Monitoring report form
(Version 05.1)

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

MONITORING REPORT		
Title of the project activity	IMPROVED JIKOS – BETTER LIVING FOR RURAL POPULATION	
UNFCCC reference number of the project activity	GS2457	
Version number of the monitoring report	1.4	
Completion date of the monitoring report	13/10/2016	
Monitoring period number and duration of this monitoring period	First Monitoring Period: Monitoring Period Duration: 2 years 01/01/2014-31/12/2015	
Project participant(s)	Fastenopfer	
Host Party	Kenya	
Sectoral scope(s)	energy demand	
Selected methodology(ies)	Gold Standard methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption (11/04/2011)	
Selected standardized baseline(s)	N.A.	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	21,205 tCO2e	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0	3,681 tCO2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>The project is the construction of efficient cook stoves to replace inefficient 3-stone fires in rural communities in Nyeri, Kitui, Machakos and Laikipia Counties, Kenya. This measure results in savings of unsustainably harvested firewood thereby reducing GHG emissions from thermal energy consumption. The project is supervised by Fastenopfer, a charitable foundation in accordance with Swiss law, and implemented by local partner organisations (see charter below in section A.1).

During the first crediting period of seven years the project plans to install approximately 41,100 efficient cook stoves. This results in total GHG emission reductions of around 301,724t CO_2 equivalent. The average annual emission reduction amounts to 43,103t CO_2 equivalent.

>>The project installs efficient cook stoves in households currently using a 3-stone open fire for cooking. The project technology employed is a brick-type rocket stove for cooking, which is made using local bricks, mud, water, cement and sand. Construction is done onsite and the materials are sourced within the vicinity of the households/homes. The stove is fixed and installed in households.

>> Relevant dates for the project activity:
Start date of the project: 20/09/2013
Date of first stove construction: 20/09/2013
Start date of the crediting period: 01/01/2014
First crediting period: 01/01/2014-31/12/2015
Date of registration: 19/05/2015
Project is in continuous operations.

In the first crediting period the following amount of tCO2e was achieved: 3681 tCO2e

A.2. Location of project activity

(1) Host Party(ies)

>>Republic of Kenya

(2) Region/State/Province etc.

>>Nyeri, Kitui, Machakos and Laikipia Counties

(3) City/Town/Community etc.

>>Rural Communities in the County of Kitui, Nyeri, Machakos and Laikipia

(4) Physical/Geographical location

Kitui County is situated in the Eastern Province of Kenya. The County's principal town, Kitui town, is located at1° 22' 0" South, 38° 1' 0" East.
Nyeri is located in the Central Province. The geographic coordinates of Nyeri, the principal town in the County, are 0° 25' 0" South, 36° 57' 0" East.
Machakos County is organized in 12 districts, it spreads out over 6208 km^2. Machakos, the principal town of Machakos County is located at 1° 131 0″ South, 37° 16′ 0″ East.
Laikipia, is a county in Central Kenya and its principal town, Rumuruti, located at 0° 19′ 0″ North, 36° 30′ 0″ East.

Map 1: Map of Kenya with the locations of the targeted counties (Nyeri, Kitui, Machakos and Laikipia) defining the project area. Source: https://opendata.go.ke/facet/counties, last accessed 4.12.2013

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)
Switzerland (Annex 1)	Private entity: Fastenopfer	No
Republic of Kenya (Host)	Private entity: Fastenopfer	No

A.4. Reference of applied methodology and standardized baseline

>>

The Gold Standard methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption (11/04/2011) was applied.
The reference site is: http://www.goldstandard.org/resources/energy-requirements

A.5. Crediting period of project activity

This is the first crediting period. A crediting period of 7 years with the option of renewal is chosen for the project activity.
Start date of the crediting period: 01/01/2014

A.6. Contact information of responsible persons/entities

David Knecht, Fastenopfer: Project participant as in Appendix 1
knecht@fastenopfer.ch

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

>>
Start date of operations: 20 October, 2013
Actual Operations: The project continuously installs efficient cook stoves in households currently using a 3-stone open fire for cooking. The project technology employed is a brick-type rocket stove for cooking, which is made using local bricks, mud, water, cement and sand. Construction is done onsite and the materials are sourced within the vicinity of the households/homes. The stove is fixed and installed in households. Since the start of project implementation a total of 1,692 project stoves have been installed. In this way the project could provide clean and efficient cooking to 7,583 people.

Table 1: Annual stove installations

Year	Number of stoves
2013	231
2014	812
2015	649
Total	1692

Figure 1: Rocket Stove

Furthermore, the project trained 105 artisans in efficient stove construction and conducted awareness and education events on efficient cooking and climate change.

