data:	Emission Reduction calculation
Additional comment:	
Data / Parameter:	f <sub>NRB,y</sub>

Unit:	Fraction
Description:	Fraction of woody biomass saved by the project activity in the year y that can be established as non-renewable biomass
Measured/ Calculated Default:	Calculated. See "Uganda f <sub>NRB</sub> " in the "CPA CER Calculation for ILF v.5" as supported by the letter from the National Forestry Authority of 10 March 2014.
Source of data:	Derived from literature and extrapolation
Value of monitored parameter	0.915
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	
QA/QC procedures:	The f <sub>NRB,y</sub> was determined for ILF CPA on the basis of the most recent national approved studies. A cross check comparison is to be made against UNFCCC published default values, and any significant differences have to be justified. In this case, the option of a project specific value has been adopted for f <sub>NRB,y</sub> . Survey has shown the existence of NRB in Uganda because the conditions listed in Appendix 1 of EB 67 Annex 22 were found to exist. Recent data from FAO (through linear regression and extrapolation) were used to determine the demand for biomass i.e. all wood harvested (Db). The growth of biomass was taken on a conservative value by considering all the growing stock in Uganda and its growth rate. This gives a value of 91.5%.
Purpose of data:	Baseline emission calculation
Additional comment:	
<b>Data / Parameter:</b>	<b>t<sub>fraction,(i,j)</sub></b>
Unit:	Fraction of 365
Description:	Fraction of the days in use in year y of a single ICS deployed
Measured/ Calculated Default:	Calculated. See sheet "CPA CER Calculation for ILF" in spreadsheet "CPA CER Calculation for ILF v6".
Source of data:	Derived from sales figures
Value(s) of monitored parameter:	Variable, dependent on day ICS was first put into use (commissioning date) with respect to the monitoring period.
Monitoring equipment:	Sales Record Excel Database and household survey
Measuring/ Reading/ Recording frequency:	Continuous monitoring and recording of each ICS sold. Sample surveys.
Calculation method (if applicable):	The CPA keeps a paper and electronic record of the sales data, and the ICS is considered to be in use from the commissioning date, which is the date on which the stove is put into use for the first time. The fraction of the number of days in use is calculated daily through the electronic database.

QA/QC procedures:	<p>Sales records were scrutinised by the CPA to avoid double counting and the CME also conducted spot-checks to verify the legitimacy of such records. On a monthly basis, the CPA verified the ICSs that had been put into use based on the ICS sales during the month through telephone surveys and/or physical inspection and CME monitoring events.</p> <p>Sales records and survey results provided the commissioning date, which is the date on which the stove is put into use for the first time. That date is used as the start date for the computation of certified emission reductions for single ICS. Based on the analysis of the sales records and survey results a commissioning date 9 days after the sales date has been conservatively calculated and used for emission reduction calculation purposes.</p> <p>On a monthly basis, the ILF (CPA implementer) has been sending duplicate copies of Sales Agreement/Logbooks to the ICSEA (CME) for verification of the data entered into the ILF sales record Excel database.</p> <p>Telephone checks and spot checks were used by the CME to review and authenticate the data in the sales database.</p>
Purpose of data:	Emission reduction calculation
Additional comment:	

<b>Data / Parameter:</b>	<b>U<sub>(i,j)</sub></b>
Unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an assessment adjust for drop off of ICS in use per cohort year. A cohort is defined as the ICS model sold or gone through maintenance in the same year.
Measured/ Calculated Default:	See sheet "Stove usage" in the spreadsheet "CPA CER Calculation for ILF v6".
Source of data:	Survey of ICS users for the total population using random sampling method.
Value(s) of monitored parameter:	0.95
Monitoring equipment:	Questionnaire
Measuring/ Reading/ Recording frequency:	The survey of ICS users was done once in the first monitoring period in accordance with Approach 2, Option 1 of the Sampling Plan in the registered CPA-DD.
Calculation method (if applicable):	<p>Monitoring of the statistically adjusted drop off involves two steps:</p> <p>Step 1: Sample survey amongst 'Okelo Kuc' ICSs deployed</p> <p>Step 2: Calculation of the adjusted drop off rate at 90% confidence level and 10% precision (annual inspections). See sheet "Stove usage, sample size calc" in the spreadsheet "CPA CER Calculation for ILF v6".</p> <p>The drop off fraction was determined through interviews during the usage survey performed by the dedicated monitoring team and enumerators. Checks were conducted until the required precision (10%) for this parameter was achieved. All questionnaires and information gathered during the sampling were analysed and entered into the electronic drop off analysis database by the CME monitoring team.</p>
QA/QC procedures:	Usage monitoring was performed by the CME following the sampling plan (see Section D.3.).
Purpose of data:	Emission reduction calculation

