GOLD STANARD MONITORING REPORT	
Title of the project activity	Improved Cookstoves for Social Impact in Ugandan Communities (formerly "Efficient Cooking with Ugastoves")
GS Reference number of the project activity	GS 447
Version number of the monitoring report	Version 03
Completion date of the monitoring report	31 March 2016
Monitoring period number and duration of this monitoring period	Monitoring Period #1 (CP2) 01 April 2014 – 30 June 2015 (both dates inclusive)
Project participant(s)	Impact Carbon
Host Party	Uganda
Sectoral scope(s)	N/A
Selected methodology(ies)	Technologies and Practices to Displace Decentralized Thermal Energy Consumption – 11/04/2011
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	980,920

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

One of the major causes of deforestation in Uganda is the use of biomass for domestic and institutional cooking. About 92% of Ugandans rely on solid fuels for cooking, typically charcoal or wood for urban dwellers, and wood for rural households[1]. A series of surveys held in 2013 at the national level in Uganda concluded that the most common domestic cooking devices are the traditional unimproved models of charcoal and wood stoves, such as three-stone wood fires and traditional metal charcoal stoves.

The project reduces green-house emissions by disseminating improved cookstoves (ICS). The project was initiated on pilot work in 2005 by the Urban Community Development Association of Kampala, Uganda (Ugastove). A stove manufacturing business with the name Ugastove was founded on the basis of this pilot work in 2007.

Tests were conducted in 2006, 2010, 2012 and 2015 to measure the fuel savings introduced by the ICS. 2015 tests on project ICS produced the following results:

- The charcoal ICS reduced charcoal consumption in sampled households by an average of 45%[2]. Results suggested that household savings scaled proportionally with the number of people cooked for and the number of meals prepared.

While these stoves significantly reduce greenhouse gas emissions, they simultaneously provide co- benefits to users and families in the form of relief from high fuel costs and reduced exposure to health- damaging airborne pollutants. These new kitchen regimes specifically provide some or all of the following benefits:

- Reduce unsustainable wood harvest and charcoal production along with the accompanying deforestation
- Diminish the charcoal and fuel wood bill for households and schools and save fuel collection time for other important activities
- Contribute to the preservation of wood resources so as to avoid inter-communal conflict over resources

Ugastove initiated its marketing efforts of charcoal ICS in Kampala and urban areas where charcoal use is most pervasive. It has quickly expanded to other areas of Uganda with the support of the carbon financing generated by the project.

Despite the efforts to promote ICS, inefficient and polluting cooking regimes are still deeply established in the culture. The project aims to break this mould and move large populations away from conditions under which GHG emissions are unacceptably high, and health effects are inhumane for the women and children spending long hours each day in conventional kitchens. The project aims to increase access to more efficient cooking technologies. It will continue to invest revenues from carbon finance in subsidies, social marketing, and the development of robust distribution channels. Carbon finance provides a basis for maintaining a professional commercial relationship between the user and the disseminators, while also introducing an affordable price,

[1] http://www.helio-international.org/uploads/VARUganda.En.pdf, page 16.

[2] KPT Analysis

a quality guarantee and a warranty system. The quality assurance strategy is a major benefit of carbon finance. It has the potential to introduce a new set of quality expectations amongst consumers and so shift the critical mass of prevailing practice away from inefficient cooking with its extreme environmental and health penalties, to a new mass prevailing practice involving significantly reduced GHG emissions and healthier kitchens.

In total 456,878 stoves have been installed since the beginning of the project, out of which 408,809 stoves were installed during the first crediting period and rest 48,069 were distributed in second crediting period. Beneficiaries received stoves free of charge and were directed in correct use of the stove by local community groups engaging with the project developers. The improved cook stoves significantly reduce fuel consumption, resulting in an improved living environment for recipients. By reducing fuel consumption, CO_2 emissions from combustion of non-renewable biomass have correspondingly been reduced by 980,520 tCO_2/y.

A.2. Location of project activity

All regions of Uganda

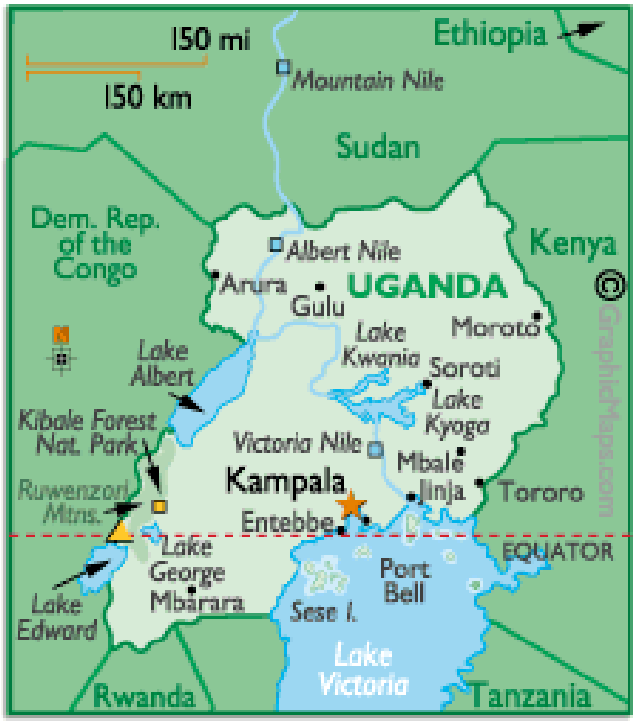

Figure 1: Location of Project Activity

The project boundary is defined as the kitchens used by the project population (ICS purchasers); this is distinct to the Reachable Fuel Collection Area, which is the geographical area of Uganda where fuel-wood can reasonably be expected to be collected throughout the period of the project.

The project will continue to promote the sale of improved wood-fuel stoves primarily in Kampala, the capital of Uganda, with expanding sales throughout the country. Wood-fuels marketed in Kampala are sourced from forest areas hundreds of kilometres from the town, and as these sources become depleted, it can be reasonably expected that more distant areas of the country will be used.

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 whether the Party involved wishes to be considered as project participant (yes/no)
Uganda	Impact Carbon (formerly as "Centre for Entrepreneurship in International Health and Development" (CEIHD))	Yes

A.4. Reference of applied methodology and standardized baseline

Gold Standard Methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" Version 1, 11/04/2011.

The first crediting period of the project followed the methodology approved in January 2008 by the Gold Standard Foundation entitled "Improved Cook-Stoves and Kitchen Regimes".

A.5. Crediting period of project activity

7 years, up to twice renewable
Ist crediting period = 01 April 2007 – 31st March 2014
IInd crediting period = 01 April 2014 – 31st March 2021

A.6. Contact information of responsible persons/entities

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SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

From the start of the project in January 2006 through today, this project continues to achieve significant results in three areas:

- Business development and growth of the local stove industry at all points of the supply chain through the Uganda Improved Stove (Ugastove) model:
  - manufacturing
  - record keeping
  - market development;
- Social, economic and environmental co-benefits to local communities; and
- Greenhouse gas emissions reductions.

Through carbon finance, the sale of the Project's improved cookstoves has steadily increased. In 2005, Project Partners[3] sold less than 10 residential charcoal stoves per day. In late 2010 and early 2011, Project Partners had steadily increased to selling an average of 75-100 stoves per day. In this current monitoring period, Project Partners sell an average of 3,205 charcoal stoves per month, or roughly 107 stoves per day—resulting in a total of 48,069 charcoal stoves sold. To date the project has distributed 456,878 charcoal stoves and 273 institutional wood stoves.[4]

Manufacturing

Project manufacturers continue to prioritize stove durability and quality. Kitchen Survey results show that the Uganda Improved Stove model is widely recognized by customers as a stove that is durable and saves charcoal. Quarterly Kitchen Surveys demonstrate that stove users report overwhelming satisfaction with project stove quality, only 1 out of 61 respondents from this monitoring period said that they would not recommend their project ICS to a friend. Usage surveys also demonstrate that stoves last for longer than projected in the PDD as stoves are still being used beyond age five. No new stove design changes have been implemented during this monitoring period.