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

>> none

B.2.3. Changes to start date of crediting period

>> none

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

>> none

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

>> none

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

>> none

B.2.7. Discussion of Forward Action Requuests

Verification FAR #1 is stated as: *"Forward Action Request # 1: The PP shall follow the 'Guideline On The Application Of Materiality In Verifications' (EB 69 Report Annex 6) in order to determine the project emission shall be accounted or not. The Verifying DOE shall provide its opinion in the verification report how these guidelines have been applied correctly."*

As confirmed by GS the applicable threshold for project emissions is 5% (as per meth. page 34). Based on this methodology we have assessed the emissions from production and transportation of bricks as suggested by Validation FAR #4 and FAR #5 of the LSC-Report Feedback by GS (p.9). We have found that the production emissions of brick production and transportation account for 1.34% if CO2 savings generated by a project stove. This value is below 5% and thus we conclude that emissions are negligible. Supporting documents are included (*150609_ER_estimation_GS2457_V3_FAR.xlsx).*

Verification FAR #2 is stated as: *"Forward Action Request #2: On time for the verification, the PP shall carry out additional surveys to meet the minimum sample size requirement according whole population of ICS. The Baseline surveys shall be carry out in the households without the project technology."*

The same has been addressed as follows. The initial baseline survey produced 79 usable data points (surveys). During registration GS pointed out that a minimum of 100 surveys is needed and raised the "Verification FAR #2". In order to proceed with project registration, the team has agreed to include an additional 21 datapoints so that the requested sample size of 100 is matched. The additional 21 surveys have been carried out in time for the monitoring report. The new baseline values will be used henceforth. The BS/PS Report and the PDD have been modified in this respect. Results are displayed in the following documents:

- *Amended_BS_PS_Report_20151204.docx*
- *160118_BS_PS_Report_GS2457_V2.docx*

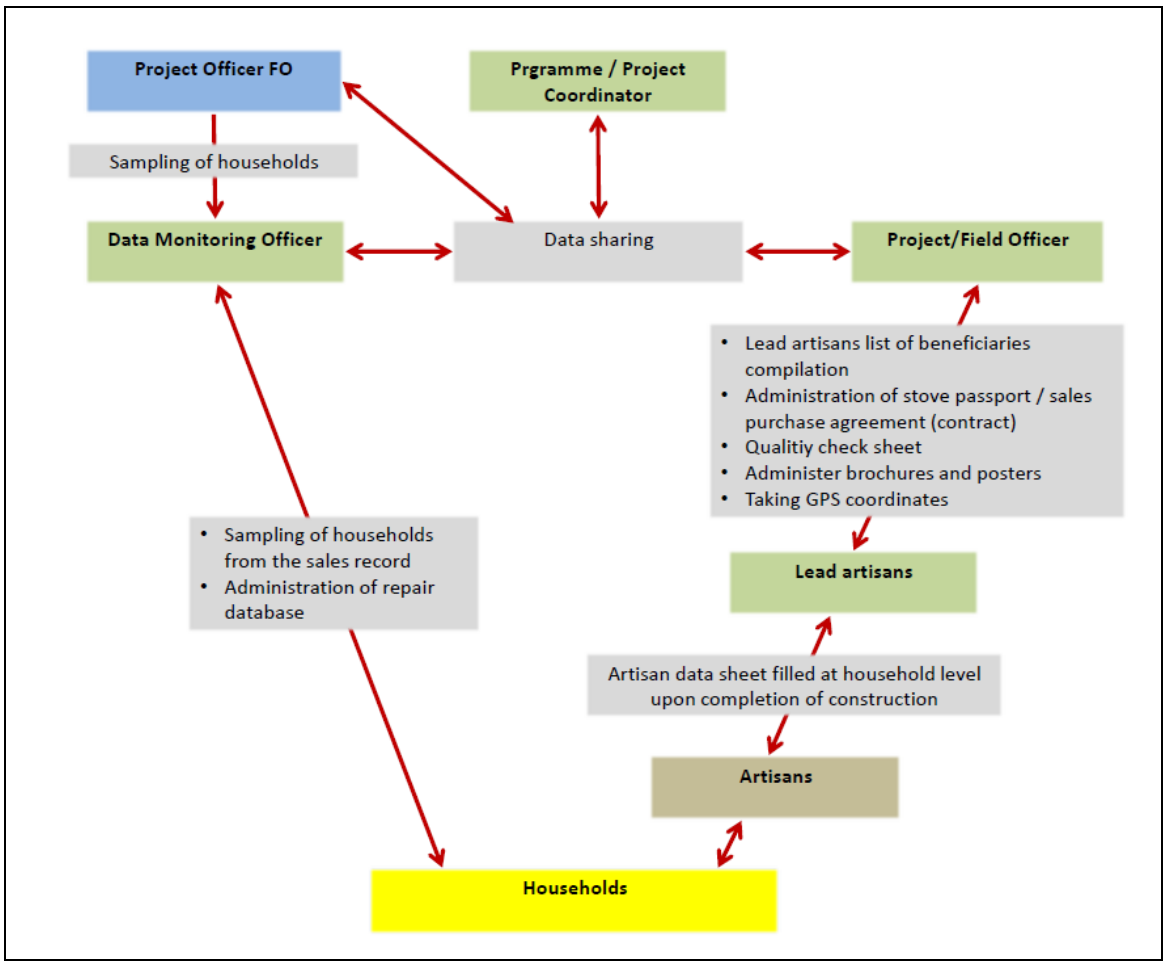
Validation FAR B3 is stated as: "*Documentation about the stakeholders project launch meeting in Machakos and/or Laikipia shall be submitted to GS once available. The DOE shall assess this documentation accordingly during validation (provided that it is available until the end of the validation process)."* And also: *"[…] to be checked at the time of first periodic verification."*