Additional comment:	
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<b>Data / Parameter:</b>	<b>L<sub>(i,j)</sub></b>
Unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an assessment adjusted for leakage risks.
Measured/ Calculated Default:	Default
Source of data:	Default value as per methodology. In accordance with AMS-II.G Version 03 clause 23, a default value of 95% has been used.
Value of monitored parameter:	0.95
Monitoring equipment:	Not applicable
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	
QA/QC procedures:	
Purpose of data:	Baseline emission calculation
Additional comment:	

<b>Data / Parameter:</b>	<b>Adjustment factor for continued use of traditional stoves</b>
Unit:	Fraction
Description:	This accounts for the exclusion of the fuel wood consumption of baseline stoves from the CER calculation in accordance with Section B.6.1 of the registered CPA-DD requiring a conservative approach to be taken regarding the replacement of traditional stoves (AMS-II.G version 03 clause 15).
Measured/ Calculated Default:	Calculated. See the sheet "Baseline stove use" in the spreadsheet "CPA CER Calculation for ILF v6", cell M42.
Source of data:	Usage survey
Value of monitored parameter	0.99
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	
QA/QC procedures:	
Purpose of data:	Baseline emission calculation
Additional comment:	

### D.3. Implementation of sampling plan

**(a) Description of implemented sampling design**

The ILF CPA chose in advance a sampling approach for its drop off check and efficiency check. (see Section C.3 (Sample Surveys) in which Option 1 was chosen by the CPA). This was based on the estimated monitoring costs and the CPA's existing monitoring/tracking system in Lira District. This was in compliance with the plans contained in the PoA-DD and CPA DD by using simple random sampling based on 90/10 confidence/precision, and in conformity with EB 74-A06 version 4 page 6, which indicates that the use of a minimum sample size of 30 shall be used whenever the sample size calculation gives a result of less than 30. The minimum sample sizes for the different scenarios required to meet the confidence and precision requirements were calculated in a sample size computation spreadsheet referenced in the POA DD.<sup>1</sup>

The overall objective was to estimate the emission reductions during a 6-month period in tCO<sub>2</sub> during the crediting period, and with 90/10 confidence/precision, and to estimate the mean thermal efficiency of the 'Okelo Kuc' ICS with 90/10 confidence/precision.

Simple random sampling was used. The target population was the 3,044 'Okelo Kuc' ICS sold by the CPA in Lira District, from 01/03/2011 until 15/03/2013.

The required sample size for the **stove usage survey** was determined using the equation in the POA DD for estimating the sample size:

$$n = \frac{1.645^2 NV}{(N - 1) \cdot 0.1^2 + 1.645^2 V}$$

where  $V = \frac{p(1-p)}{p^2}$  and p is the expected proportion

n	Sample size
N	Population total
p	Our expected proportion
1.645	Represents the 90% confidence required
0.1	Represents the 10% relative precision

The values used (see "Stove Usage Sample Size Calc" in the spreadsheet "CPA CER Calculation for ILF v6") were:

n	43 (an adjusted sample size of 55 was used according to expected response rate)
N	3,044
p	86% (derived from the Monitoring Manager's pre-test exercise in Lira District on 1 August 2013 to determine a pre-survey estimate of the expected proportion of stoves in use <sup>2</sup> )
1.645	Represents the 90% confidence required
0.1	Represents the 10% relative precision

A total of 300 stove serial numbers were generated for the stove usage survey using simple random sampling with the aid of a computerised randomiser.

The monitoring team made telephone calls to the registered owners of the randomly selected stoves in the order generated by the randomiser. A total of 96 owners were telephoned, but due to the 41 non-responses (after three attempts on separate days) 55 stove users were eventually contacted (an adjusted over-sample size of 55 was used according to the expected response rate – see above).