Figure 2: Ugastove charcoal stove inventory

Ugastove's Makindye factory reached its kiln's maximum production capacity and has used carbon revenues to invest in a second kiln on-site. The new kiln has an operating capacity of 4,000 liners per firing and facilitates improved liner quality, production, and inventory management.

Figure 3: Ugastove kiln

Figure 4: EUF workers in front of factory

Ugasove also won the Uganda Manufacturers Award of Energy Exhibitors in 2013 and was featured in the October 7, 2013 edition of *The Daily Monitor* newspaper. The award is given to the company that best works to conserve Uganda's natural environment. Ugastove won primarily as a result of its strong charcoal stove sales in 2013 and 2014 and resulting carbon emission reductions.

[3] "Project Partners" refers to all entities (5) currently manufacturing and selling improved cookstoves and receiving assistance through this project. These partners are: Ugastove, SESSA, African Energy Stoves (AES), Energy Uganda Foundation (EUF), and Friends of Wealthy Environment (FOWE).

[4] There were no institutional wood ICS installed after July 2013. For this monitoring period the PP has decided not to claim the ERs for Institutional wood stoves, this is conservative.

EUF has completed the purchase of land that will become the new factory site. EUF is now exploring funding options including grants, private investment, and carbon financing to construct the factory. When complete it is expected to include machinery, significantly improved storage space, and a high capacity kiln.

Friends of Wealthy Environment, LTD (FOWE) opened two retail shops one in Kabalagala and Mengo to increase sales and stove accessibility.

Record Keeping and Business Systems

Reporting and recordkeeping continues to be clear, rigorous, and comprehensive. AES, EUF, FOWE, and SESSA continue to work with Traidlinks, a non-profit organization with the goal of helping businesses in Uganda improve operations and business practices. Traidlinks has been contracted to provide additional capacity building support to all manufacturing partners in preparation for future growth. Partners learn to hone skills in areas such as recordkeeping, financial management, and human resources.

With Traidlinks mentorship, EUF has developed comprehensive record keeping for stove sales, production, and finances. EUF is leveraging Traidlinks mentoring to develop its inventory tracking and planning. Through trainings with Traidlinks, SESSA has been able to utilize QuickBooks to track sales, production, and financial data. It has developed comprehensive inventory tracking in 2014. The Project continues to implement regular randomized Spot Checks to ensure recordkeeping quality and sales record conservativeness. CIRCODU performs quarterly spot checks on recordkeeping to ensure the various components are accurate and corroborate with one another.

Market Development

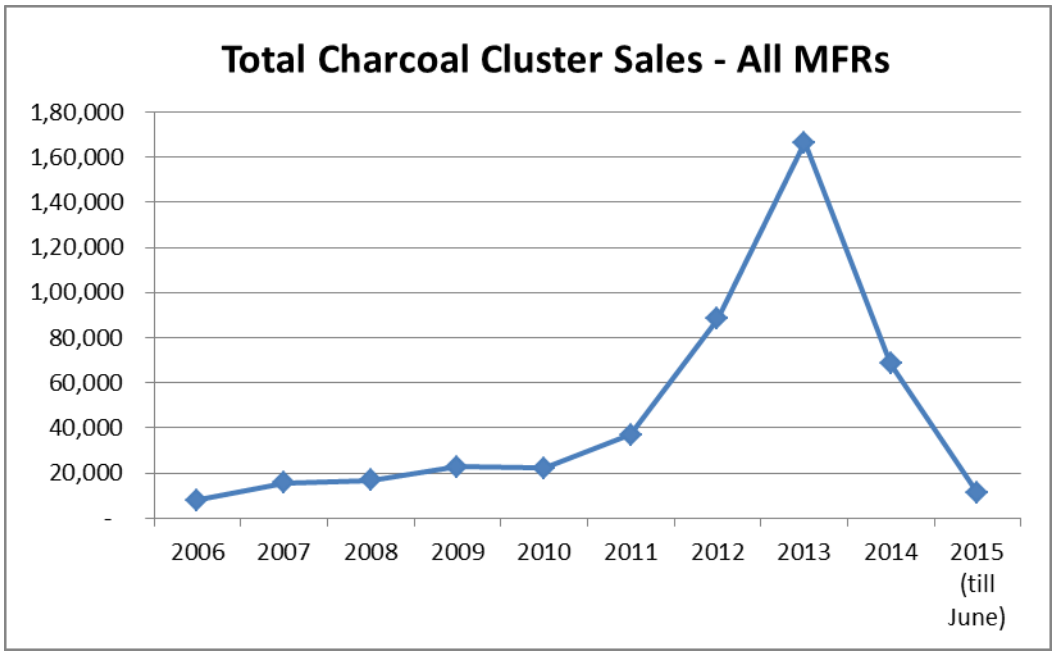


Figure 1: Charcoal ICS sales 2006-2015 (till June)

Impact Carbon has made improvements to its marketing and laid a strong marketing strategy foundation in 2014. Since July 2013 Impact Carbon's Uganda office has added nine staff

members to its sales, management, and office support teams in order to support GS447. These include a Partnership Coordinator, Product Manager, and Marketing Director.

Impact Carbon has seen continued distribution success through its partnerships. Living Goods has continued its stove purchasing for distribution throughout Uganda. Impact Carbon also worked closely with Living Goods to increase their stove prices to Impact Carbon's recommended retail prices in order to help improve market competitiveness of manufacturers. Through a project in Northern Uganda with Mercy Corps, Impact Carbon has reached a largely untouched improved cook stove market. The aim of the project is to create a self-sustaining stove distribution network throughout East Acholi.

Ugastove has adopted a new marketing strategy. Rather than sending trucks throughout Uganda, regional branches will be opened and serve as staging points for distribution. This shift is primarily due to the high costs and logistical challenges inherent with a traveling sales team and inventory. Branches have recently opened in Hoima, Mbale and Kasese.

EUF has developed an extensive new marketing strategy and capital investment. The approach is comparable to Ugastove's as it will leverage regional branches to bring efficiency to its regional stove distribution. Its capital investment plan is an exciting vision for company growth and East African expansion by 2020. EUF has also had success with a project recently launched in East Acholi, which is currently managed by Impact Carbon, but will eventually transition operations to EUF. EUF has contributed by finding creative means to drive down transportation costs, providing sales personnel for marketing events and radio talk shows.

Figure 6: SESSA Delivery Truck

SESSA has also formed a new marketing strategy, which will leverage regional outlets as replacements to mobile sales teams and inventories. SESSA already has experience with this model, through its outlet in Mbale. The next branch will open in Gulu in early 2014. In addition to changes in sales methodology, SESSA will begin including novel sales offers and free stove trials for end users in an effort to prove charcoal savings. SESSA has also developed an aggressive growth plan that projects financial and sales data through 2020. In a testament to its ability to achieve this plan, SESSA has purchased three new trucks in line with the schedule. The trucks will be used to support the sales and distribution of regional outlets.

Figure 7: New FOWE Kampala outlet

In the second half of 2014 AES primarily focused on improving sales and distribution through asset and partnership development. Through the purchase of the truck, AES has improved its marketing and distribution by expanding door to door sales and bulk order delivery to retailers in

regions beyond Kampala. The truck has also reduced distribution costs as AES no longer needs to use third party transportation. AES also formed a marketing team, which has the skill set to sell stoves door to door and recruit wholesale buyers.