The project has not yet expanded into the said project areas. Thus, no additional project launch meetings were held.

SECTION C. Description of monitoring system

>>

A detailed description of the monitoring system can be found in the latest version of the Monitoring Manual provided as a separate document. This includes roles and responsibilities, organizational structure, etc.



The following project staff is involved in monitoring activities:

Switzerland:

Name	Job Title	Monitoring Activity	Qualification
Benno Steffen	Program Coordinator Fastenopfer	- Approval of official Monitoring reports	Master in Geography Certificate of Advanced Studies in Management of Development Projects
David Knecht	Project Officer Fastenopfer	- Supervision of national database - Data analysis of project surveys - Data analysis of kitchen performance tests	B.A. in International Relations Master in International Economics

Kitui:

Name	Job Title	Monitoring Activity	Qualification
Peninah Mwende	Project Coordinator	- Supervision of project surveys - Supervision of kitchen performance test - Database accuracy cross check	B.A. in Agro forestry and Rural development. Experience in data management.
Benson K. Muyanga	Data Monitoring Officer	- In charge of project survey - In charge of kitchen performance test - In charge of regional database - In charge of storage quality control -Involved in stove quality control	BA Sociology and communication, Diploma in community development

Charles Mulinge	Lead artisan	- Involved in stove quality assurance - Involved in project survey and kitchen performance test	Experience in stove construction and masonry
Berrita Mainge	Lead artisan	- Involved in stove quality assurance - Involved in project survey and kitchen performance test	Experience in stove construction and masonry
David Mulatya	Lead Artisan	- Involved in stove quality assurance - Involved in project survey and kitchen performance test	Experience in stove construction and masonry

Nyeri:

Name	Job Title	Monitoring Activity	Qualification
Simon Wanjohi	Program Coordinator	- Supervision of project surveys - Supervision of kitchen performance test	HDIP In Modern Management and Administration. 20 years experience in program management and administration.
Caroline Kagiri	Project Officer	- In charge of stove quality control - Involved in project survey & kitchen performance test	B.A. in Community Development, B.A. in Peace and Conflict Transformation, Diploma Community Development.
James Mathenge	Data Monitoring Officer	- In charge of project survey - In charge of kitchen performance test - In charge of regional database - In charge of storage quality control -Involved in stove quality control	Bachelor of Business and Information Technology
Rosemary Wagaki	Lead artisan	- Involved in stove quality assurance - Involved in project survey and kitchen performance test	Experience in stove construction
Charles Nderitu	Lead artisan	- Involved in stove quality assurance - Involved in project survey and kitchen performance test	Experience in stove construction
William Maina	Lead Artisan	- Involved in stove quality assurance - Involved in project survey and kitchen performance test	Experience in stove construction

General Summary of Monitoring System

1. Data Management and Storage

Data officers in Kitui and Nyeri, as well as the Project officer are responsible for archiving and maintenance of data.

Hard copies:

- Kitui has file cabins that are securely locked to store the data for the entire project period and as required by GS procedures.
- Nyeri stores hard copies in a separate office for the carbon project staff, which is securely locked.

Digital data:

- Digital data is stored in; email accounts, portable backup disks, flash disks and dropbox.

2. Monitoring data collection tools

The following data documents are used for QA/QC and monitoring purpose:

The Database:

this is an excel file that is used to enter details about the stoves. The file enable entry on the data of construction, name of stove owner, location, postal address, telephone number, GPS

coordinates, mode of use, stove type, stove number and other monitoring details. It is prepared regionally in Kitui and Nyeri and updated every month. The final database is compiled in Switzerland.

The database is filled based on the following procedure and documents;

1. Artisan data sheet **(tool 3):**
   - is filled by the artisan
   - the document is submitted to the lead artisan bi-weekly
   - The document captures stove number, date, name of stove user, no of bricks, parish, village, phone number, initial amount paid and signed of client
2. Lead artisan construction summary sheet **(tool 4):**
   - Prepared by lead artisan
   - Submitted bi-weekly to the project officer
   - Captures the following information;
     - Artisan information - artisan code
     - Household owner information- name and contact/address and geographic area of the stove owner
     - GPS coordinates - latitude and longitude coordinates of the home
     - Stove information- stove number, material subsidy and mode of use
     - Remarks by artisan - this is meant to capture the observation of the lead artisan on the quality of work done by individual artisans.

