MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
version 1.0 30/01/2016

Energy Efficient Cook Stoves for Siaya Communities, Kenya
GS 879
monitoring period 4 (01/01/2015 - 31/12/2015)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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1. The objective of this project is to construct energy efficient stoves for rural communities in the Siaya County in Nyanza province, Kenya, to replace inefficient 3-stone fires for cooking. Over 7 years the project plans to install approximately 48,900 stoves into households in Siaya County, Kenya.
An innovative village based community savings and loaning mechanism is integrated in the project to enhance affordability and access to efficient cook stoves through soft loans. This scheme involves local capital mobilization methodology that seeks to address the unmet needs of the poor brought about by the existing gap in the major financial services providers like the banks and insurance companies.

2. The employed technology is a fix installed biomass rocket stove designed for burning wood and consisting of two cooking units that can be separately fired. The efficient cook stoves are constructed using locally available materials, such as mud, bricks and sawdust.

3. Relevant dates for the project activity:
Start date of the project: 04 October 2010
Start date of crediting period: 01 January 2011
Date of first stove sale: 04 October 2010
First monitoring period: 01 January 2011 – 02 July 2012
Second monitoring period: 03 July 2012 to 31 Dec 2013
Third monitoring period: 01 Jan 2014 to 31 Dec 2014
Fourth monitoring period: 01 Jan 2015 to 31 Dec 2015
Date of registration: 03 July 2012
Project is in continuous operation.

4. Total emission reductions achieved in this monitoring period are **59,274 tCO2e**

A.2. Project Participants

>>

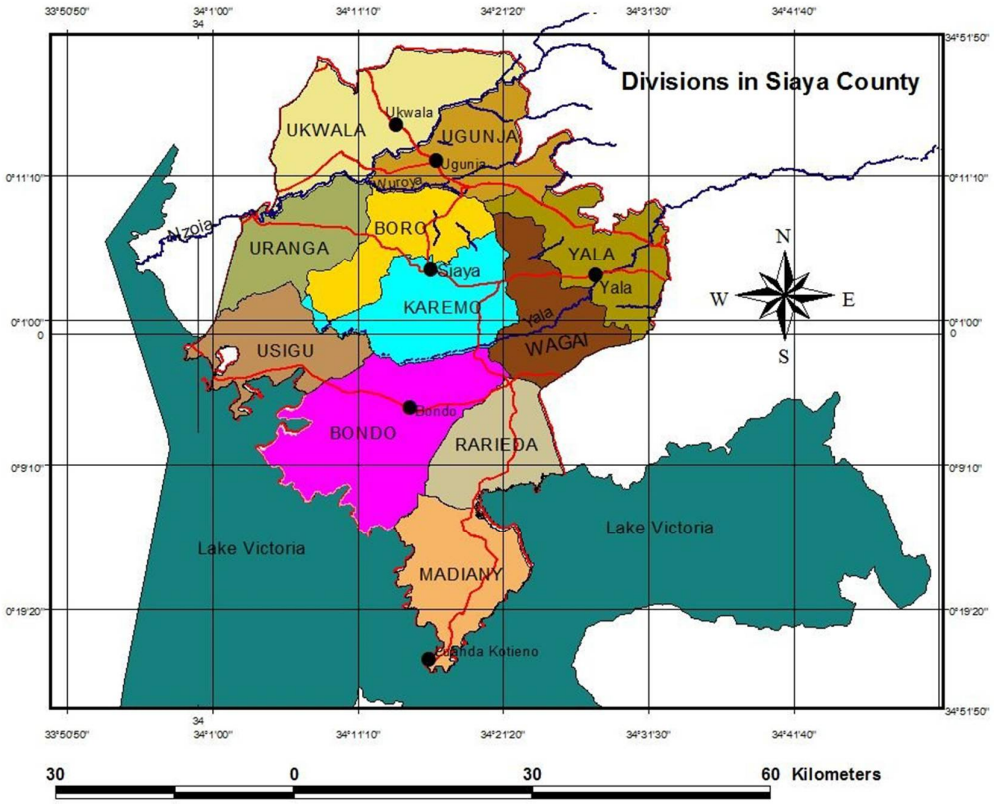
Name of Party involved (*) ((host) indicates a host Party)	**Private and/or public entity(ies) project participants (*) (as applicable)**	**Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Kenya (host)	Private entity: - Tembea Youth Centre for Sustainable Development	No
Switzerland (Annex 1)	Private entity - myclimate Foundation	No