FOWE has expanded its retail network by opening a new outlet in Kampala. The outlet is located in Kabalagala, a densely populated area frequented by a diverse collection of demographics. In addition to the new outlet, FOWE has purchased a truck, which allows the partner to expand household stove distribution in a more cost effective manner.

Co-Benefits

The Project continues to provide co-benefits to end users and their communities in addition to fuel savings and reduced indoor air pollution. These co-benefits are described below.

Job Creation and Capacity Building: Locally, the project continues to provide employment for significant numbers of artisans, office staff and field marketers. The Project currently employs more than 230 artisans. Project partners also employ nearly 50 operations, management and administration staff. The Project also supports over 1,000 retailers and other small enterprises who sell stoves by reducing the wholesale price at which they purchase the stoves, providing a steady supply stream and putting resources into marketing the stoves to increase demand. Impact Carbon continues to work with stove manufacturers as well as retailers and distributors to create a sustainable supply chain that benefits parties at all levels of the supply chain.

Livelihood of the Poor: The project's primary goal is to reach low-income families that normally cannot afford to purchase improved stoves. This project saves customers money in two phases: first, when they purchase the stove at a reduced price, and second when they continue to save money regularly on fuel. A major way in which this has been done previously is by subsidizing the manufacture and sale of high quality, long lasting and efficient stoves with carbon revenues wherein the project applies carbon revenues to operations, sales and marketing and production efforts in order to scale the business and reduce costs. These savings are directly passed on to the end user in the form of reduced prices, facilitating greater access to these stoves than would exist without carbon finance. The Project has not only done significant self-promotion of improved cookstoves, it has also developed partnerships with organizations who distribute the cookstoves to previously inaccessible regions such as Northern and Western Uganda. These partnerships have not only facilitated awareness of the importance of improved cooking, but have also provided access to areas that previously would not have had any opportunity to buy a stove.

Figure 8: Commercial stove user cooks local dish chapatti

Once a family owns a stove, reduced charcoal consumption and the subsequent financial savings are social benefits evident in this project. In Kampala, where low-income families spend as much as 15% of annual income on cooking fuels, the cost savings are immense: families using Uganda Improved Cookstoves, which reduce fuel use by 36% compared to traditional cooking methods, can save roughly US$100 per year.

The reduced charcoal consumption also introduces environmental benefits through minimized charcoal-production pressure on forest resources. In a country where more than 90% of the population cooks with biomass fuels,[5] scaling dissemination of high-efficiency cookstoves is a necessary part of the effort to mitigate deforestation trends.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

None

B.2.2. Corrections

For the calculation of Emission Reduction in this Monitoring Period the PP has chosen to use the default values of Emission Factor and NCV of Charcoal because all the HHs uses Charcoal as the fuel.

All parameters listed in the registered PD as ex-ante are for wood fuel. It was mentioned in the PD that "*A general trend of fuel mixture in the form of firewood and charcoal is observed across the country. Thus, the charcoal and wood fuels are quantified separately and subsequently combined into a unique fuel consumption value in the form of woody biomass using the charcoal conversion factor*".

Hereafter following values has been used for the calculation.

	As per registered PD	Value used in the MP	Rationale
NCV of Fuel that has been substituted	Wood = 15.6 TJ/Gg	Charcoal = 29.5 TJ/Gg[6]	As mentioned above the substitute fuel is charcoal. Hence value of charcoal is used.
CO_2 Emission Factor (Fuel Consumption)	Wood = 112,000 $kgCO_2$ / TJ	Charcoal = 112,000 $kgCO_2$ / TJ[7]	As mentioned above the substitute fuel is charcoal. Hence value of charcoal is used.
Non-CO_2 Emission Factor	Wood = 33,952.2 $kgCO_2$ / TJ	Charcoal = 9.886 $kgCO_2$ / TJ[8]	As mentioned above the substitute fuel is charcoal. Hence value of charcoal is used.
Emission Factor from Fuel Production	-	Charcoal = 1.802 $kgCO_2$ / kg of charcoal production[9]	Net EF can include a combination of emission factor from

[5] http://www.who.int/indoorair/publications/indoor_air_national_burden_estimate_revised.pdf

[6] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf (table 1.2)

[7] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf (table 1.4)

[8] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf (table2.9) - CH_4 EF for charcoal stoves is 330.5 {(275+386)/2} $kgCH_4$/TJ; hence CO_2eq EF for charcoal stoves is 8,262.5 (330.5*25) $kgCO_2$/TJ. N_2O EF for charcoal stoves is 5.45 {(1.6+9.3)/2} kgN_2O/TJ; hence CO_2eq EF for charcoal stoves is 1,624.1 (5.45*298) $kgCO_2$/TJ. Therefore total Non-CO_2 EF is 9,886.6 (8,262.5+1,624.1) $kgCO_2$/TJ.

			fuel production

B.2.3. Changes to start date of crediting period

As mentioned in the section C.1.1. of the registered PDD for the second crediting period, the start date of crediting period is April 1, 2014. The same is applied.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

No

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

No

B.2.6. Changes to project design of registered project activity

No

B.2.7. Types of changes specific to afforestation or reforestation project activity

Not Applicable

SECTION C. Description of monitoring system

A. Total Sales Record

Sales records are maintained continuously. Sales records provide a conservative record of sales. Sales records are first captured in paper form on warranty cards. Ugastove's records are kept in QuickBooks and exported to Excel format, whereas other manufacturing locations/partners making the same design enter sales directly into Excel. Sales are entered using paper records and are spot-checked internally by Impact Carbon's Business Development team. The sales record is used to create the Project Database, which re-organizes sales data into one spread sheet and tracks the quantity of stoves sold each day, by cluster.

The sales records are maintained by as per the Monitoring Methodology as mentioned in the methodology[10].

B. Project Database

[9] http://ehsdiv.sph.berkeley.edu/krsmith/publications/JGRPennise.pdf (table 6.a) {As per " Consolidated GHG database for the charcoal sector" (https://www.google.com/url?q=https://cdm.unfccc.int/methodologies/standard_base/GHDdatabase.xls&sa=U&ved=0ahUKEwj1kKms84_LAhXMV44KHWo-CCAQFggEMAA&client=internal-uds-cse&usg=AFQjCNHxfn6_0vdrn0E4c368OrOJgKUa1g). The emission of CO2 from 1 Kg of Charcoal Production is 6513 Grams. The value we are using here for the calculation is 1802 Grams and that is conservative.

[10] Page 22 of the methodology.

The PP updated the project database every month based on the sales records of all the technology. Due to criticality of the numbers, careful attention has been paid to accuracy of the sales records. Project Database is a conservative record of all stoves that have entered use, and a conservative estimation of the first day they entered use. The data in the Project Database is referred to as Data Variable: Stove Sales (ID#: 1) in the Project Design Document. The project database is used to measure Variable #1:

ID #	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived?	Comment
1	*Stove Sales*	*Sales Records*	*Number of stoves by type and size*	*M*	*Daily*	*All sales*	*Electronic and paper*	

Method of Collection

A comprehensive Project Database is kept electronically by Impact Carbon: this is "Complete Sales Record and Project Database". The database logs how many stoves of each type (sorted by cluster) entered use on each day. Impact Carbon maintains this file as a password protected excel document.

The Project Database is created from the Partners' Sales Records. The Makindye Factory's Sales Record logs sales in QuickBooks, whereas the other Project Factories use the aforementioned Excel-based tool. The files are password-protected and can only be accessed by the Director of Finance. On a monthly basis, the sales records are quality-checked internally for accuracy to catch any data entry errors. Partners then submit the electronic sales record at the end of each month, so these records can be checked against the sales totals that are submitted at the end of each quarter. Then the sales record is checked by Impact Carbon's Business Development Manager.