3. QA/QC measures

- Certification of artisans with badge
- Consumer education
- Standards for material quality and material storage
- Monitoring of material storage
- Monitoring of stoves constructed
- Database accuracy cross-check
- Measures to avoid double counting

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	tCO2/t_fuel
Description	CO2 emission factor arising from use of wood-fuel in baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Tables 1.2/2.5
Value(s) applied	1.7472 tCO2/t wood
Calculation Method (if applicable):	Default IPCC values for wood / wood waste are applied
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$EF_{b,non-CO2}$
Unit	tCO2/t_fuel
Description	Non-CO2 emission factor arising from use of wood-fuel in baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 2.5
Value(s) applied	0.1356 tCO2eq/t wood (CH4: 0.1170 tCO2e/t wood; N2O: 0.0186 tCO2eq/t wood)
Choice of data or Measurement methods and procedures	Default IPCC values for CH4 and N20 emissions for wood / wood waste are applied and summed. The following GWP100 are applied: 25 for CH4, 298 for N20
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$EF_{p,CO2}$
Unit	tCO2/t_fuel
Description	CO2 emission factor arising from use of wood-fuel in project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Tables 1.2/2.5
Value(s) applied	1.7472 tCO2/t wood (=112.0 tCO2/TJ * 0.0156 TJ/ t)
Choice of data or Measurement methods and procedures	Default IPCC values for wood / wood waste are applied
Purpose of data	Calculation of project emissions
Additional comment	

Data / Parameter	$EF_{p,non-CO2}$
Unit	tCO2/t_fuel
Description	Non-CO2 emission factor arising from use of wood-fuel in project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 2.5
Value(s) applied	0.1356 tCO2eq/t wood (CH4: 0.1170 tCO2e/t wood; N2O: 0.0186 tCO2eq/t wood)
Choice of data or Measurement methods and procedures	Default IPCC values for CH4 and N20 emissions for wood / wood waste are applied and summed. The following GWP100 are applied: 22 for CH4, 298 for N20
Purpose of data	Calculation of project emissions
Additional comment	

Data / Parameter	$P_{b,y}$
Unit	t_biomass/unit-year and t_biomass/unit-day
Description	Quantity of woody biomass consumed in the baseline scenario in year y and per day in year y.
Source of data	BFT 2014
Value(s) applied	2.81 t wood/year and 0.0077 t wood/day
Choice of data or Measurement methods and procedures	Estimated mean (justified because statistical analysis fits within 90/30 rule).
Purpose of data	Calculation of baseline emissions
Additional comment	

D.2. Data and parameters monitored

Data/parameter:	$f_{NRB,i,y}$
Unit	Fractional non-renewability (%)
Description	Non-renewability status of woody biomass fuel in scenario I during year y
Measured/calculated/default	The CDM default value for fNRB published on the CDM website for Kenya and approved by the Kenyan DNA is applied.
Source of data	CDM default value: http://cdm.unfccc.int/DNA/fNRB/index.html
Value(s) of monitored parameter	92%
Monitoring equipment	
Measuring/reading/recording frequency:	Fixed by baseline study for a given crediting period, updated if necessary
Calculation method (if applicable):	
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of baseline and project emissions

Additional comments:	The applied methodology states on page 25: ""The non-renewable biomass fraction is fixed based on the results of the NRB assessment. Over the course of a project activity the project proponent may at any time choose to re-examine renewability by conducting a new NRB assessment. In case of a renewal of the crediting period and as per GS rules, the NRB fraction must be reassessed as any other baseline parameters and updated in line with most recent data available".

Data/parameter:	$P_{p,y}$
Unit	t_biomass/unit-year and t_biomass/unit-day
Description	Quantity of woody biomass consumed in the project scenario in year y and per day in year y.
Measured/calculated/default	Calculated based on measurements
Source of data	PFT 2014
Value(s) of monitored parameter	1.62 t wood/year and 0.0044t wood/day
Monitoring equipment	A portable electronic scale of the brand WeiHeng is used for weighing fuelwood before each PFT. Protocols are kept for calibration process. Accuracy class of the weighing device is 10 gram for 40 kilogram.
Measuring/reading/recording frequency:	Updated every two years
Calculation method (if applicable):	Performance Field Tests conducted and analysed according to the requirements of the methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption - 11/04/2011”
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of Project Emissions
Additional comments:	

Data/parameter:	$U_{p,y}$
Unit	Percentage
Description	Usage rate in project scenario p during year y
Measured/calculated/default	calculated
Source of data	Usage survey 2015
Value(s) of monitored parameter	93.4%
Monitoring equipment	
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Conducting usage surveys as required by the methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption - 11/04/2011”
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of project emissions
Additional comments:	A single usage parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario.

