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 cook stoves in pastoral and agro-pastoral communities in Southern Ethiopia
UNFCCC reference number of the project activity	GS3422
Version number of the monitoring report	Version 02
Completion date of the monitoring report	28/09/2017
Monitoring period number and duration of this monitoring period	Monitoring period nro 2 01/04/2016 – 31/03/2017 [12 months]
Project participant(s)	COOPI – Cooperazione Internazionale Fondazione
Host Party	Ethiopia
Sectoral scope(s)	Energy efficiency
Selected methodology(ies)	The Gold Standard Simplified Methodology for Efficient Cookstoves (February 2013)
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	

Vintage	Estimated amount (tCO_2e)
2016 (01/04-31/12/2016)	7,326
2017 (01/01-31/03/2017)	2,426
Total	9,752

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
	N/A	

		Vintage / Estimated amount (tCO_2e)
		2016 (01/04-31/12/2016) / 6,682
		2017 (01/01-31/03/2017) / 3,233
		Total / 9,915

SECTION A. Description of project activity

A.1 Purpose and general description of project activity

The Project Activity has involved the distribution of 4,955 fuel efficient cookstoves to families within Liben, Gorodola and Arero Woredas of Oromia Regional State and Filtu and Hudet Woredas of Somali, Regional State in Southern Ethiopia. The goal of the project is to improve energy efficiency as well as the conditions of the local population. At the same, the project will reduce CO_2 emission by the reduced fuel use for cooking activities.

Currently most families (75%) living in the above mentioned woredas, cook with the traditional three stone fires or other inefficient wood stoves that consume large amounts of firewood[1]. In the rural areas, which are the focus area of this project, firewood is practically the only fuel used due to the fact that alternative fuel sources are either unavailable or unaffordable. This means that lots of firewood is used and a lot of time spent for the fuel collection. The traditional cooking method also produces a lot of smoke which causes respiratory diseases, particularly in women/girls who use it for cooking, but also in young children and other people (e.g. the elderly) who spend a lot of time indoors. The use of inefficient cooking method has also unintentional negative impacts on the environment.

The project activity aims to organize Fuel Saving Stove (FSS) producing cooperatives in the main centres of the project area, Negele Borena town in Guji Zone (Oromia Regional State) and Filtu in Liben Zone (Somali Regional State). Part of the stoves will be bought also directly from the already existing producers from the capital city, Addis Ababa, and brought to the project invention area for selling. The distribution of the stoves to end-users will be made by retailers with the support of project proponent (COOPI). The cookstove model distributed in the project is Tikikil Rocket Stove. This stove model is tailored and optimized for local cooking requirements and it can accommodate the Ethiopia's most commonly used pot types. The fuel used by the stove is firewood.

The stove distribution started on 11th of October 2014 and was completed within one year (by 11th of November 2015). All together 4,955 stoves have been distributed to the local families. The first monitoring period covered the period 12/10/2014 – 31/03/2016 (totally 17 months) during which 9,067 tCO_2e emission reductions were achieved.

This Monitoring Report covers the second monitoring period from 01/04/2016 to 31/03/2017 (totally 12 months) for which the monitoring activities were implemented in the field during May and June 2017. The GHG emissions achieved during this second monitoring period are 9,915 tCO_2e.

A.2 Location of project activity

Host Party:	Federal Democratic Republic of Ethiopia
Regional State:	Oromia and Somali Regional States
Woredas:	Arero, Liben and Gorodola Woredas of Oromia Regional State and Filtu and Hudet Woredas of Somali Regional State

The core area of the project will be the surroundings of the towns of Negele Borena and Filtu as these two towns will host the project stove producing cooperatives. Therefore, the coordinates of these towns are used to represent the physical location of the project activity (table 1).

[1] BAGER SAFE ENVIRONMENT FOR HEALTH SERVICES PLC, 2012 (uploaded to GS registry during 1st verification)

Table 1: Coordinates of the towns of Negele Borena and Filtu

Coordinates	Latitude (North)	Longitude (East)
Negele Borena	5°19'58.24	39°34'27.70
Filtu	5°06'45.97	40°39'15.69