A questionnaire with 22 questions was administered to the 55 stove users where the 'Okelo Kuc' ICS were located. The purpose of the survey was to support the monitoring of parameters in accordance with the registered PDD and GS Passport, namely:

1. Improved stove usage – location, serial number confirmation, commissioning date, current usage

<sup>1</sup> Sample size calculation spreadsheet provided to the validation DOE

<sup>2</sup> See spreadsheet Pre-Test Sample v01

2. Usage of original (baseline) stove(s) – frequency and extent of use and purpose
3. Household family size
4. Adjustment for continued use of baseline stoves
5. Instructions regarding, and practice of, disposal of original stove(s)
6. Household fuel usage and expenditure changes
7. Local fuel (charcoal) price changes
8. Perception of air quality changes

The selection of questions for the questionnaire was undertaken having in mind the purpose of the survey. In all cases stoves were found in use in domestic households, and no commercial uses of the stove were found.

The sheet “Stove Usage Sample Size Calc” in the spreadsheet “CPA CER Calculation for ILF v6” was used.

The required sample size for the **stove efficiency check survey** was determined using the equation in the POA DD for estimating the sample size in each age cohort (in accordance with standard statistical practice in conformity with EB 74-A06 version 4 para 12(b) – “using the project planner’s knowledge and experience”, whereby an initial estimate of the Standard Deviation based upon the CME’s prior knowledge from the testing of 1 and 2-year old Okelo Kuc stoves, based on 4 stoves per cohort taking into account the uniform quality of the stoves manufactured in the ILF factory conforming to set design specifications confirmed in the tight thermal efficiency results in the initial Okelo Kuc Rating Test<sup>3</sup> (as opposed to variable quality stoves made by artisans), and used in a single District where cooking practices are uniform. The stoves were chosen at random by the PP in accordance with normal statistical best practice from stoves tested at accredited laboratories, see the respective estimates and references in sheets “Efficiency sample calc 1-yr old” and “Efficiency sample calc 2-yr old” in the spreadsheet “CPA CER Calculation for ILF v6”).

$$n \geq \frac{1.645^2 NV}{(N - 1) \cdot 0.1^2 + 1.645^2 V}$$

Where  $V = \frac{\frac{SD}{Mean}}{0.1}$

n	Sample size
N	Total number of ICS in use
Mean	Our expected efficiency mean
SD	Our expected standard deviation
1.645	Represents the 90% confidence required
0.1	Represents the 10% relative precision

The values used (see sheets “Efficiency sample calc 1yr old”, “Efficiency sample calc 2yr old” in the spreadsheet “CPA CER Calculation for ILF v6”) were:

#### **1-year old stoves**

n	1 (however, in conformity with EB 74-A06 version 4 page 6, which indicates that the use of a minimum sample size of 30 shall be used whenever the sample size calculation gives a result of less than 30)
N	1,742
Mean	0.440
SD	0.02979094
1.645	Represents the 90% confidence required
0.1	Represents the 10% relative precision

#### **2-year old stoves**

n	1 (however, in conformity with EB 74-A06 version 4 page 6, which indicates that the use of a minimum sample size of 30 shall be used whenever the sample size calculation gives a result of less than
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<sup>3</sup> See file “ILF initial rating test results.pdf”



30)

N 1,302  
 Mean 0.47525  
 SD 0.01192686  
 1.645 Represents the 90% confidence required  
 0.1 Represents the 10% relative precision

A total of 300 stove serial numbers were generated for both age cohorts of the stove efficiency check survey using simple random sampling with the aid of a computerised randomiser.

An over-sampling approach was used to help maximise the response rate for any possible outliers. The sample size was determined using a sample size model and data from the survey. The sheets "Efficiency Sample Calc 1yr Old" and "Efficiency Sample Calc 2yr Old" in the spreadsheet "CPA CER Calculation for ILF v6" show how.

For the sampling of the 1-year old cohort for the **stove efficiency check survey**, the monitoring team made telephone calls to the registered owners of the randomly selected stoves in the order generated by the randomiser. A total of 72 owners were telephoned, but due to the 40 non-responses (after three attempts on separate days) 32 owners were eventually contacted. A minimum of 30 stoves was needed (EB 74-A06 version 4 page 6). The 32 ICS, all of which were in daily use, were collected (a deliberate over sample of 2 to provide for any contingency) by the ICSEA team of enumerators from individual households, and they replaced them with a new one of the same model as the one previously owned.