Data/parameter:	Project technologies credited (units)
Unit	Number of stoves installed
Description	Technologies in the project database for project scenario p
Measured/calculated/default	calculated
Source of data	Sales record/ Project database 2015

Value(s) of monitored parameter	**Table 1: Annual stove installations** **Year** / **Number of stoves** **2013** / **231** **2014** / **812** **2015** / **649** **Total** / **1692**
Monitoring equipment	
Measuring/reading/recording frequency:	Continuous
Calculation method (if applicable):	The number of project technology units installed as per project database.
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of baseline and project emissions
Additional comments:	The total sales record is divided based on project scenario to create the project database.

Data/parameter:	Project technologies days $N_{p,y}$
Unit	Number of days
Description	Cumulative number of technology days in the project database for project scenario.
Measured/calculated/default	calculated
Source of data	Sales record/Project database 2015
Value(s) of monitored parameter	694,104
Monitoring equipment	
Measuring/reading/recording frequency:	Continuous
Calculation method (if applicable):	The number of project technology days between the installation date of each stove and the end of the monitoring period is calculated and then adjusted for the 21 days time period between date of sale and start of stove usage for households (for drying the new stove).
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	calculation of baseline and project emissions
Additional comments:	The total sales record is divided based on project scenario to create the project database.

Data/parameter:	$LE_{p,y}$
Unit	t_CO2eq per year
Description	Leakage in project scenario p during year y
Measured/calculated/default	Calculated
Source of data	Monitoring survey 2015
Value(s) of monitored parameter	0
Monitoring equipment	
Measuring/reading/recording frequency:	Every two years
Calculation method (if applicable):	Interviewing households with baseline and monitoring surveys
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of leakage

Additional comments:	Aggregate leakage can be assessed for multiple project scenarios

Data/parameter:	Similar cook stove project activities in the project area
Unit	Number of projects and/or extent of overlap
Description	List of similar cook stove projects and an assessment of how (e.g. target population, cook stove type, etc.) and to what degree overlap occurs
Measured/calculated/default	Calculated
Source of data	Various sources (CDM pipeline, GS registry, etc.)
Value(s) of monitored parameter	None
Monitoring equipment	
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	N.A.
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Avoidance of double counting
Additional comments:	

Data/parameter:	Incentive scheme to abandon baseline technology (3-stone fires)
Unit	Percentage of households
Description	Percentage of households that use the baseline technology (3-stone fires) regularly (every day use) in addition to the project stove
Measured/calculated/default	Calculated
Source of data	Monitoring/Usage Surveys 2015
Value(s) of monitored parameter	11%
Monitoring equipment	
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Interviewing households with monitoring/usage surveys
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of project emissions.
Additional comments:	

This value of 11% indicates the percentage of households using regularly a 3-stone fire next to the energy efficient cooking stove. However, the incentive scheme has been put in place in early 2016 and therefore we cannot yet monitor its efficiency.

Sustainable development indicators

N	Indicator	Parameter	Data source
1	Air quality	Chosen parameter: *# of positive comments from stove users*	Household interviews for Monitoring Survey
	Summary: The monitoring parameter "air quality" was assessed during the monitoring survey 2015. In this survey we found that **97%** of stove users indicate that the new rocket stove emits less smoke. Furthermore, **97%** indicate that air quality has improved (for details see separate report "Monitoring/Usage Survey Report GS2457"). These values are magnificent and display clearly the benefit of the applied technology.		