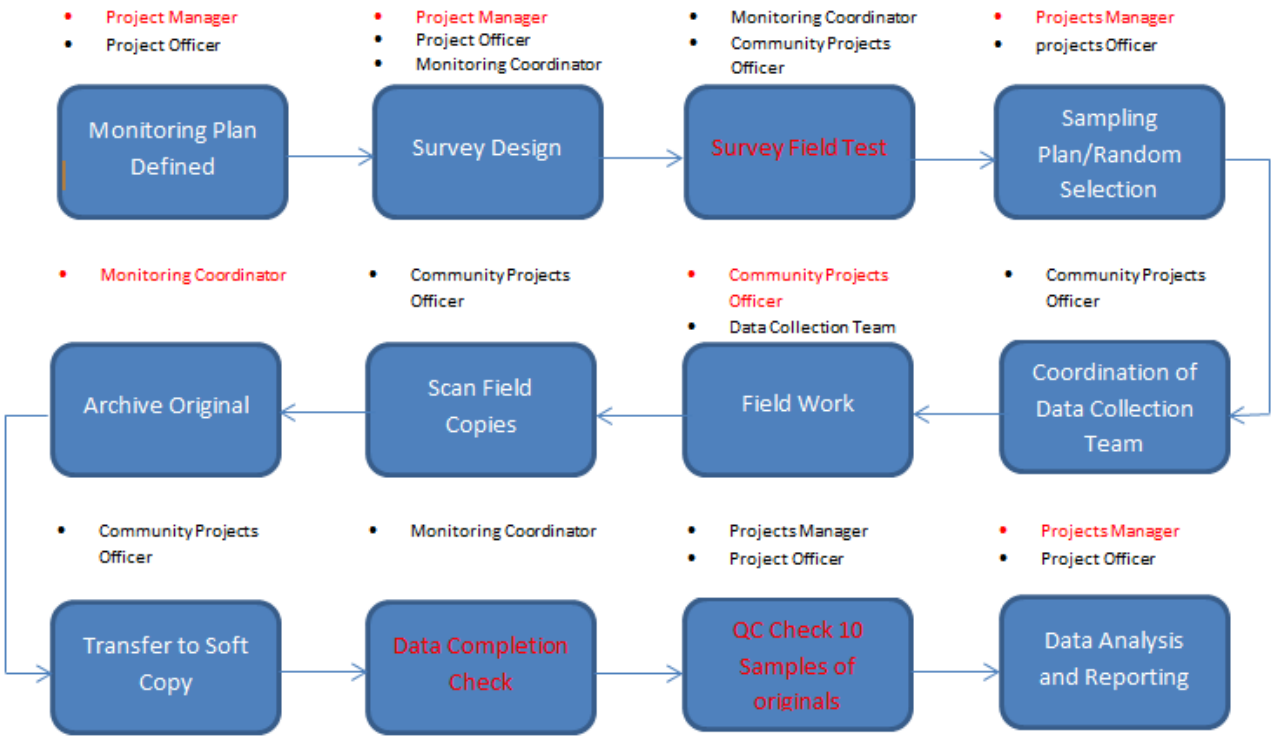
All paper invoices and receipts are saved to provide an additional cross-check. Partners provide a paper record of every stove sold, and any sale without a paper record is removed from the database. Many stoves that enter use are not counted, as receipts are lost, or sometimes not issued. This further ensures the conservativeness of the project database.

C. Monitoring Studies

The survey process is summarised by the flow diagram below, which shows the origin and transfer of data and the employee responsible for each phase. Items that are highlighted in red indicate a quality control point, which may be an actual process itself – or indicated by the manager or coordinator responsible for internal quality control. To aid in the comprehension of the flow diagram, the roles and responsibilities of each employee involved in the process are summarised below:

- Projects Manager - Programme management, Staff Training, Internal Quality Control, Defining Job Descriptions
- Carbon Projects Officer - Defining Parameters, Completion of Monitoring Plan, Coordinating Project Monitoring, Data quality check, Monitoring Analysis and Calculation, Training Host Country Staff, Producing Training Literature

- Monitoring Coordinator / Projects Development Coordinator - Coordinating Monitoring Programme, Data quality check, Reporting Data, Employee Training, Scanning Originals, Archiving Originals
- Data Collection Team - Gathering Field data (hard copy)



Data Management and Storage

The results of all Monitoring (Kitchen) Surveys (MKS's), Usage Surveys, Project Technology Days, and Kitchen Performance Tests (KPT's) are collated in excel spreadsheets and stored on a central server in an electronic format.

The documentation procedure that Impact Carbon has devised ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in our Uganda HQ (rather than being posted to the US).

All surveys are administered by trained Impact Carbon staff local to the area or fully trained temporary staff who are conversant in the local dialects to ensure that responses were consistent and not biased by any regional language barriers. Field staffs were provided with an English and local language version of the questionnaire to provide for the greatest possible standardisation of responses.

The MKS provides information regarding the ongoing relevance of Baseline KPT results and sustainable development indicators to the project scenario. All MKSs were carried out face to face. Data collected during an MKS contains the following type of data:

- General information - Name, address, telephone number etc
- Household socio-demographic information
- Cooking behaviour, fuel type & mix
- Sources of fuel, prices

The answer sheets completed in the field are returned to the Uganda office for transcribing into an excel spreadsheet. Once completed, the data is sent to the US office for analysis. As required by the applicable Gold Standard Methodology the MKS is conducted annually to capture any emerging trends.

Periodic Monitoring Task

The periodic monitoring tasks are as follow:

- Monitoring Kitchen Surveys are conducted annually to determine emerging trends in demographics, fuel use and sustainability indicators.
- Usage surveys are carried out annually.
- A project KPT will be also be carried out every two years to assess any changes in performance of the project stoves.
- New stove KPT will be carried out for new models if launched.
- Project Technology Days will be reviewed continuously throughout the project in order to determine the number of crediting stoves.
- Leakage estimates (identified in the PDD and possible new sources) will be surveyed every two years
- NRB fraction assessed by literature review every two years

All data recorded will be stored by the project proponents for a minimum of two years after the end of the crediting period or the last issuance of VERs, whichever occurs later.

SECTION D. Data and parameters

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

Data / Parameter:	$EF_{b,CO2}$
Unit:	kg CO_2/TJ
Description:	CO2 emission factor arising from use of fuels (wood or wood equivalents) in baseline scenario
Source data	IPCC defaults
Value(s) applied:	112,000
Choice of data or Measurement methods and procedures	Deemed valid by GS VER Methodology 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Purpose of data	Baseline emission calculations.
Additional comments	When EF is in units of tCO2/t_fuel, NCV term will be removed from emission calculations. Term can include a combination of emission factors from fuel production, transport, and use. Measuring emission factors from stove technologies is costly and difficult to do accurately. Lacking measurable emission factors from the project technologies, PP applies default IPCC emission values.

Data / Parameter:	$EF_{b,nonCO2}$
Unit:	kg CO2e/TJ

Description:	Non-CO2 emission factor arising from use of fuels (wood and wood equivalents) in baseline scenario
Source data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories IPCC 2007 4th Assessment report
Value(s) applied:	33,952.5
Choice of data or Measurement methods and procedures	Deemed valid by GS VER Methodology
Purpose of data	Baseline emission calculations.
Additional comments	*Term can include a combination of emission factors from fuel production, transport, and use.* Measuring emission factors from stove technologies is costly and difficult to do accurately. Lacking measurable emission factors from the project technologies, PP applies default IPCC emission values.