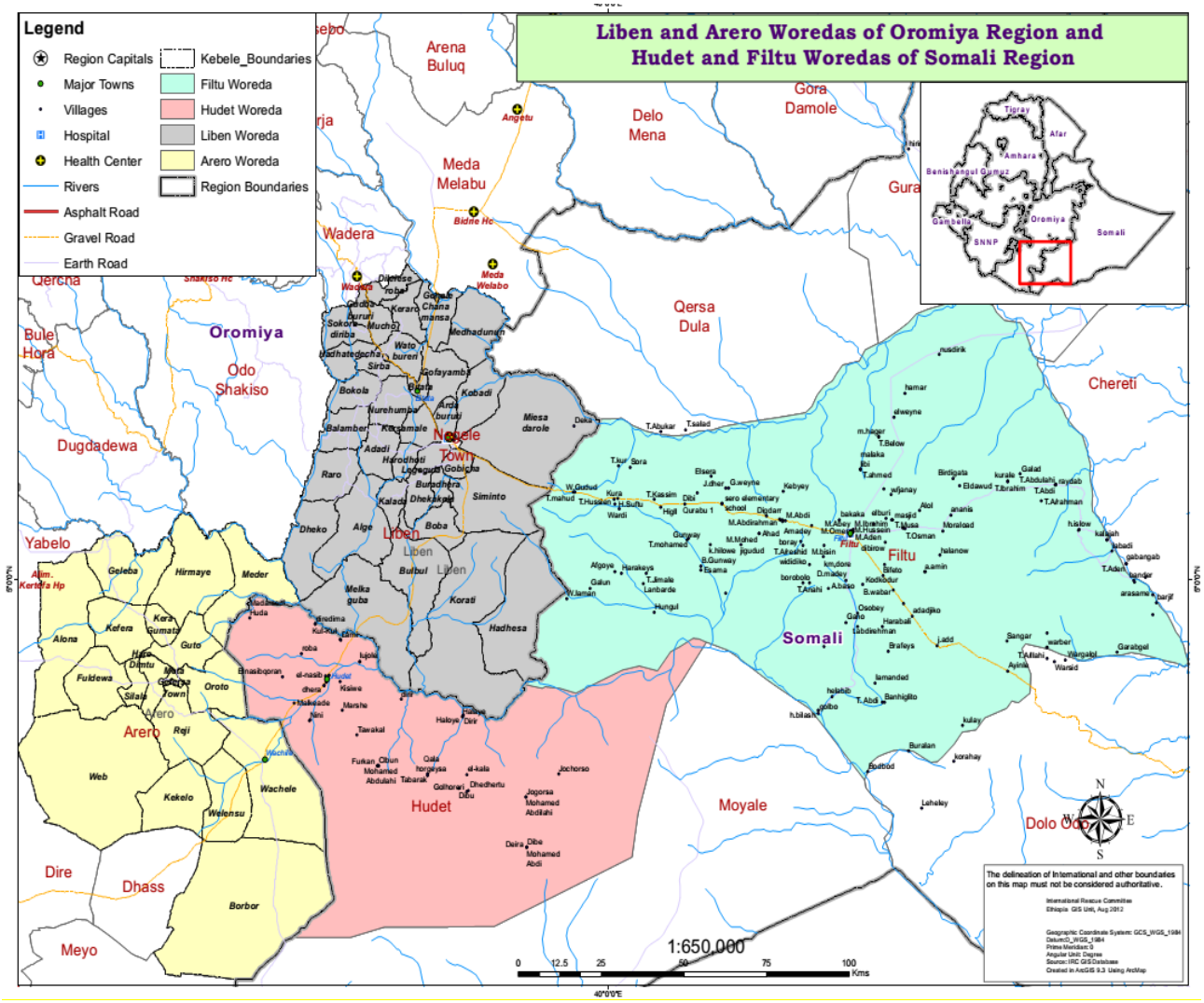

Figure 1: Project invention area including Arero, Liben, Gorodola, Filtu and Hudet woredas. Note that Gorodola woreda is presented as a part of Liben woreda since this woreda is only recently separated from Liben woreda.

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)
Ethiopia (host)	N/A	No
Italia/Ethiopia	COOPI – Cooperazione Internazionale Fondazione (Private entity)	No

A.4 Reference of applied methodology and standardized baseline

The applied methodology is the Gold Standard Simplified Methodology for Efficient Cookstoves (February 2013)[2].

A.5 Credit period of project activity

The type and length of crediting period applied to this project is renewable 7 years crediting period. The start date of the crediting period is 12/10/2014.

This Monitoring Report covers the period of 01/04/2016 to 31/03/2017.

A.6 Contact information of responsible persons/entities

CarbonSinkGroup S.r.l. The contact details are presented in Appendix 1.