2	Quality of Employment	Chosen parameter: Number of artisans trained and active over time	Training records Quarterly Artisan Meeting records
	Summary: As of January 2016 the project has trained **105** artisans. We observe that one year after completion of the training still **43%** of artisans report to the artisan meetings. The same rate is around **56%** after 6 months. It has to be noted that the rate is much higher in Kitui, where **91%** continue reporting to artisan meetings. This rate needs to be improved for Nyeri as it is key in successful stove implementation. These values are an indicator that artisans adhere to the project activity (stove construction) and thus that the project has a long term effect on them.		
3	Livelihood of the poor	Chosen parameter: *Time and money savings per week due to reduced fuel consumption*	Household interviews for Monitoring Survey
	Summary: Before project implementation (baseline situation), people report to have spent on average 5h per week for fuelwood collection or 247 KSH for buying fuelwood (BS/PS Report GS2457). In the monitoring survey 2015 (project situation), people report to spend on average 3.2h per week for fuelwood collection or 147 KSH for buying fuelwood (Monitoring/Usage Survey Report GS2457). Hence, we register savings of **1.8h** per week (reduction of **36%**) or **100 Ksh** per week (reduction of **40%**) (depending on the fuel acquisition mode of the household). This translates into yearly savings of **93.6h** for collection fire wood or savings of **5200 Ksh** for buying fuel wood. We conclude that the project has a very positive impact on the "livelihood of the poor".		
4	Access to affordable and clean energy services	Chosen parameter: *Number of households using efficient cook stoves at end of project*	Sales record
	Summary: By the end of 2015 the project has implemented 1692 stoves. According to the usage survey 2015, 93.4% of households use the stove. This translates into **1580** stoves and thus 1580 households. On average, a rural household has 4.8 members (monitoring survey 2015). Thus, as of now around **7584** people have benefitted from the project activities.		
5	Human/institutional capacity	Chosen parameter: *Number of women trained as artisans and active over time*	Training records Quarterly Artisan Meeting records
	Summary: As of January 2016 the project has trained 33 women, which is **31%** of all trained artisans. This value exceeds expectations, given the socio cultural environment where women are rather supposed to cater for the family and the household and to leave masonry work to men. Women are slightly less likely to drop out of project activity with around **55%** of women still reporting to meetings one year after completion of their training. Again, we have to differentiate between Kitui and Nyeri. While in Nyeri only **13%** of women report to the meeting a level as high as **94%** is registered in Kitui.		
6	Quantitative employment and income generation	Chosen parameter: *Number of people receiving income from project activity*	Employment records and financial records
	Currently, the project hires **4 full time staff** (2 in each area) and **one part time staff**: a project coordinator in Kitui, a data monitoring officer in Kitui, a project officer in Nyeri, a data monitoring officer in Nyeri and a part time programme coordinator in		

	Nyeri. Furthermore, each region employs an accountant for a day per week (20%). What is more, the project employs currently **3 lead artisans in each area**. The number of lead artisans is supposed to increase over time as the project areas expand. Furthermore, the project has trained **105 artisans**, who generate income through project activity. They are not directly employed by the project and work as independent artisans. However, the households pay the artisans for constructing their stove. This allows the artisans to access a new income opportunity.

D.3. Implementation of sampling plan

>>The applied methodology defines minimum sample sizes for the different monitoring activities and requires random and representative sampling methods (pages 10, 13, 43). Below minimum sample sizes and required sampling methods are listed for each monitoring activity.

1. Monitoring surveys

Sample size:	Group size <300: Minimum sample size 30 or population size, whichever is smaller Group size 300 to 1000: Minimum sample size 10% of group size Group size > 1000 Minimum sample size 100 (meth. p. 10)
Sampling approach:	Common sampling approaches are allowed and geographic distribution should be factored into the selection criteria (meth. p. 24). Simple random sampling was applied during the monitoring period in question.
Representativeness:	The monitoring survey will only be conducted with end users representative of the project scenario and who will be using the project technology at the time of the survey (meth. p. 24)
Frequency:	completed annually, beginning 1 year after project registration
Comments:	Monitoring survey can be conducted with usage survey participants that are currently using the project technology (meth. p. 24)

The monitoring survey shall investigate changes over time in a project scenario by surveying end users with project technologies on an annual basis. It will provide critical information on year-to-year trends in end user characteristics such as technology use, fuel consumption and seasonal variations.

Monitoring Survey Representativeness:
End users from a given project scenario will be selected using representative sampling techniques to ensure adequate representation of users with technologies of different ages. Common sampling approaches such as clustered random sampling will be used. End users will be surveyed once a year with care taken to collect information pertaining to seasonal variations in technology and fuel use patterns.
As the project expands to other areas, monitoring surveys will guarantee that noticeable differences are detected and if needed new scenarios or appropriate adjustment factors will be defined.

Monitoring Survey sample sizing and data collection:
The monitoring survey has the same sample sizing and data collection guidelines as the baseline survey, but in this case, the monitoring survey will only be conducted with end users representative of the project scenario and who will be using the project technology at the time of the survey.

2. Usage surveys

Sample size:	Total minimum sample size is 100, with at least 30 samples for project

	technologies of each age being credited (meth. p. 24)
Sampling approach:	Random sampling approaches
Representativeness:	To ensure conservativeness, participants in a usage survey with technologies in the first year of use (age0- 1) must have technologies that have been in use on average longer than 0.5 years. For technologies in the second year of use (age1-2), the usage survey must be conducted with technologies that have been in use on average at least 1.5 years, and so on (meth. p. 24)
Frequency	completed annually
Comments:	Monitoring survey can be conducted with usage survey participants that are currently using the project technology (meth. p. 24)

The usage survey provides a single usage parameter that is weighted based on drop off rates that are representative of the age distribution for project technologies in the total sales record. A usage parameter must be established to account for drop off rates as project technologies age and are replaced. A usage parameter is required prior to any request for issuance.