Data / Parameter:	$EF_{p,CO2}$
Unit:	kg CO2/TJ
Description:	CO2 emission factor arising from use of fuels (wood and wood equivalents) in project scenario
Source data	IPCC 2006 Guidelines for National Greenhouse gas Inventories
Value(s) applied:	112,000
Choice of data or Measurement methods and procedures	Deemed valid by GS VER Methodology
Purpose of data	Project emission calculations.
Additional comments	When EF is in units of tCO2/t_fuel, NCV term will be removed from emission calculations. Term can include a combination of emission factors from fuel production, transport, and use. Measuring emission factors from stove technologies is costly and difficult to do accurately. Lacking measurable emission factors from the project technologies, PP applies default IPCC emission values.

Data / Parameter:	$EF_{p,nonCO2}$
Unit:	kg CO2e/TJ
Description:	Non-CO2 emission factor arising from use of fuels (wood and wood equivalents) in project scenario
Source data	Options: IPCC defaults, credible published literature, project-relevant measurement reports, or project-specific field tests prior to first verification. Chosen:

	IPCC 2006 Guidelines for National Greenhouse gas Inventories IPCC 2007 4th Assessment report
Value(s) applied:	33952.5
Choice of data or Measurement methods and procedures	Deemed valid by GS VER Methodology
Purpose of data	Baseline emission calculations.
Additional comments	*Term can include a combination of emission factors from fuel production, transport, and use.* Measuring emission factors from stove technologies is costly and difficult to do accurately. Lacking measurable emission factors from the project technologies, PP applies default IPCC emission values.

Data / Parameter:	NCV_b
Unit:	TJ/Gg
Description:	Net calorific value of the fuel (wood and wood equivalents) used in the baseline
Source data	IPCC default value 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied:	15.6
Choice of data or Measurement methods and procedures	Adopt IPCC default values. Net Calorific Values were not measured in actual baseline, thus the project uses IPCC default values.
Purpose of data	Baseline emission calculations.
Additional comments	When EF is in units of tCO2/t_fuel, the NCV term will be removed from emission calculations.

Data / Parameter:	NCV_p
Unit:	TJ/Gg
Description:	Net calorific value of the fuel (wood and wood equivalents) used in the project
Source data	IPCC default value for wood. 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied:	15.6
Choice of data or Measurement methods and procedures	Adopt IPCC default values. Net Calorific Values were not measured in the project, thus the project uses IPCC default values.

Purpose of data	Project emission calculations
Additional comments	When EF is in units of tCO2/t_fuel, the NCV term will be removed from emission calculations.

Data / Parameter:	$f_{nrb,i,y}$
Unit:	Fractional non-renewability
Description:	Non-renewability status of woody biomass fuel in scenario i during year y
Source data	CDM default value (accepted by Ugandan DNA on 11 April 2012)
Value(s) applied:	0.82
Choice of data or Measurement methods and procedures	Option (b) chosen is deemed valid by the methodology: Adoption of the approach similar to CDM-approved methodology AMS II.G v02.
Purpose of data	Baseline emission calculations
Additional comments	

D.2. Data and parameters monitored

Data/parameter:	$P_{b,y}$
Unit	Kg/person-meal
Description	Quantity of fuel (Charcoal) that is consumed in baseline scenario b during year y
Measured/calculated/default	Calculated
Source of data	Baseline Field Test
Value(s) of monitored parameter	0.204 kg/person-meal
Monitoring equipment	Updated every two years, or more frequently
Measuring/reading/recording frequency:	Biennially
Calculation method (if applicable):	N.A
QA/QC procedures:	Baseline FTs are carried out by staff trained by Impact Carbon to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by Impact Carbon.
Purpose of data:	ER Calculation
Additional comments:	

Data/parameter:	$P_{p,y}$
Unit	Kg/person-meal
Description	Quantity of fuel that is consumed in project scenario b during year y

Measured/calculated/default	Calculated
Source of data	Project FT
Value(s) of monitored parameter	0.108 kg/person-meal
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Biennially – latest carried out in June, July 2015.
Calculation method (if applicable):	Analysing the survey data. For detailed calculation, please refer to excel sheet.
QA/QC procedures:	The scales are calibrated prior to each use by measuring against a known weight. The data is uploaded to the database and mean fuel savings are calculated accordingly.
Purpose of data:	ER Calculation
Additional comments:	FTs are carried out by staff trained by Impact Carbon to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by Impact Carbon.

Data/parameter:	$U_{b,y}$
Unit	Fraction
Description	Cumulative Usage rate for technologies in project scenario p in year y, based on cumulative adoption rate and drop off rate revealed by the usage surveys.
Measured/calculated/default	Calculated
Source of data	Usage Survey
Value(s) of monitored parameter	82.95 %
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	By doing survey and then analysing the survey. The detailed raw data of survey and analysis of survey has been submitted.
QA/QC procedures:	Usage Survey are carried out by staff trained by Impact Carbon to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by Impact Carbon.
Purpose of data:	ER Calculation
Additional comments:	

Data/parameter:	$N_{p,y}$
Unit	Project technologies credited (units)

Description	Technologies in the project database for project scenario p through monitoring period
Measured/calculated/default	Measured and Calculated
Source of data	Total Sales records
Value(s) of monitored parameter	Refer to sales databse
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Continuously
Calculation method (if applicable):	Cumulative amount of days each stove has credited for: number of stoves built on each month multiplied by the number of days accordingly. Stove sold in X month has been credited for 15 days of X month and 15 days of X+1 month for a fair assessment of the emission reduction.
QA/QC procedures:	Values can be cross checked by sales records.
Purpose of data:	ER Calculation
Additional comments:	

Data/parameter:	$LE_{p,y}$
Unit	t_CO_2e per year
Description	Leakage in project scenario p during year y
Measured/calculated/default	N.A.
Source of data	Mentioned in detail in section E.3 below.
Value(s) of monitored parameter	0
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Biannually
Calculation method (if applicable):	N.A.
QA/QC procedures:	N.A.
Purpose of data:	ER calculation
Additional comments:	No leakage was identified

Following parameters were not listed in the monitoring parameters in the PDD but have been monitored for the transparency of the calculation.

Data/parameter:	Person-meals/HH-day
Unit	Person-meals/HH-day
Description	Average number of person meal in a single household in one day
Measured/calculated/default	Calculated

Source of data	Project FT
Value(s) of monitored parameter	15.67
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Biennially – latest carried out in June, July 2015.
Calculation method (if applicable):	Analysing the survey data. For detailed calculation, please refer to KPT Analysis excel sheet.
QA/QC procedures:	The value used here is based on cumulative survey data. For the latest survey the value is 18 Person-meals/HH-day, but after analysing the latest data merging with the old data, the values comes out to be 15.67 Person-meals/HH-day. Using of 15.67 Person-meals/HH-day for calculation is hence conservative. It was assumed that each HH has only one stoves. HH found using more than one stove are removed as per Multi-ICS Usage Adjustment
Purpose of data:	ER Calculation
Additional comments:	FTs are carried out by staff trained by Impact Carbon to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by Impact Carbon.

Data/parameter:	Multi-ICS Usage Adjustment
Unit	Fraction
Description	Household who are using more than 1 project stoves
Measured/calculated/default	Calculated
Source of data	Usage Survey
Value(s) of monitored parameter	8.99%
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	Analysing the survey data. For detailed calculation, please refer to usage survey excel sheet.

QA/QC procedures:	The value used here is based on cumulative survey data. For the latest survey the value is 18 Person-meals/HH-day, but after analysing the latest data merging with the old data, the values comes out to be 15.67 Person-meals/HH-day. Using of 15.67 Person-meals/HH-day for calculation is hence conservative. It was assumed that each HH has only one stoves. HH found using more than one stove are removed as per Multi-ICS Usage Adjustment
Purpose of data:	ER Calculation
Additional comments:	FTs are carried out by staff trained by Impact Carbon to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by Impact Carbon.

Sustainability Indicators

The following sustainable development indicators have been monitored at different frequencies in line with the Gold Standard Passport.