SECTION B. Implementation of project activity

B.1 Description of implemented registered project activity

Purpose of Project Activity and the description of the installed technology

The Micro-Scale Voluntary Project Activity GS3422 "Improved cook stoves in pastoral and agro-pastoral communities in Southern Ethiopia" involves the distribution domestic fuel-efficient cookstoves to households within the project area located in Oromia and Somali Regional States in Southern Ethiopia. The goal of the project is to improve energy efficiency as well as the conditions of the local population. At the same, the project will reduce CO_2 emission by the reduced fuel use for cooking activities.

The cookstove model distributed in the project is Tikikil Rocket Stove (figure 2). This stove model is tailored and optimized for local cooking requirements and it can accommodate the Ethiopia's most commonly used pot types. The fuel used by the stove is firewood. The design of the stove ensures efficient combustion leading to fuel wood usage reduction up to 50% of compared to the traditional

[2] https://www.goldstandard.org/wp-content/uploads/2013/11/GS-simplified-micro-scale-cookstove-meth.pdf (site visited 02/07/2014)

three stone fires and average thermal efficiency of 2%[3]. The Tikikil stoves also emit less smoke compared to the traditional cooking methods. The technical specifications of these one are shown in the table below (table 2).

Table 2: Technical specifications of Tikikil double skirt stove[4]

Technical specification	Tikikil duble skirt stove
Stove Type	Portable rocket stove
Production materials	Inner clay liner for the combustion chamber clad with galvanized sheet metal on the outside
Dimensions	Skirt diameter 29 cm and 33 cm Height 36 cm
Thermal efficiency	27%[3]
Average lifespan	5 years[5]

Figure 2: Tikikil Rocket Stove production in Filtu (Photo: COOPI)

Implementation Status

The project stated in October 2014 when the first project stoves were distributed to the local families. In totally 5,672 families bought the project stove. The first monitoring period covered the first 17 project months (12/10/2014 – 31/03/2016) for which the corresponding carbon credits were verified and issued in February 2017.

The second monitoring period covers the 12 months from 01/04/2016 to 31/03/2017. For the second monitoring period the monitoring activities were implemented in the field during May and June 2017.

Below table presents a summary of the project phases to date (table 3).

[3] The Water Boiling Test results ("WBT sample 1-3") provided to Gold Standard during the validation process.
[4] Deutsch Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, 2011. Available at https://energypedia.info/images/2/2c/GIZ_HERA_2012_Tikikil_Stove_ET.pdf (site visited 22/05/2014)
[5] Eco-Energy Options Pty Ltd, 2011: Durability Testing of the Tikikil Stove as provided to Gold Standard during the validation process.

Table 3: Summary of the project phases

Timing	Date	Task/Event
October 2014	11/10/2014	Project start date (Stove distribution start date)
October 2014	12/10/2014	Project crediting period start date
November 2014	03/11/2014	Project listed with GS
October 2015	10/10/2015	Stove distribution completed
December 2015	05/12/2015	Project registered with GS
February – March 2016	17/02 – 19/03/2016	1st Usage survey
February 2017	07/02/2017	1st verification with GS
May – June 2017	15/05 – 14/06/2017	2nd Usage survey
August 2017	09/08/2017	Submission to GS for the 2nd verification

In accordance with the implementation plan, the stoves have been sold to the families at a subsided cost, in exchange for the rights to the Voluntary Emission Reductions (VERs). With the signature of the "Carbon Transfer Contract" at the moment they have bought the stove, the users have entered into an agreement with the project implementer, transferring rights to the VERs generated by the VPA in return for the subsided payment of the stove.

The local workers implementing the stove distribution were trained by COOPI to fill the "Carbon Transfer Forms (CTF)[6]" in a correct and carefully manner. The data from the "Carbon Transfer Forms" have been entered into the electronic stove selling database[7] to enable the monitoring of the stoves over the crediting period. Data collected during Monitoring Survey have also been recorded in electronic format[8].

B.2 Post-registration changes

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

There have been only one temporary deviation from the registered monitoring plan during this monitoring period.

The deviation from the monitoring plan was made because the project area has been suffering severe droughts and for consecutive emergency and security problems part of the monitoring visits for the families living in the Arero, Hudet and Filtu woredas was impossible to be executed. The project area covers totally 5 "woredas" from which 3 are facing the security problems (Arero, Hudet and Filtu Woredas). Within these problematic areas there are living about 35% of the project households.