A.3. Location of the project activity:

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Country: Kenya
Province: Nyanza

County: Siaya
Coordinates: The County is located between the following coordinates: 0°24'08.52"S, 34°17'24.05"E to the south, 0°01'57'59"S, 34°00'31.65"E to the west, 0°19'04.01"N, 34°16'52.80"E to the north and 0°06'38.41"N, 34°33'16.82"E to the far east.
The coordinates of the town Ugunja, where the office of the project owner Tembea Youth Centre for Sustainable Development is located, are 00° 10' 59.88" N and 34° 17' 59.99" E.



Map 1: Divisions in Siaya County

A.4. Technical description of the project

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The project currently produces and installs one type of efficient biomass stoves.

The project disseminates a rocket-type improved cook stove to replace the use of open fires for cooking. The efficient cook stoves are constructed using locally available materials, such as mud, bricks and sawdust. Local artisans are identified in the villages and trained in stove construction and household mobilisation.



Installed project rocket stove with two cooking units.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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The approved monitoring methodology applied to the project activity is Gold Standard methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption (11/04/2011)." The reference is http://www.cdmgoldstandard.org/project-certification/gs-methodologies

A.6. Registration date of the project activity:

>> 03 July 2012

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

>> The start date of the crediting period is 01 January 2011.

A crediting period of 7 years with the option of renewal is chosen for the project activity

A.8. Name of responsible person(s)/entity(ies):

>>

Jared Buoga, Tembea Youth Center for Sustainable Development
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Job Orina, Tembea Youth Center for Sustainable Development
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Tobias Hoeck, myclimate
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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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1. **Start date of operations:** 04 October, 2010
2. **Actual Operations**: The project continuously installed efficient cook stoves since the start of project implementation. Since then a total of 36,338 project stoves have been installed. In this way the project could provide clean and efficient cooking to 177,070 persons. The project also continuously trained community members in the Community Savings and Loaning Methodology (CSL) and established to date a total of 1,264 groups with 36,371 participants: of it there are 1,018 supervised groups with 31,827 participants and 246 graduated groups with 4,544 participants. 100 of all cook stoves installed where purchased through the CSL mechanism. This clearly shows how important this saving and loaning mechanism is for the dissemination and affordability of the cook stove.

Table 1: Annual stove installations

Year	number of stoves
2010	324
2011	4,662
2012	5,139
2013	5,187
2014	6,840
2015	14,186
TOTAL	**36,338**

Furthermore, the project trained 150 persons in efficient stove construction and conducted awareness and education events on efficient cooking and climate change.

Tembea supports a climate change education program that targets primary and secondary schools. In the monitoring period Tembea was able to implement the program in Siaya County and the entire Nyanza region. The following activities were accomplished;

1. Development of Information and education communication materials
2. Running a workshop that brought together various actors in Kenya and in climate education
3. Community based trainings on climate change
4. Support for climate change/environment clubs in schools through provision of vegetable seeds
5. Establishment of tree nurseries in schools

The project's awareness creation activities reached a total number of 4130 people.

3. **Impact on applicability of methodology:** No events occurred during this monitoring period, which impact the applicability of the monitoring methodology.

B.2. Revision of the monitoring plan

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The validated monitoring plan has not been revised.

Forward Action Request from Gold Standard 3rd issuance review:
„For the next project field tests, the PP shall identify potential outliers applying a recognized statistical method (see e.g. footnote 58 of the GS methodology TPDDTEC)."
A statistical outlier analysis has been applied for the PFT Update 2015. See PFT Update Report 2015 page 4 and PFT Update analysis excel sheet "statistical_outlier".