For the sampling of the 2-year old cohort for the **stove efficiency check survey**, the monitoring team made telephone calls to the registered owners of the randomly selected stoves in the order generated by the randomiser. A total of 108 owners were telephoned, but due to the 76 non-responses (after three attempts on separate days) 32 owners were eventually contacted. A minimum of 30 ICS were needed for the efficiency check (in accordance with EB 74-A06 version 4 page 6). The 32 ICS, all of which were in daily use, were collected (a deliberate over sample of 2 to provide for any contingency) by the ICSEA team of enumerators from individual households, and they replaced them with a new one of the same model as the one previously owned.

In all cases stoves were found in use in domestic households, and no commercial uses of the stove were found.

All the 'Okelo Kuc' ICS that were collected were transported to the CME's office in Kampala and later delivered for testing by ICSEA Ltd at the three stove testing laboratories (previously accredited by ICSEA Ltd), namely Chemiphar, the Centre for Renewable Energy & Energy Efficiency (CREEC) at Makerere University) and the Uganda National Bureau of Standards (UNBS).

**(b) Collected data (electronic spreadsheets may be attached and referenced)**

The primary means of monitoring the CPA's activities is by means of buyer information collected through Sales Agreements/Logbooks and the unique numbering of each 'Okelo Kuc' ICS. The sales data was stored in the CPA's sales record Excel database and transferred into the PoA's master sales record Excel database.

**(c) Analysis of the collected data**

Parameter	n*	Value**	Standard Deviation***	Confidence	Precision	Lower bound applicable?
$\eta_{\text{new}}$ (1 yr cohort)	32	40%	11.1659803	90%	10 %	No
$\eta_{\text{new}}$ (2 yr cohort)	32	37%	16.418757	90%	10%	No
U	55	95%	N/A	90%	10%	No

\* valid responses

\*\* from laboratory results for 1 and 2-year old sampled stoves and the usage survey

\*\*\* from laboratory tests of 1 and 2-year old stoves, ref. "Efficiency tests 1yr old", "Efficiency tests 2yr old" in the spreadsheet "CPA CER Calculation for ILF v6".

**(d) Demonstration on whether the required confidence/precision has been met**

In all three surveys (stove usage survey and the 1-year and 2-year old stove cohorts for the stove efficiency check surveys) the minimum sample sizes required to achieve the 90/10 confidence/precision requirement were met.

*The required confidence/precision for both the efficiency and the drop off checks were met.*

**SECTION E. Calculation of emission reductions or GHG removals by sinks****E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

AMS-II.G Version 03 does not provide specific equations for the calculation of baseline emissions or baseline net GHG removals by sinks.

Equation used for the calculation of emission reductions, in line with AMS-II.G Version 03:

$$ER_y = B_{y,savings} \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected-fossilfuel}$$

The Option 2 in Section E.6.2. of the PoA-DD was chosen to calculate the  $B_{y,savings,(i,i)}$  of the ICS. This option compares the efficiency of the baseline stove against the efficiency of the ICS deployed. See CPA CER Calculation for ILF in the spreadsheet "CPA CER Calculation for ILF v6".

ER<sub>y</sub> for a 2-year old ICS:

$$ER_y = 1.488 \cdot 0.92 \cdot 0.015 \cdot 81.6$$

**ER<sub>y</sub> = 1.677 t CO<sub>2</sub>e** (from Excel spreadsheet "CPA CER Calculation for ILF v6" sheet "CPA CER Calculation\_ILF" cell S31)

Total number of emission reductions generated by 2-year cohort is:

$$ER_{2-y \text{ cohort}} = 1,302 \cdot 1.677 = 2,185 \text{ t CO}_2\text{e}$$

ER<sub>y</sub> for a 1-year old ICS:

$$ER_y = 1.537 \cdot 0.92 \cdot 0.015 \cdot 81.6$$

**ER<sub>y</sub> = 1.723 t CO<sub>2</sub>e** (from Excel spreadsheet "CPA CER Calculation for ILF v6" sheet "CPA CER Calculation\_ILF" cell S1334)

This is the emission reduction achieved per 1-year old ICS during the monitoring period of 181 days for an ICS that was in operation for the full monitoring period of six months. Not all 1-year cohort ICS were in operation for the whole monitoring period of 181 days. The value of ER<sub>y</sub> for 1-year old ICS that had been in use for less than 181 days is lower (ER<sub>y</sub> decreases proportionally to the decrease of the  $t_{fraction}$ ).