No		**1**
Indicator		**Air quality**
Mitigation measure		None needed – The Project has a positive impact for this indicator.
Chosen parameter		Measurement of user perceptions for ICS - smoke levels, incidence of coughing, incidence of respiratory illness, and incidence of itchy eyes.
Current situation of parameter		All the households with ICS reports decrease in smoke levels, incidence of coughing, incidence of respiratory illness, and incidence of itchy eyes.
Estimation of baseline situation of parameter		Current situation will persist.
Future target for parameter		Project households will report reduced smoke levels, reduced incidence of coughing, reduced incidence of respiratory illness, reduced incidence of itchy eyes.
Way of monitoring	How	Kitchen Performance Tests & Kitchen Surveys
	When	At least every two years
	By who	Monitoring specialists to conduct surveys among end users.

The Kitchen Survey Report reveals that overall households have observed a reduction in the amount of charcoal they use and virtually all of them report less smoke since using the improved stoves. End users have report reduced symptoms of Indoor Air Pollution (IAP).
Hence it is clear that use of the stove results in a cleaner and healthier environment. **Positive**

No	**2**
Indicator	**Livelihood of the poor**
Mitigation measure	None needed – The Project has a positive impact for this indicator.
Chosen parameter	Money savings due to reduced fuel consumption
Current situation of parameter	Families purchasing charcoal report a significant percentage of monthly income going toward fuel.

Estimation of baseline situation of parameter		Current situation will persist. Increasing deforestation will result in shortages of non-renewable biomass, causing fuel prices and average time families spend gathering fuel to rise.
Future target for parameter		For families that purchase charcoal, access to efficient cookstoves will likely reduce fuel expenditures, resulting in more disposable income.
Way of monitoring	How	Kitchen Performance Tests & Kitchen Surveys
	When	At least every two years
	By who	Monitoring specialists to conduct surveys among end users.

The Project's improved charcoal stoves continue to increase the spending power of lower income Ugandans by reducing the amount families must spend on charcoal. With the increase in fuel prices, charcoal prices have increased significantly over the past years. Poor families are forced to devote ever larger portions of their income to fuel purchase. As per Survey, 56.07% users said that they notices a significantly decreased in fuel consumption, 33.64% respondents said that they noticed not significantly but little less consumption in fuel. The Monitoring KT estimates the average money saved from fuel savings after using ICS is around 153,450 UGX per year. As charcoal prices rise, fuel savings becomes increasingly more important. The average price per kilogram of charcoal has risen over the lifespan of this project:

- 2010: 401 shillings/kg
- 2011: 445 shillings/kg
- 2012: 701 shillings/kg
- 2013: 664 shilling/kg
- 2014: 702 shilling/kg[11] (assuming 5.7% inflation)

On average, for all stove sizes, customers realize even more than that, particularly for those who cook more often. As per survey, 67% of respondents who answered the question about how they use their financial savings said they use the savings to purchase necessities such as food, water, and clothes; 10% use it as school fees for the children; 7% do saving and 5% in other economic activities. **Positive**

No		**3**
Indicator		**Employment**
Mitigation measure		None needed – The Project has a positive impact for this indicator.
Chosen parameter		Employment Records
Current situation of parameter		Partners continue to hire and employ Ugandans in administrative, sales, production and management positions.
Estimation of baseline situation of parameter		In baseline the employees have to search for the employment.
Future target for parameter		Partners continue to hire and employ Ugandans in administrative, sales, production and management positions.
Way of monitoring	How	Partner Employees Records
	When	At least every two years
	By who	Project Participant

As Manufacturing Partners grows, they continue to hire and employ Ugandans in administrative, sales, production and management positions. Refer to Annex 05 for employment information. In addition, artisan training has allowed other stove entrepreneurs to open workshops: there are

[11] https://www.bou.or.ug/bou/bou-downloads/press_releases/2014/Nov/Consumer-Price-Index-November-2014.pdf

several other stove manufacturers in Kampala who have opened their own businesses after being an apprentice at Ugastove. Finally, the livelihood of stove retailers also improves by an increased margin of stove sales. Partners currently have a network of more than 1,000 retailers. The jobs and emissions reductions generated by the improved stoves of other workshops were supported by carbon finance.

No		**4**
Indicator		**Access to affordable and clean energy services**
Mitigation measure		None needed – The Project has a positive impact for this indicator.
Chosen parameter		Number of households and institutions reached with clean energy products through activity.
Current situation of parameter		Most households are reliant on traditional inefficient cooking technologies.
Estimation of baseline situation of parameter		Current situation will persist.
Future target for parameter		Project households and institutions will adopt ICS.
Way of monitoring	How	This will be tracked through Impact Carbon's customer database.
	When	Tracked on-going at time of distribution
	By who	Field-level project partners

Impact Carbon monitors the access that Project Stoves provide for Ugandans to efficient energy technologies through sales records. In this Monitoring Period, Project Partners sell an average of more than 3,205 stoves per month, roughly 107 stoves per day. The sales record is cross-checked on a quarterly basis with production, inventory and labour records. Additionally, about all the of Kitchen Survey respondents, report that it is easier for them to meet their household energy needs with their project stove. Furthermore, as demonstrated earlier, the stove reduces charcoal cnsumption and therefore smoke generation. The charcoal saving also translates into increase saving. **Positive**

No		**5**
Indicator		**Human and institutional capacity**
Mitigation measure		None needed – The Project has a positive impact for this indicator.
Chosen parameter		The number of local jobs created directly and indirectly due to the program activity and skill level.
Current situation of parameter		Employees are continuously increasing and their skills are improving in respective field.
Estimation of baseline situation of parameter		According to the 2012 International labor Organization, the national unemployment rate in Uganda is 5.1%.[12]. This unemployment situation will persist.
Future target for parameter		The project will provide local employment opportunities associated with education, distribution, installation, and monitoring.
Way of monitoring	How	The number of people employed directly by the project and quality of work by employees monitored.
	When	At least every two years
	By who	Project Participant

[12] http://www.brookings.edu/blogs/africa-in-focus/posts/2014/08/26-youth-unemployment-uganda-ahaibwe-mbowa

Using carbon financing, Uganda Improved Cookstoves manufacturers continue to invest in trainings that build human and institutional capacity, such as internal control systems, accounting systems, and improved manufacturing systems.

Partners employ a set of recordkeeping techniques recommended by CIRCODU and Impact Carbon's business development team. Over time, partners' recordkeeping becomes increasingly robust, as the companies develop streamlined templates to track production, sales, inventory, labor and purchase of raw materials – both for carbon purposes as well as business development. This includes the comprehensive sales tracking system as well as the introduction of a serial pilot program, referenced earlier in the report.

Staff Training: Partners have facilitated professional development opportunities for management staff, such as a Human Resources training course for upper management and QuickBooks training events for the finance department, including data entry staff. Refer to Annex 06- Audit. **Positive**

No		**6**
Indicator		**Technological self-reliance**
Mitigation measure		None needed – The Project has a positive impact for this indicator.
Chosen parameter		Achievement
Current situation of parameter		Manufacturing Partners continue to innovate and improve stove technology in Uganda through research and development operations.
Estimation of baseline situation of parameter		No learning about the stoves use of baseline stoves
Future target for parameter		Impact Carbon's Team continues to work with partners on improving the stoves.
Way of monitoring	How	By Adaption of new stoves by the community
	When	At least every two years
	By who	Project Participant

Manufacturing Partners continue to innovate and improve stove technology in Uganda through research and development operations. This includes continuous feedback from end-users, retailors, sales personals and Impact Carbon team. These research helps manufacturers in developing on more robust, lower cost stoves and analyse different requirements like stove walls, the opening for the fuel and fir ash removal. The current Ugastove design is the result of research on stove design, efficiency, and patterns of usage actively monitored and improved continuously. The current stove is a portable improved burning stove consisting of an hour-glass shaped metal cladding with an interior ceramic liner that is perforated to permit the ash to fall to the collection box at the base. A thin layer of vermiculite or cement is placed between the cladding and the liner. A single pot is placed on the rests at the top of the stove.