The minimum total sample size will be 100, with at least 30 samples for project technologies of each age being credited. The majority of interviews in a usage survey must be conducted in person and include expert observation by the interviewer within the kitchen in question. The usage survey will establish a useful lifetime for technologies after which they are removed from the project database and no longer credited

3. Project FT Update

Sample size:	Minimum sample size is greater than 20 (meth. p. 13) Sample size attrition should be considered to achieve minimum number of valid results (meth. p. 44)
Sampling approach:	Any sampling methods can be used, provided that the sample is selected randomly (meth. p. 43)
Representativeness:	90/10 rule: When the sample sizes are large enough to satisfy the "90/10 rule," i.e. the endpoints of the 90% confidence interval lie within +/- 10% of the estimated mean, overall emission reductions can be calculated on the basis of the estimated MEAN annual emission reduction per unit or MEAN fuel annual savings per unit (meth. p. 13)
Frequency	completed every other year (every two years)
Comments:	

The PFT update is an extension of the project PFT and provides a fuel consumption assessment representative of project technologies currently in use every two years. Hence the PFT update shall account for changes in the project scenario over time as project technologies age and new customers are added, also as new models and designs are introduced. It is legitimate to apply an Age Test instead of a PFT, to project technologies which remain materially the same year after year.

Description and Analysis of Surveys and Data

The description and the analysis of the data from the initial PFT (=KPT), the baseline/project survey and the usage/monitoring survey 2015 can be found in the respective reports and excel files. The exact names of all the documents are given in Appendix 2 at the end of this document.

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

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

>>see under E.2.

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

>> According to the applied methodology, there is no need to calculate baseline and projects emissions separately. When the baseline fuel and the project fuel are the same and the baseline emission factor and project emission factor are considered the same, overall GHG reductions achieved by the project activity are calculated as follows (see applied methodology, page 14):

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

Where:

$\Sigma_{b,y}$ = sum over all relevant (baseline b/project p) couples

$N_{p,y}$ = cumulative number of project technology days included in the project database for project scenario p against the baseline scenario b in year y.

$U_{p,y}$ = cumulative usage rate for technologies in project scenario p in year y, based on cumulative adoption rate and drop off rate revealed by usage surveys (fraction)

$P_{p,b,y}$ = Specific fuel savings for an individual technology of project p against an individual technology of baseline b in year y, in tons/day, as derived from the statistical analysis of the data collected from field tests.

$NCV_{b,fuel}$ = Net calorific value of the fuel that is substituted or reduced ((IPCC default for wood fuel, 0.015 TJ/ton)

$f_{NRB,b,y}$ = fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass

$EF_{fuel,CO2}$ = CO2 emission factor of the fuel that is substituted or reduced. 112 tCO2/TJ for wood/wood waste.

$EF_{fuel,\ nonCO2}$ = Non-CO2 emission factor of the fuel that is reduced

$LE_{p,y}$ = leakage for project scenario p in year y (tCO2eq/yr)

The parameters $NCV_{b,fuel}$ and $NCV_{p,fuel}$ are not applicable to this project since EF is in units of tCO2/t_fuel (see methodology page 21). Therefore the formula applied is:

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

Table 9: calculation of emission reductions for year 2014 & 2015 (copy of the excel spreadsheet):

Annual ER (tCO2e) 2014			
Item	Unit	Value	Source
Project Technology Days (N)	days	216,241	Stove Database 2015
Cumulative Usage Rate (U)	fraction	0.934	Usage Survey 2015
Fuel Savings (P)	t wood/day-stove	0.0033	calculated from KPT 2014
Non-renewable biomass fraction	fraction	92%	CDM default value
Net Caloric Value*	TJ/t wood	n.a	IPCC 2006 default
EF wood, CO2	tCO2e/t wood	1.7472	IPCC 2006 default
EF wood, nonCO2	tCO2e/t wood	0.1356	IPCC 2006 default (CH4 + N2O)
Leakage LE	tCO2e/t year	0	assumption

*not used if EF is in tCO2/t fuel

Total ER (tCO2e/year-stove)	**1147**

Total BE (tCO2e/year-stove)	**2706**

Total PE (tCO2e/year-stove	**1559**

Baseline fuel consumption

Item	Unit	Value	source
Wood combusted	t/year/stove	2.81	KPT 2014
Wood combusted	t/day/stove	0.0077	calculated

Project fuel consumption

Item	Unit	Value	source
Wood combusted	t/year/stove	1.62	KPT 2014
Wood combusted	t/day/stove	0.0044	calculated

Fuel Savings

Item	Unit	Value	source
Wood savings	t/year/stove	1.19	calculated
Wood savings	t/day/stove	0.0033	calculated