[6] Example of Carbon Transfer Contract 11-10-2014 (uploaded to GS registry during 1st verification)
[7] Stove Selling Database ver02 has been uploaded to GS Registry (note: no changes from the 1st verification)
[8] 2nd Monitoring Raw Data and Analysis ver02 (2017) has been uploaded to GS Registry

Telephonically made monitoring interview were first considered as an option but as only few families have their own mobile phones this option would not have been functional. Therefore, totally 34 families of the original sample were replaced with new randomly selected families living within the safer areas (i.e within Liben and Gorodola Woredas). This deviation was as approved via email by Gold Standard.

For the above reasons also the implementation time of the monitoring survey was delayed and the survey was not made during February-March 2017as foreseen but in May-June 2017. This slight delay of few months is not expected to have any impact on the results. Neither the reselection of the 34 sample families is not considered to have impact on the results as the area covered by the current survey covers anyhow the areas where the majority (66%) of the project families are living.

B.2.2 Corrections

There have been no corrections.

B.2.3 Changes to start date of crediting period

There have been no changes to the start date of the crediting period during this monitoring period.

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

N/A

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

There have been no permanent changes from the registered monitoring plan, the applied methodology during this monitoring period or standardized baseline.

B.2.6 Changes to project design of registered project activity

There have been no changes to project design of the registered project activity during this monitoring period.

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

N/A

SECTION C. Description of monitoring system

Below is presented the description of the monitoring system and its implementation during the second monitoring period. The monitoring of the project is made in accordance with the “Gold Standard

Simplified Methodology for Efficient Cookstoves (February 2013)[9]"and the attached "Project Monitoring Plan"[10] .

A. Sale Record

The Sale Record will include the following data as required by the methodology:

i. Date of sale and of installation

ii. Geographic area of sale

iii. Model/type of project cookstove(s) sold

iv. Name and telephone number (if available), address.

a. Required for all bulk purchasers, i.e. retailers

b. All end users; The names and telephone numbers or names and addresses collected must be commensurate with representative sampling, i.e. the names and addresses or phone numbers (where possible) within sales records shall be large enough so that surveys can be based on representative, random selected sample.

The above information has been collected in paper format during the stove selling. The electronic Sale Record is maintained and updated continuously by the project participant, COOPI. The original hard copies and the electronic database will be stored for entire life cycle of the project.

In line with the sale record the number of stoves distributed is totally 5,672.[7] No new stoves were sold or substituted during the second monitoring period.

B. Project database

The project database is derived from the total sales record with project cookstoves differentiated by different project scenarios. The differentiation of the project database into sections is based on the results of the applicable monitoring studies for each project scenario, in order that emissions reduction calculations can be conducted appropriately section by section. Project database is maintained and updated by the project participant, COOPI. The data will be backed up electronically, with original documentation being stored for entire life cycle of the project.

During this monitoring period only one project scenario, installation of Tikikil stoves, has been identified.

C. Ongoing Monitoring Studies

In line with the registered PDD, the ongoing monitoring studies are conducted for each project scenario annually, at least beginning one year after the project registration and on time for any request of issuance. Survey format B in Annex A of the applied methodology will be applied for carrying out the studies.

i. Monitoring consist of checking of a representative sample, once every year (annually) to ensure that project cookstoves are still operating by carrying out the usage survey as per the guidelines below.

[9] http://www.goldstandard.org/wp-content/uploads/2013/11/GS-simplified-micro-scale-cookstove-meth.pdf (site visited 02/07/2014)

[10] Project Monitoring Plan has been uploaded to GS Registry

Usage survey must be conducted to estimate the drop off rates as project cookstoves may not be adopted or may be disposed off and potentially replaced again by a baseline stove. Moreover, through the usage survey it will be ensured that the possible households using in the baseline improved stoves or other fuels than firewood will be excluded from the ER calculations.

Prior to the verification, a usage survey for each cookstove age-groups is required. For example, if only cookstoves in the first year of use (age0-1) are being credited, a usage parameter must be established for age-group 0-1, through a usage survey for cookstove age 0-1. If cookstoves of age 0-1 and age 1-2 are being credited (as part of first request for issuance), usage parameters must be established for age-group 0-1 and 1-2, respectively through a usage survey. If cookstoves of age-group 0-1 and age-group 1-2 are being credited (as part of second request for issuance), usage parameter must be established for age group 1-2 only through a usage survey as the usage rate for cookstoves of age-group 0-1 can be applied from the previous issuance.