B.3. Request for deviation applied to this monitoring period

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NA

B.4. Notification or request of approval of changes

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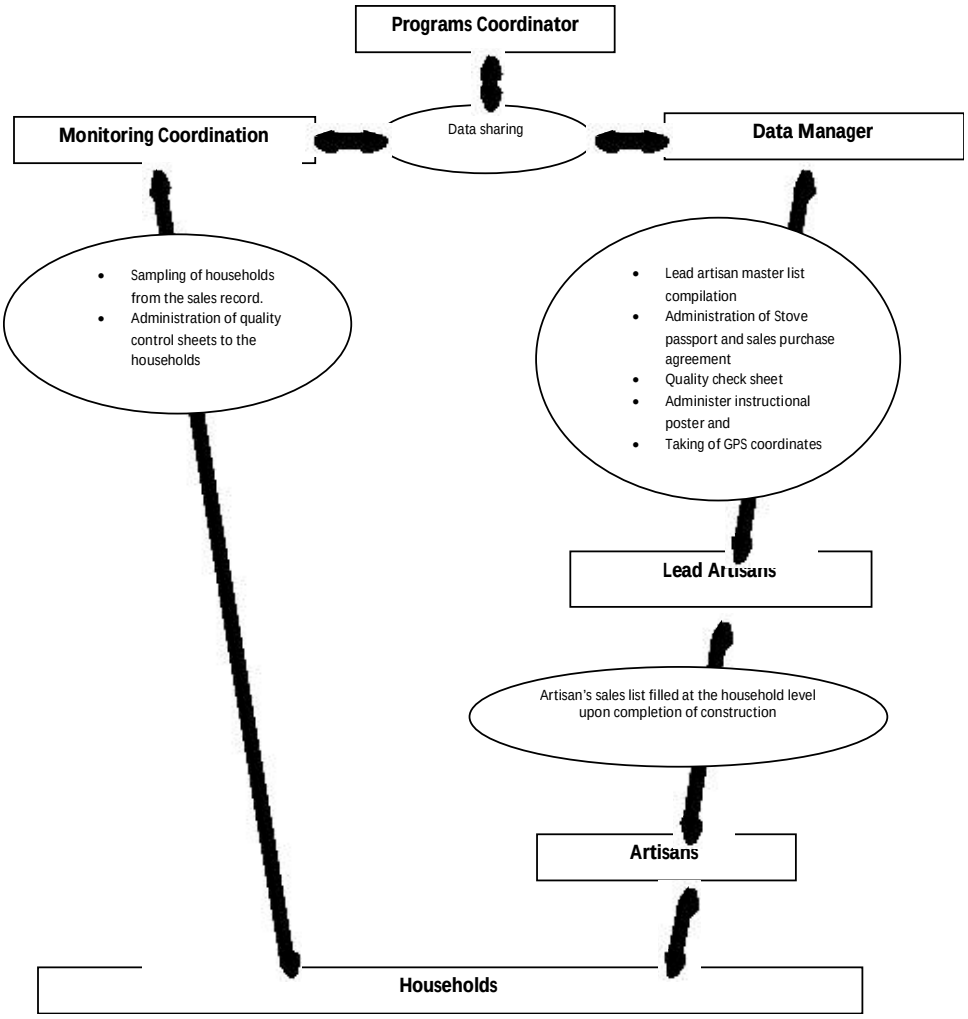
NA

SECTION C. Description of the monitoring system

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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.

Monitoring coordination



Specific Personnel and Qualifications

Name	Designation	qualification
Job Orina	Internal monitoring manager	Bsc In Disaster Mitigation and Sustainable development, certificate in Low Carbond development (WBI) and monitoring & evaluation (UNPAN), long exepirience in data collection, analysis and report preparation as well long experience in the climate change sector.
Victor John Mondi	Data Manager/deputy manager	Bsc In Disaster Mitigation and sustainable development, long experience in data managment
Nicholas Ngesa	Project officer in charge of construction	Bachelor of Commerce

Joshua Omondi	Project officer in charge of CSL	Certifcate in project design and development and Certificate in Community saving and loaning
Erick Otieno	Field officer csl/stove construction	Certificate in Community Saving and Loaning
Sarah Sophy	Finance officer	Dilploma in Community development and social work, certificate in Accounting
Vincent Odour	Lead artisan	Long experience in stove construction, kenya secondary school certificate

General Summary of Monitoring System:

Data management and storage
Tembea has developed internal mechanisms to ensure availability of data within and beyond the project period. All data used for monitoring is stored in soft and hard copies. Tembea uses cloud storage, back up systems as well as file cabins in the office to ensure safe keeping of the data.