Impact Carbon's Business Development Team continues to work with partners on recordkeeping and market development. The Makindye factory has also trained many stove builders in Kampala, many of whom are now replicating the design and are included in this project credited in the same cluster. **Positive**

D.3. Implementation of sampling plan

The parameters above have been monitored through a Random Sample Group (RSG). The size of the sample group will be selected to ensure the parameters measured satisfy 90/30 precision (90% confidence interval and 30% margin of error), according to the methodology (p.13).

Due to large number of technologies, huge distribution area and many number of years coupled with the project increases difficulty for sampling also it is not economically feasible to conduct a random sampling on all the geographical area. Till this monitoring period, a total of 456,878 project stoves were sold from 2006. Along with sales channel, purchase location, quantity, and the date of purchase details which are kept for each sale in the Complete Sales Record, further contact details are compiled for a subset of household stove customers in a Customer Sampling Record. The Customer Sampling Record is used for customer follow-up and sampling for monitoring surveys. The Customer Sampling Record is a paper file of returned warranty cards kept in the manufacturer's office. The cards are included when a Uganda Improved Cookstove is sold. As with all warranty cards, a percentage of cards are returned to the manufacturers' offices and filed. For direct sales to end-users, manufacturers collect cards directly.

The customer sampling record continues to grow due to prioritized customer tracking. These customers are distributed all throughout Kampala and neighbouring sales areas and are sufficient for random sample selections for the monitoring activities.

7 different Parish/Zone were randomly selected from the database and the trained Impact Carbon Staff visited randomly to the houses to do the survey if they are using the project stoves.

Monitoring (Kitchen) Survey

The Gold Standard Methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption V.01' states that monitoring surveys should be carried out annually, beginning one year after project registration. The monitoring survey has the same sample size requirements as the baseline survey;

Group size<300: Minimum size 30 or population size, whichever smaller
Group size 300-1000: Minimum sample size 10% of group size
Group size>1000: Minimum sample size 100

MKS respondents were selected as mentioned above. All the interviews were conducted face-to-face in the respondent's home. Responses are then analysed based on averages, allowing population trends to be established and reported on. A total of 109 surveys were conducted, out of which two were identified as outliers and hence 107 surveys has been used for the results.

Kitchen Performance Test- Project Stove

Prior to the KPT analysis, outliers were examined to check for potential mistakes in data recording. Two outliers greater than 1.5 times the IQR from the third quartile (10.7) were found in the survey. Both of the outlier were removed from the sample as there appeared to have been an error in data collection/recording.

In order to fulfil the precision requirements of 90/10 of the methodology for an 'Independent' sample and in view of the variability of the fuel consumption data reported, over 107 HHs were enrolled for the kitchen performance test.

Applying 90/10 Precision rule on test results	
n	107
Avg	0.108
Median	0.10
Std. Dev.	0.04
90% Confidence Interval (2-sided)	0.01
Lower 90% (2-sided)	0.10
Precision (2-sided)	5.6%

90/10 Rule Met?	YES

Kitchen Performance Test- Baseline Stove

Quantity of fuel wood that is consumed in the baseline scenario during the monitoring period has been examined by the Baseline Field Test. As this is the first issuance of the crediting period 2, the PP conducted KPT on the baseline stoves. A total of 127 surveys were conducted. Prior to the analysis, outliers were examined to check for potential mistakes in data recording. Eight outliers were identified which were not in the range of 1.5 times the IQR from the first and third quartile.

In order to fulfil the precision requirements of 90/10 of the methodology for an 'Independent' sample and in view of the variability of the fuel consumption data reported, over 119 HHs were enrolled for the Baseline KPT.

Applying 90/10 Precision rule on test results	
n	119
Avg	0.204
Median	0.20
Std. Dev.	0.05
90% Confidence Interval (2-sided)	0.01
Lower 90% (2-sided)	0.20
Precision (2-sided)	4.6%
90/10 Rule Met?	YES

Usage Survey

As stipulated in the Methodology a Usage Survey needs to be conducted on a minimum sample size of 100, with at least 30 samples for project technologies of each age being credited. As the stoves were built over the course of 9 years (2006-07 to 2014-15), 30 stoves from each age were tried to include in the survey and then the cumulative (resulting) usage parameter is weighted based on the proportion of technologies in the total sales records of each age.

To ensure conservativeness, participants in a usage survey with technologies in the first year of use (age0- 1) have technologies that have been in use on average longer than 0.5 years i.e from 0.5 years to 1.5 Years and so on.

Usage Survey was conducted on 267 Households (respondents) with total of 286 stoves (2006 to 2014) as some houses have more than 1 stove. The beak-up of stoves according to vintage is shown below:

S. No.	Age	Vintage	Stoves in Survey
1	$Age_{0\ 1}$	2014	43
2	$Age_{1\ 2}$	2013	46
3	$Age_{2\ 3}$	2012	41
4	Age_{3_4}	2011	31
5	$Age_{4\ 5}$	2010	43
6	$Age_{5\ 6}$	2009	36
7	$Age_{6\ 7}$	2008	23
8	$Age_{7\ 8}$	2007	13
9	$Age_{8\ 9}$	2006	10

			286

As for Age_{6_7}, Age_{7_8} and Age_{8_9}, the total number of samples does not include 30 samples for each so being conservative PP has added the remaining number assuming all are not in use. So for calculation the figures are as follow:

S. No.	Age	Vintage	Stoves in Survey	Not in use	Usage %
1	$Age_{0\ 1}$	2014	43	1	98%
2	$Age_{1\ 2}$	2013	46	5	89%
3	$Age_{2\ 3}$	2012	41	7	83%
4	$Age_{3\ 4}$	2011	31	6	81%
5	$Age_{4\ 5}$	2010	43	5	88%
6	$Age_{5\ 6}$	2009	36	11	69%
7	$Age_{6\ 7}$	2008	23+7 = 30	4+7 = 11	63%
8	$Age_{7\ 8}$	2007	13 + 17 = 30	5 + 17 = 22	27%
9	$Age_{8\ 9}$	2006	10 + 20 = 30	6 + 20 = 26	13%
			286 +44 = 330	50+44 = 94	

Weighted Usage as proportionate to sales:

S. No.	Vintage	Sales	Weighted Sales	Usage %	Weighted Usage
1	2014	68,630	15.03%	98%	15.03%
2	2013	166,680	37.38%	89%	33.32%
3	2012	88,465	19.84%	83%	16.45%
4	2011	36,819	8.26%	81%	6.66%
5	2010	22,030	4.94%	88%	4.37%
6	2009	22,791	5.11%	69%	3.55%
7	2008	16,906	3.79%	63%	2.40%
8	2007	16,624	3.50%	27%	0.93%
9	2006	7,984	1.79%	13%	024%
Total		**445,929**	**100%**		**82.95%**

Kindly refer to Usage Survey excel sheet for detailed calculation

SECTION E. Calculation of emission reductions or GHG removals by sinks

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

As the baseline fuel and the project fuel are the same and the baseline emission factor and project emission factor are considered the same, the overall GHG reductions achieved by the project activity is calculated using equation 1 of the methodology (provided in sec. E.4.) and baseline emissions are not calculated separately.

Actual ER calculations are based on the fuel savings figure derived from the Kitchen Performance tests.