To successfully conduct a usage survey, a minimum project cookstove sample size of each age-group should be in line with the following guidelines:

- Target population < 300: Minimum sample size 30
- Target population 300 to 1,000: Minimum sample size 10% of group size
- Target population > 1,000: Minimum sample size 100

ii. Where replacements are made, monitoring shall ensure that the efficiency of the new cookstove is similar to the appliance being replaced.

iii. The project must monitor the use of baseline stove in the project activity during annual surveys.

iv. The project must monitor the physical conditions of the cookstoves during annual surveys.

For this monitoring period 100 randomly selected project families were visited and interviewed between 15th May 2017 and 14th June 2017. The random selection of the families was made by using the function "Random" of Microsoft Excel for extracting the stove IDs the from the Selling Database. The project partner, COOPI, carried out the questionnaire interviews (Figures 3-4). The collected data have been inserted in an electronic database file by COOPI, and analysed by CarbonSink. The used questionnaire (exactly same as was used for the first monitoring survey) and the collected raw data are presented in separate files[11,12].

[11] Monitoring Questionnaire has been uploaded to GS Registry

[12] 2nd Monitoring Raw Data and Analysis ver02 (2017)" and "Examples of Filled Monitoring Forms (2017)"

Figure 3: Monitoring survey interview in Gorodola Woreda. Foto by COOPI

Figure 4: Monitoring Survey Interview in Liben Woreda. Foto by COOPI

Below are presented the main evidences emerged by the annual survey:

End-user profile: within the monitoring sample, each family had averagely 5.9 family members composed averagely from 42% of children, 32% of women and 26% of men (figure 5).

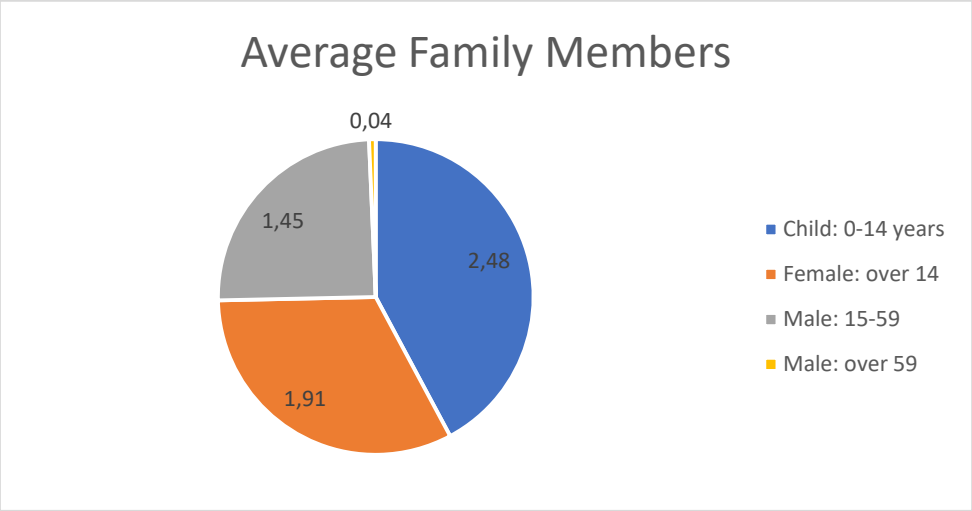

Figure 5: average family members' distribution

Cooking technologies used in the baseline situation:. Most families, 97% (98 respondents out of 100), stated to have cooked principally with three stone fires, while 2% (2 respondents out of 100) stated to have cooked principally with traditional charcoal stoves and one respondent (1%) to have used both three stone fire and traditional charcoal stove in the baseline situation (figure 6). No other cooking technology was stated to be used as principal cooking method.