Monitoring data collection tools and methodologies
The following approaches are used in collecting data for monitoring;
a) Office based

1. Sales record: this is an excel file that is used to enter details about the stoves. The file enable entry on the data of sale, name of stove owner, location, postal address, telephone number, GPS coordinates, mode of use, stove type, stove number and other monitoring details.
2. CSL database: this is a customized excel file that is used to analyze and store data on the community savings and loaning approach that is used to facilitate local communities to acquire cook stoves. The file capture the names of the groups, names and sex of the members, dates of formation, asset based information, loan information amongst others.
3. Excel sheet for monitoring data: this is a template that is used to enter and store all the data collected from the field for monitoring surveys. The file captures the questions in the questionnaires and their varying responses. This is used to capture the sustainable development indicators that the project is promoting.

b) Field based

1. Artisan Data sheet: this is a tool used by the artisan involved in the construction of the stoves in the field. They capture the following details; date of construction, name of stove user, sub-location, village, address and phone number.
2. Lead Artisan construction summary sheet: This is a tool that has been developed to help lead artisans collect information on the stoves constructed. The template collects the date of construction, the constructing artisan information, stove owner name, contacts, stove number, mode of purchase, initial amount, GPS coordinates and lead artisans remarks.
3. Transaction books for CSL: these are books that are used by the CSL groups to record their transactions. The book collect the details of the groups including, date of formation, group name, names of members, transaction procedures, loans information and meetings dates.
4. Questionnaires: there are many questionnaires that are administered to monitor project progress. The Questionnaires include the one for monitoring and usage survey. They are all attached in the monitoring manual.

C) Data flow consistency and intervals

1. Sales Record: the sales records is updated once a month. Every other Monday of the week the data manager receives data from the field and throughout the month QA/QC procedures are administered on the data.
2. CSL database: is updated once a month. Throughout the month field officer and the project officer are involved in collecting and verifying data from the groups.

3. Excel sheet for monitoring data: this is done once a year as is agreed upon with the project partners.

D) QA/QC measures
Tembea is responsible for ensuring data quality, the following measures are undertaken for the information described above;

1. Tracking of data
2. Use of SP/SPA
3. Counter checking with field officer documents
4. Review of group transaction books
5. Review of financial records
6. Counter checking of data

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	$EF_{b,co2}$
Data unit:	tCO2/t_fuel
Description:	CO2 emission factor arising from use of wood-fuel in baseline scenario
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Tables 1.2/2.5
Value(s) :	1.7472 tCO2/t wood
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Default IPCC values for wood / wood waste are applied
Additional comment:	

Data / Parameter:	$EF_{b,non-co2}$
Data unit:	tCO2/t_fuel
Description:	Non-CO2 emission factor arising from use of wood-fuel in baseline scenario
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 2.5
Value applied:	0.1356 tCO2eq/t wood (from 01.01.2013 on)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default IPCC values for CH4 and N20 emissions for wood / wood waste are applied and summed. From 01.01.2013 on the following GWP100 are applied: 25 for CH4, 298 for N20.
Any comment:	

Data / Parameter:	$EF_{p,co2}$
Data unit:	tCO2/t_fuel
Description:	CO2 emission factor arising from use of wood-fuel in project scenario
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Tables 1.2/2.5
Value applied:	1.7472 tCO2/t wood (=112.0 tCO2/TJ * 0.0156 TJ/ t)
Justification of the choice of data or description of measurement methods and	Default IPCC values for wood / wood waste are applied

procedures actually applied :	
Any comment:	

Data / Parameter:	$EF_{p,non\text{-}co2}$
Data unit:	tCO2/t_fuel
Description:	Non-CO2 emission factor arising from use of wood-fuel in project scenario
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 2.5
Value applied:	0.1356 tCO2eq/t wood (from 01.01.2013 on)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default IPCC values for CH4 and N20 emissions for wood / wood waste are applied and summed. From 01.01.2013 on the following GWP100 are applied: 25 for CH4, 298 for N20.
Any comment:	

Data / Parameter:	$\mathbf{f_{NRB,i,y}}$
Data unit:	Fractional non-renewability (%)
Description:	Non-renewability status of woody biomass fuel in scenario I during year y
Source of data used:	CDM default value: http://cdm.unfccc.int/DNA/fNRB/index.html
Value applied:	92%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The CDM default value for fNRB published on the CDM website for Kenya and approved by the Kenyan DNA is applied.
Any comment:	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".

Since a fixed baseline is applied, the following baseline parameters are also known. They will not be monitored.

Data / Parameter:	$\mathbf{P_{b,y}}$
Data 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 used:	BFT 2011
Value applied:	2.6645 t wood/year and 0.0073 t wood/day
Justification of the choice of data or description of measurement methods and procedures actually applied :	Estimated mean (justified because statistical analysis fits within 90/30 rule).
Any comment:	

The following project parameter from the PFT was also known at validation, but it is monitored and updated if needed during the crediting period.