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

As the baseline fuel and the project fuel are the same and the baseline emission factor and project emission factor are considered the same, the overall GHG reductions achieved by the project activity is calculated using equation 1 of the methodology (provided in sec. E.4.) and project emissions are not calculated separately.

Actual ER calculations are based on the fuel savings figure derived from the Kitchen Performance tests.

E.3. Calculation of leakage

The potential sources of leakage listed in the methodology and PDD are investigated, and addressed below:

a) *The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.*

   In all cases the traditional stoves replaced are three rocks; these have no market value and are not a product as such. There is nothing limiting the use of three stone cooking across the country (technology is lowest, price is zero), which is why this cooking method is so widespread. This leakage source can therefore be discounted.

b) *The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.*

   There is no evidence to suggest significant use of renewable energy for cooking as found in the Kitchen Survey. As solar ovens are not available, renewable energy use for cooking would likely be use of animal dung or crop residues which will be used due to ease of availability/proximity to the home rather than due to a shortage of wood fuel, therefore being an independent factor. This leakage source can therefore be discounted.

c) *The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario.*

   The NRB fraction will be periodically monitored. The participant are the users who uses charcoal as fuel in the stove and therefore the NRB is not expected to be affected in other areas. Although there are registered PoAs comprising the whole of Uganda as the project boundary, the NRB has been reassessed and no significant changes were found. The fNRB remains at 0.82.

d) *The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.*

   The climate throughout Uganda is temperate to hot. There is very little space heating by stoves in the population. No evidence exists that the project will result in increased fuel use for heating from inefficient stoves. Even if this condition changes, and some homes required residential heating, the project stoves are capable of providing heat from the combustion chamber, as well as from residual heat captured in the liner post-combustion. Thus, project ICS may in fact act as more efficient heat sources than traditional cook stoves. The scarcity and/or cost of fuel is an additional incentive to not use multiple stoves for heating–thus reducing the likelihood that space heating is compensated by inefficient stoves.

e) *By virtue of promotion and marketing of a new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.*

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period
Total	Not Applicable	Not Applicable	Not Applicable	980,920

In line with the Gold Standard Methodology 'Energy Efficiency – Technologies and Practices to Displace Decentralized Thermal Energy Consumption V.01' baseline and project emissions are only used for ex-ante ER estimation (see Methodology p.17) and are therefore not applicable. Actual ER calculations are based on fuel savings of the specific project technology against the baseline technology, as derived from the Kitchen Performance tests. As explained in section E.3. no leakage has been detected.

Equation used for the calculation of emissions in line with Gold Standard Methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption' v.1.0:

$$ERy = \Sigma_{b,p} (N_{p,y} * U_{p,y} * P_{p,b,i,y} * NCV_{b,fuel} * (f_{NRB,b,y} * EF_{fuel,CO2} + EF_{fuel,nonCO2})) - \Sigma LE_{p,y}$$

Parameter	Description	Method	Value
$\Sigma_{b,p}$	The sum over all relevant (baseline b/project p) couples.	In the case of this Project there was only one baseline/project scenario.	-
$N_{p,y}$	Cumulative number of Project Technology Days	For detailed calculation, please refer to Sales database and ER Sheet	See Section D.2.
$U_{p,y}$	Cumulative Usage rate for technologies in the project scenario p in year y based on cumulative adoption rate and drop off rate	Usage Survey	82.95%
$P_{p,b,i,y}$	Specific fuel savings for an individual technology of the project against an individual technology in the baseline in tons/day.	Derived from KPTs and baseline data.	0.001496 Ton/HH/day
$NCV_{b,fuel}$	Net calorific value of the fuel that is substituted or reduced	IPP default value for Charcoal	0.0295 TJ/Ton
$f_{NRB,b,y}$	Non renewability status of woody biomass fuel in scenario i during year y.	From registered PDD and latest value from CDM EB	0.82
$EF_{fuel,CO2}$	CO_2 emission factor arising from use of fuels in baseline scenario	From IPCC and Pennise in JGR 2001, table 6a	173.08 tCO_2/TJ
$EF_{fuel,nonCO2}$	Non CO2 emission	From IPCC and	9.886 tCO_2/TJ

	factor arising from use of fuels in baseline scenario	Pennise in JGR 2001, table 6a	
$LE_{p,y}$	Leakage for project scenario in year y	As defined in the PDD	0

N(p,y) (the number of Project Technology Days) was determined by calculating the cumulative number of crediting days of all stoves during this monitoring period. For the fair assessment, stove sold in X month are credited for 15 days of X month and 15 days for X+1 months.

Being conservative, we have used one more factor "Multi-ICS Usage Adjustment". This is for the Households which are using more than 1 stove. PP has calculated that factor during the Usage Survey. If the HH is using more than 1 stove at a time then that stove has been removed from the crediting. In this MR, this figure is 8.99%. To calculate the final Project Technology Days, PP has multiplies the Operation Stove Days with 91.01% (1-8.99%). For detailed calculation please refer to Usage Survey and ER Calculation Sheet.

Dates	Project Technology Days	Emission Reduction
1-Apr-14 to 30-Apr-14	10,479,970	58,241
1-May-14 to 31-May-14	11,162,457	62,033
1-Jun-14 to 30-Jun-14	11,053,961	61,430
1-Jul-14 to 31-Jul-14	11,610,184	64,522
1-Aug-14 to 31-Aug-14	11,743,538	65,263
1-Sep-14 to 30-Sep-14	11,468,838	63,736
1-Oct-14 to 31-Oct-14	11,952,079	66,422
1-Nov-14 to 30-Nov-14	11,666,867	64,837
1-Dec-14 to 31-Dec-14	12,167,627	67,619
1-Jan-15 to 31-Jan-15	12,257,345	68,118
1-Feb-15 to 28-Feb-15	11,169,363	62,072
1-Mar-15 to 31-Mar-15	12,512,311	69,535
1-Apr-15 to 30-Apr-15	12,219,961	67,910
1-May-15 to 31-May-15	12,700,351	70,580
1-Jun-15 to 30-Jun-15	12,344,463	68,602
Total		**980,920**

The table below shows the ERs generated during each year of the monitoring period.

Vintage	Emission Reduction
2014	574,103
2015	406,817
Total	**980,920**

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

Item	Values estimated in ex ante calculation of registered PD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	455,830[13]	980,920

E.6. Remarks on difference from estimated value in registered PD

The actual emission reductions are higher as compared to ex-ante calculation on the registered PD. It is because in the registered PD, the emission reductions are calculated only on the operational units which would have been sold in that particular monitoring period only. While in actual the the emission reductions are calculated for all the operational units which were sold from date of operation i.e. January 2006. The usage for historical sales is quite good that leads to increase in number of operational units and hence number of emission reductions.

[13] 262,701 (for 2014) and 193,129 (for 2015). 386,257 (for 2015)tCO_2e , yearly emission reductions in the registered PD was recalculated by half-yearly, resulting in 193,129 tCO_2e for this monitoring. (1386,257 tCO_2 ×6/12 = 193,129 tCO_2e

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Impact Carbon
Street/P.O. Box	47 Kearny Street
Building	Suite 600
City	San Francisco
State/region	California
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Country	United States
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Appendix 2. Forward Action Requests

Table below outlines the forward action requests (FARs) issued from project validation as well as PP actions fulfilled this issuance period to meet these requests.

FAR #	Repeat Assessment	Description	PP Comment
1 (From last issuance – CP1)	Yes	The PP shall revise the monitoring plan for Air Quality indicator to include questions to explore the effects of carbon monoxide exposure on the kitchen survey.	The PP has revised the kitchen survey and included direct question of risks related to CO poisoning. It included asking incidences of Headache, Weakness, Vomiting, Dizziness, Difficulty breathing and Nausea. A total 94.39% HH responded decreasing of incidence related to CO poisoning.