Annual ER (tCO2e) 2015

Item	Unit	Value	Source
Project Technology Days (N)	days	477,863	Stove Database 2015
Cumulative Usage Rate (U)	fraction	0.934	Usage Survey 2015
Fuel Savings (P)	t wood/day-stove	0.0033	calculated from KPT 2014
Non-renewable biomass fraction	fraction	92%	CDM default value
Net Caloric Value*	TJ/t wood	n.a	IPCC 2006 default
EF wood, CO2	tCO2e/t wood	1.7472	IPCC 2006 default
EF wood, nonCO2	tCO2e/t wood	0.1356	IPCC 2006 default (CH4 + N2O)
Leakage LE	tCO2e/t year	0	assumption

*not used if EF is in tCO2/t fuel

Total ER (tCO2e/year-stove)	**2534**

Total BE (tCO2e/year-stove)	**5979**

Total PE (tCO2e/year-stove	**3445**

Baseline fuel consumption

Item	Unit	Value	source
Wood combusted	t/year/stove	2.81	KPT 2014
Wood combusted	t/day/stove	0.0077	calculated

Project fuel consumption

Item	Unit	Value	source
Wood combusted	t/year/stove	1.62	KPT 2014
Wood combusted	t/day/stove	0.0044	calculated

Fuel Savings

Item	Unit	Value	source
Wood savings	t/year/stove	1.19	calculated
Wood savings	t/day/stove	0.0033	calculated

The emission reduction ER for the project year 2014 is found to be **1147t CO2e** and in 2015 **2534t CO2e** summing up to a total of **3681t CO2e** in this monitoring period. Baseline emission, **BE** is calculated as **2706t CO2e** in 2014 and **5979t CO2e** in 2015, whereas project emission, **PE,** is calculated as **1559t CO2** in 2014 and **3445t CO2e** in 2015. There is no leakage associated with this project hence **LE=0.**

E.3. Calculation of leakage

>>According to PDD, no significant leakages are currently included.

Based on the monitoring conducted no leakages were identified in the possible leakage effects identified in PDD. Leakage therefore is:

$\sum LE1 = 0$

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		
				Up to 31/12/2012	From 01/01/2013	Total amount
2014	2706	1559	0	0	1147	1147
2015	5979	3445	0	0	2534	2534
Total	8685	5004	0	0	3681	3681

E.5. Comparison of actual emission reductions or net 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
Emission reductions or GHG removals by sinks (t CO_2e)	2014: 5,285 2015: 15,920 Total: 21,205	2014: 1,147 2015: 2,534 Total: 3,681

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

>> Differences between ex ante estimation of ER in PDD and actual monitored emission reductions for first monitoring period are due to the following reasons:

1. Less stoves were installed since project start than forecasted in the PDD (11,600 planned against 1,692 installed).

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	Fastenopfer
Street/P.O. Box	Alpenquai 4
Building	
City	Luzern
State/region	LU
Postcode	6002
Country	Switzerland
Telephone	+41 (0)41 227 59 59
Fax	+41 (0)41 227 59 10
E-mail	cookstoves@fastenopfer.org
Website	www.fastenopfer.ch
Contact person	Mr. Benno Steffen
Title	Programm coordinator Kenya and Haiti
Salutation	Mr.
Last name	Steffen
Middle name	
First name	Benno
Department	
Mobile	
Direct fax	
Direct tel.	+41 (0)41 227 59 44
Personal e-mail	Steffen@fastenopfer.ch

Appendix 2

References

No.	Description	Available at	File name
1	Applied methodology: "Technologies and Practices to Displace Decentralized Thermal Energy Consumption (11/04/2011)."	GS website: http://www.goldstandard.org/resources/energy-requirements	-
2	Monitoring and Usage Survey Report 2015	GS registry	160115_Monitoring_Usage_Survey_Report_GS2457_V1.pdf
3	Monitoring and Usage Survey Data 2015	GS registry	160115_MS_US_Dataset_V1.2.xlsx
4	Monitoring Manual	GS registry	160204_monitoring_manual_GS2457_V2_final.pfd
5	PDD	GS registry	160126_PDD_GS2457_V3_3.pdf
6	GS Passport	GS registry	160126_GS_Passport_GS2457_V3.1.pdf
7	Sales Record & Project Database V01	GS registry	160301_Database_Consolidated_ER_calculations_151231.xlsx
8	Baseline and Project Survey Report	GS registry	160118_BS_PS_Report_GS2457_V2.pdf
9	Baseline and Project Survey Data	GS registry	151118_BS_PS_Data_GS2457_V02_amended.xlsx
10	Kitchen Performance Test (PFT) Report	GS registry	150609_KPT_Report_GS2457_V02.pdf
11	Kitchen Performance Test (PFT) Data	GS registry	150609_KPT_Data_GS2457_V02.xlsx
12	Project Emissions	GS registry	150609_ER_estimation_GS2457_V3_FAR.xlsx
13	Baseline and Project Survey Report	GS registry	Amended_BS_PS_Report_20151204.docx