Data / Parameter:	$\mathbf{P_{p,y}}$
Data 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.
Source of data used:	PFT 2015
Value applied:	1.3505 t wood/year and 0.0036t wood/day
Justification of the choice of data or description of measurement methods and procedures actually applied :	Estimated mean (justified because statistical analysis fits within 90/30 rule).
Any comment:	Results of the PFT 2011 were confirmed by PFT Update 2015

D.2. Data and parameters monitored

>> Since a fixed baseline is applied only project parameters but no baseline parameters are monitored.

Data / Parameter:	**Project technologies credited (units)**
Data unit:	Number of stoves installed
Description:	Technologies in the project database/Total Sales Record for project scenario for the year y.
Measured /Calculated /Default:	Measured
Source of data:	Tembea sales records
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of technology days
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	n.a.
Measuring/ Reading/ Recording frequency:	Continuously
Calculation method (if applicable):	The Total Sales Record is continuously populated with all sales of stoves installed since the start date 04 October 2010. The Total Sales Record for this monitoring period contains sales from 04 October 2010 to 31 December 2015.
QA/QC procedures applied:	Third party financial audit of stove sales activities

Year	number of stoves
2010	324
2011	4,662
2012	5,139
2013	5,187
2014	6,840
2015	14,186
TOTAL	**36,338**

Data / Parameter:	$P_{p,y}$
Data unit:	t_biomass/unit-year and t_biomass/unit-day
Description:	Quantity of woody biomass consumed in the project scenario during year y
Measured /Calculated	We measured quantity of woody biomass consumed per unit-day and

/Default:	calculated to biomass/unit-year
Source of data:	PFT Update 2015
Value(s) of monitored parameter:	1.314 t wood/year and 0.0036t wood/day
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission reduction calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Digital weight scales to measure wood weight
Measuring/ Reading/ Recording frequency:	Once prior to verification and then every other year
Calculation method (if applicable):	Mean of wood biomass use of all selected households was calculated
QA/QC procedures applied:	Transparent data analysis and reporting

Data / Parameter:	Usage ($U_{p,2}$)
Data unit:	Percentage
Description:	Usage rate in project scenario during year y
Measured /Calculated /Default:	Calculated
Source of data:	Usage Survey 2015 (see Usage/Monitoring Survey Report)
Value(s) of monitored parameter:	91.9%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission reduction calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	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. See Project Database for details.
QA/QC procedures applied:	Random sampling of population

Data / Parameter:	Project Technology Days ($N_{p,1}$)
Data 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
Value(s) of monitored parameter:	9,996,635
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission reduction calculations

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	The number of days between the installation date of each stove and the day before registration (defining the first monitoring period) was calculated then adjusted for the 21 days time period between date of sale and start of stove usage for households.
QA/QC procedures applied:	N.A.

Data / Parameter:	Leakage ($LE_{p,y}$)
Data unit:	t_CO2eq per year
Description:	Leakage in project scenario during year y
Measured /Calculated /Default:	Calculated
Source of data:	PDD and Monitoring/Usage Survey 2015
Value(s) of monitored parameter:	0 Potential leakage effects were assessed at the stage of validation in 2012 and were considered insignificant. Further, results from Monitoring/Usage Survey conducted in 2015 showed no leakage effects.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission reduction calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every other year
Calculation method (if applicable):	
QA/QC procedures applied:	Random selection of surveyed households.

Data / Parameter:	Similar cook stove project activities in the project area
Data 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:	Reported
Source of data:	Gold Standard registry, UNEP Risoe CDM Pipeline and other local sources.
Value(s) of monitored parameter:	0 (no similar project activity was identified)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Avoid double counting

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N.A.
QA/QC procedures applied:	N.A.

Sustainable Development Indicators:

Data / Parameter:	**SD 1) Air Quality**
Data unit:	Number of households
Description:	# of positive comments from stove users
Measured /Calculated /Default:	Measured
Source of data:	Monitoring/Usage Survey 2015
Value(s) of monitored parameter:	100 % of households state improved indoor air quality
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N.A.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	N.A.
QA/QC procedures applied:	Random sampling of population

Summary: The target for this indicator was that all new stove users give positive comments about indoor air quality. We found that all (100%) stove users agree that the project stove generates less smoke emissions than the baseline stove. As specific indicators for improvements of air quality in the kitchen households mention less eye irritation (97%), it is easier to breathe (92%), less coughing (90%) and less headache (78%). Thus, it can be concluded that the project stove considerably improved indoor air quality and this has an effect on stove users' health.