Total number of emission reductions generated by the 1-year cohort is:

**ER<sub>1-y cohort</sub> = 1,873 t CO<sub>2</sub>e** (from Excel spreadsheet "CPA CER Calculation for ILF v6" sheet "CPA CER Calculation\_ILF" cell W2933)

The total number of emission reductions achieved by all the ICS included in the ILFUg1 CPA is the sum of the emission reductions achieved by both cohorts multiplied by the applied weighted factor for continued use of the baseline (0.999):

$$ER_{total} = (ER_{1-y \text{ cohort}} + ER_{2-y \text{ cohort}}) \cdot 0.999 = (1,873 + 2,185) \cdot 0.999 = 4,052 \text{ t CO}_2\text{e}$$

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

Not applicable, as methodology AMS-II.G Version 03 does not consider project emissions or actual net GHG

removals by sinks.

### E.3. Calculation of leakage

Leakage Adjustment Factor  $L_{(i,j)}$  as per the methodology is applied to the project activity to calculate the Emission Reductions of this Monitoring Period.

In accordance with AMS-II.G Version 03 clause 23, a default value of 95% has been used. See the Values table in Section E.4.

### E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO <sub>2</sub> e)
<b>Total</b>	<b>4,052</b>	Not applicable	Not applicable	<b>4,052</b>

### E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
<b>Emission reductions or GHG removals by sinks (t CO<sub>2</sub>e)</b>	23,244 tonnes of CO <sub>2</sub> e (for 12 months). Pro-rata for the first Monitoring Period of 181 days (15/09/2012 – 14/03/2013 inclusive) = 11,526 tonnes of CO <sub>2</sub> e	4,052 (6 months)

### E.6. Remarks on difference from estimated value in registered PDD

In the registered CPA-PDD, the expected annual emission reductions are 23,244 tonnes of CO<sub>2</sub>e for the period 15/09/2012 – 14/09/2013 (365 days) (see Section A.4.4 of the CPA-PDD).

This monitoring period covers 181 days (15/09/2012 – 14/03/2013). The expected emission reductions as applied in the ex-ante calculation of the registered PDD are 23,244 tonnes of CO<sub>2</sub>e / 365 days \* 181 days = 11,526 tonnes of CO<sub>2</sub>e.

The actual values achieved during this monitoring period are lower than estimated in the CPA-PDD. The main reason is that this was the first monitoring period in the implementation of the CPA and the number of 'Okelo Kuc' ICS disseminated was lower than estimated.

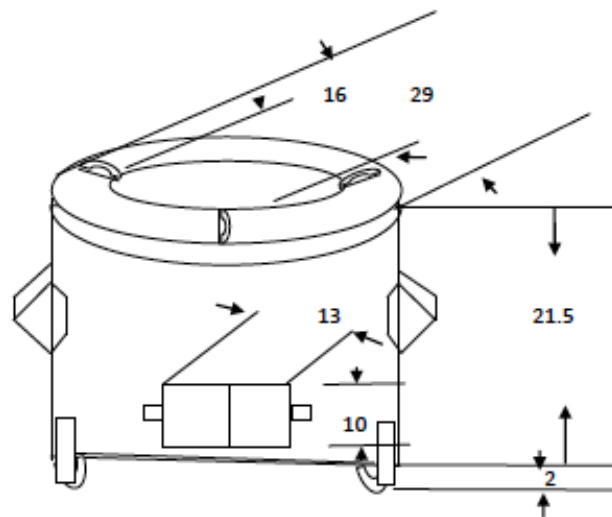
### E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards

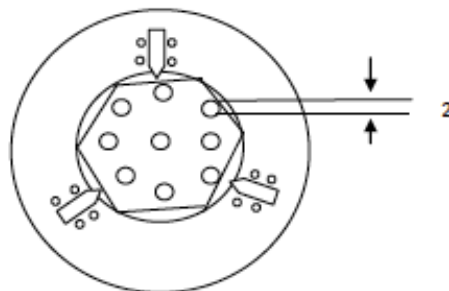
Emission reductions or GHG removals by sinks (t CO <sub>2</sub> e)	2,193	1,859
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Appendix 1