Data / Parameter:	**SD 2) Quality of employment**
Data unit:	Number of persons
Description:	Number of artisans trained in stove construction
Measured /Calculated /Default:	Calculated
Source of data:	Training records
Value(s) of monitored parameter:	Number of artisans trained: 150 (48% women, 52% men)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N.A.

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	N.A.
QA/QC procedures applied:	N.A.

Data / Parameter:	**SD 3) Livelihood of the poor**
Data unit:	Time (hours/year), money (KSH/year) and number of persons

Description:	- Time and money savings due to reduced fuel consumption: Time and money spent on fuel per household per year compared to the baseline scenario.
	- Number of people in savings and loaning groups:
	  - to acquire efficient cook stoves
	  - to access medical care, pay for school fees, and other social services.

Measured /Calculated /Default:	Calculated
Source of data:	Household interviews for Monitoring Survey 2015. Record keeping of savings and loaning groups.

Value(s) of monitored parameter:	- Time and money savings due to reduced fuel consumption:
	8,232 KES saved per household per year
	278 hours time saved per household per year
	- Number of people in savings and loaning groups:
	  - Total: 36,371
	  - 36,337 acquired efficient cook stoves
	  - Purposes loans are used for: 36% for trade activities, 26% to access medical care, 20% for food, and 18% for other purposes.

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N.A.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	N.A.
QA/QC procedures applied:	N.A.

Summary:
The BS estimated an expenditure of KES 10,972 on fuel per year and 431 hours used in fuel gathering per year for the baseline scenario. The monitoring survey 2015 showed average annual expenditures of

KES 2,740 on fuel and 153 hours for fuel collection. This results in average annual savings of KES 8,239 and 278 hours per household.
There are a total of 36,371 persons participating in 1,264 Saving and Loaning Groups established to date: of it there are 1018 supervised groups with 31,827 participants and 246 graduated groups with 4,544 participants. Almost 100% (36,337) of participants used the CSL mechanism to purchase an efficient cook stove. Other common purposes loans are used for trade activities (36%), to access medical care (26%), for food (20%) and for other social services (18%).

Data / Parameter:	**SD 4) Access to affordable and clean energy services**
Data unit:	Number of households
Description:	Number of households using efficient cook stoves.
Measured /Calculated /Default:	Measured
Source of data:	Sales Record/Project Database
Value(s) of monitored parameter:	33,410
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N.A.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	Number of stoves installed multiplied with latest usage rate (= 36,338 x 91.9)
QA/QC procedures applied:	N.A.

Summary:
The project installed stoves into 36,338 households. Applying the latest usage rate of 91.9% this results in 33,410 stoves in use. From the latest monitoring and usage survey we know that households have on average 5.3 members. Thus, the project provided clean and efficient cooking stoves for 177,070 persons.

Data / Parameter:	**SD 5) Human/institutional capacity**
Data unit:	Number of women, number of persons

Description:	- Number of women trained:
	  - number of women trained for saving and loaning groups (CSL)
	  - number of animators (women) trained for awareness creation and education
	- Number of people reached through awareness creation on efficient cook stoves and climate change.

Measured /Calculated /Default:	Calculated
Source of data:	Training records

Value(s) of monitored parameter:	- Number of women trained:
	  - 21,075 women trained for saving and loaning groups (CSL)
	  - 60 animators (43 women and 17 men) trained for awareness creation and education

	- 4,130 people reached through awareness creation on efficient cook stoves and climate change.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N.A.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	N.A.
QA/QC procedures applied:	N.A.

Summary:
The project trained 23,503 persons[1] (of which 21,075 are women) on CLS methodology and at the same time created awareness for clean cook stoves. In addition 4,130 persons were reached through awareness creation events in this monitoring period. For awareness creation and education 60 animators were trained.

Data / Parameter:	**SD 6) Quantitative employment and income generation**
Data unit:	Number of persons
Description:	Number of people receiving income from project activity
Measured /Calculated /Default:	Measured
Source of data:	Employment records and financial records
Value(s) of monitored parameter:	- 88 artisans installing cook stoves - 17 project staff (field officers, coordinator, administration, project officers…) - 60 community mobilizers Total: 165 persons receiving income from project activity 100% are local employees
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N.A.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A.
Measuring/ Reading/ Recording frequency:	Every year
Calculation method (if applicable):	N.A.
QA/QC procedures applied:	N.A.

[1] This figure is lower than total number of CSL participants, since the training is conducted at the beginning of a loaning cycle and further participants join the group later on.

The project aims at maintaining a close and continued contact with the stove users to ensure stove usage. This is important to receive feedback from the stove users and to advise on appropriate project stove application. One main instrument for this is the Community Savings & Loaning groups (CSL) approach. In addition also community mobilizers and environmental clubs in schools are crucial to reach out to households:
- The CSL groups play a very important role for the successful adoption and use of the project stove and discontinuation of the baseline technology. CSL groups meet on a weekly basis and provide a perfect framework for peer-to-peer support and knowhow exchange amongst stove users thus increasing use and adoption of the Tembea stoves. Further, Tembea staff attends CSL meetings of each group on a monthly basis. This is a good opportunity to get regular feedback from households on their experience with the project stove, to advise on appropriate stove usage and to discourage the use of the three stone fire.
- A network of community mobilizers visits stove users on a random basis to provide accompaniment/solidarity in decommissioning the traditional stoves. Regular reporting/feedback from the community mobilizers to lead artisans/project staff helps in gauging the level of discontinuation by stove users.
- The environmental clubs run by Tembea in schools in the project catchment area play a crucial role in sensitizing pupils/students in efficient stove usage and to discourage parents from using traditional stoves.
In addition a new awards scheme was recently introduced on effective and continuous use of Tembea stove during public awareness campaigns. Best stove users are awarded (e.g. with cooking pans or official certificate of recognition) during regular public awareness and education days as well as during visits by mobilizers.
The project monitors the use of baseline technology through monitoring/usage surveys.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>> According to the applied methodology, there is no need to calculate baseline 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:

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

E.2. Project emissions calculation

>> According to the applied methodology, there is no need to calculate project 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:

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

E.3. Leakage calculation

>>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:

$\sum LE_1 = 0$

E.4. Emission reductions calculation / table

>> According to the applied methodology, we applied the formulae:

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

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 in units of tCO2/t_fuel (see methodology page 21). Therefore the formula applied is:

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

The table below summarizes the values used in **2015** for the parameters of the applied formula:

Parameter	**Project Scenario**
Baseline wood use (tons/day)	0.0073
Project wood use (tons/day)	0.0036
$P_{p,b,1}$: Fuel savings (tons/day)	**0.0037**
Fraction NRB	0.92
U_p	0.919
N_p	9,996,635
$EF_{fuel,CO2}$	1.7472
$EF_{fuel,\ nonCO2}$	0.1356
LE_p	0

The formula for emission reduction calculations including the values used for the parameters is:

$$ER_{2014} = 9,996,635 * 0.919 * 0.0037 * (0.92 * 1.7472 + 0.1356) - 0$$

Total ERs = ER_{2015} = **59,270**

Achieved emission reductions in the monitoring period per calendar year:

Year	**ER (tCO2e)**
2015	59,274
Total	**59,274**

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**2015: 58,910**	**2015: 59,274**

E.6. Remarks on difference from estimated value in the 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. Increased installation in 2015 due to increased community uptake.
2.

Annex 1

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.cdmgoldstandard.org/project-certification/gs-methodologies	-
2	Monitoring and Usage Survey Report 2015	GS registry	160106_Monitoring_Usage_Survey_Report_Tembea_2015_V01.pdf
3	Monitoring and Usage Survey Data 2015	GS registry	160106_Monitoring_Usage_Survey_2015_analysis_V01.xlsx
4	Monitoring Manual	GS registry	120829_monitoring_manual_V02.pdf
5	PDD	GS registry	120710_PDD_Tembea_V3_2.pdf
6	GS Passport	GS registry	120710_GS_Passport_Tembea_V3_2.pdf
7	Sales Record & Project Database V01	GS registry	160126_Tembea_project_database_2015_V01.xlsx
8	PFT Update report 2015	GS registry	151013_Project_FT_Update_2015_V01
9	PFT Update data analysis 2015	GS registry	151013_PFT_Update_2015_analysis_V01.xlsx