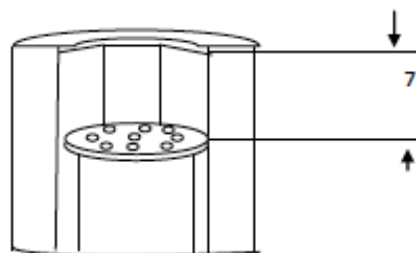
**Okelo Kuc Stove**



Side view



Top view



Cross section view

Scale in Cm

Appendix 2

### Procedure for choosing random numbers

The random number generator used is

<http://stattrek.com/statistics/random-number-generator.aspx>

- Enter a value in each of the first three text boxes.
- Indicate whether duplicate entries are allowed in the table.
- Click the **Calculate** button to create a table of random numbers.

**Note:** The seed value is optional. Leave it blank to generate a new set of numbers. Use it to repeat a previously-generated set of numbers.

How many random numbers?

Minimum value

Maximum value

Allow duplicate entries

Seed (optional)

Figure: 1

**Figure 2:- Raw data from the randomiser**

1710	1820	677	1861	2180	2658	2037	840	1371	1404	1306	1600
2964	305	730	2515	219	174	1122	1338	1502	1012	2482	317
2939	2004	938	1077	2286	906	1175	1992	1788	775	1567	3
11	1612	2115	2854	1449	2605	1383	2801	795	2318	808	1469
1110	3000	2012	293	2392	3025	313	770	1771	2641	31	117
672	2065	1759	431	542	2457	2829	901	1379	758	2620	2339
2371	2273	2567	1685	2085	2510	423	2000	1955	2902	2306	2469
1979	391	2098	848	725	2718	2045	195	2686	2143	2960	509
2555	2535	1783	1791	333	836	1575	170	1326	105	1522	2575
227	2588	2437	2077	97	2980	1261	301	934	1281	1052	1738
2739	2796	999	1085	1640	3033	1914	587	1510	366	738	1869
2347	1726	529	248	280	182	476	2653	2241	2666	1391	2968
2110	3058	215	378	2947	1359	7	1816	881	627	3013	1163
595	52	868	1477	464	444	2751	1947	489	1804	2543	325
2294	260	2490	2731	1195	497	346	3045	1064	889	2228	456
1902	2249	2020	2706	2894	705	1967	2053	2608	129	2882	1555
2477	521	1706	2837	2502	1881	685	1215	1248	1150	1444	562
150	574	2359	64	19	966	1183	1346	856	2326	162	2784
1849	783	921	2130	750	1019	1836	2445	619	1412	660	2915
1457	2771	2698	1293	203	1228	399	640	2163	652	1314	954
2032	1857	137	1424	2869	2404	2175	2862	803	1673	2935	2208
2764	1097	791	2522	2633	1489	2673	2992	411	2849	1653	2183

2216	2118	2412	717	1117	1542	268	1032	987	1934	2151	2314
1824	235	1130	693	2817	1751	1889	39	1718	1987	2804	2600
1587	2379	815	823	2424	2927	607	2261	358	2196	554	1608
72	1620	2281	1922	1087	1773	2774	585	1034	84		

**Figure 3:- Sample of the random selection**

TOTAL ENTRIES	Random Number Generator	Random Selections	STOVE SERIAL NUMBER
1	1710	#N/A	CS0011685
2	1820	#N/A	CS0011606
3	677	3	CS0012847
4	1861	#N/A	CS0009249
5	2180	#N/A	CS0000340
6	2658	#N/A	CS0013101
7	2037	7	CS0013106
8	840	#N/A	CS0011005
9	1371	#N/A	CS0010392
10	1404	#N/A	CS0009263
11	1306	11	CS0009329
12	1600	#N/A	CS0009333
13	2964	#N/A	CS0009261
14	305	#N/A	CS0012818
15	730	#N/A	CS0001030
16	2515	#N/A	CS0010454
17	219	#N/A	CS0010339
18	174	#N/A	CS0010705
19	1122	19	CS0012098

**Document information**

03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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