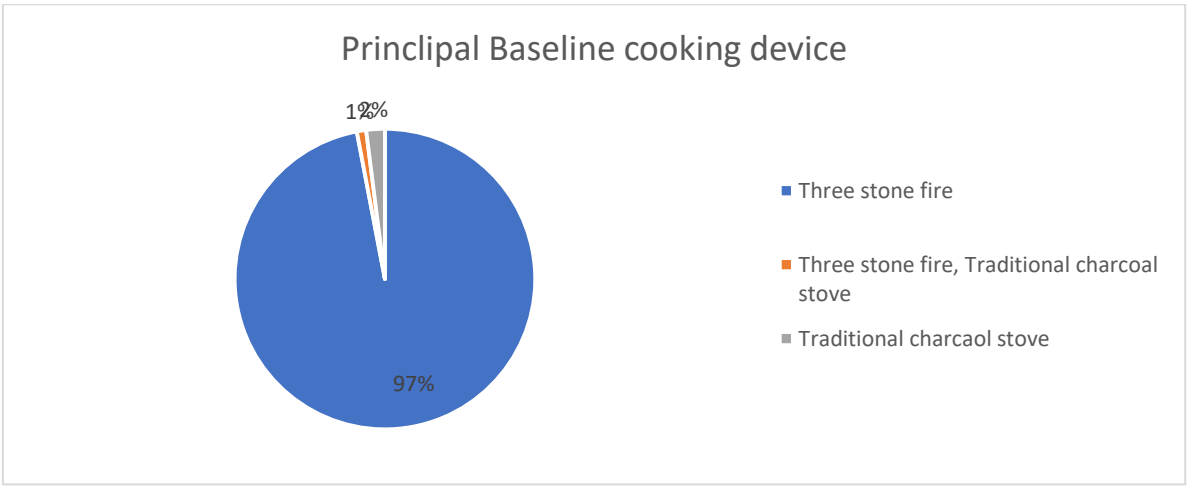

Figure 6: Principal cooking technologies used in the baseline situation

Cooking fuels used in the baseline situation: All households, 100 respondents out of 100, used firewood as their baseline fuel. In addition to firewood 3 households (3%), had used also charcoal (figure 7). No other fuel was stated to be used as principal cooking fuel.

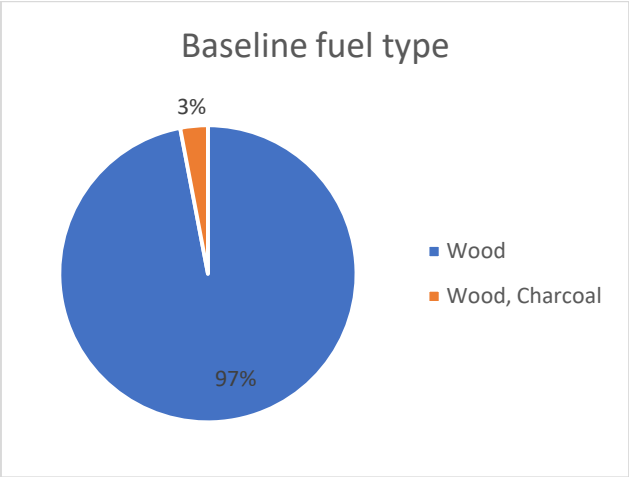

Figure 7: types of fuel used in the baseline situation

Project stoves usage: All the 100 respondents (100%) used the project stove daily cooking 2-4 daily meals. An average of 2.9 daily meals were cooked with the project stoves (figure 8). All the project stoves were declared also to be in good conditions (100 respondents out of 100), however 11% of the stoves were stated to have some small damages (like damages in pot stabilizer) but also all of these stoves were find to be working properly.

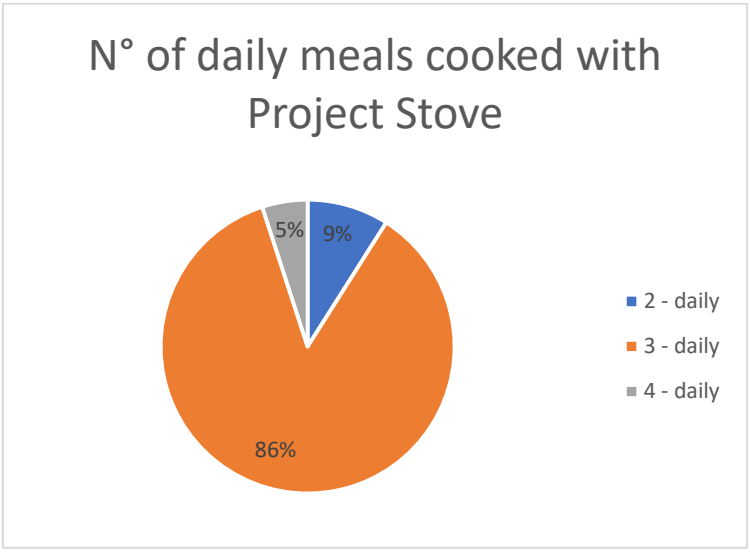

Figure 8: number of daily meals cooked with Project stove

Simultaneous use of additional technologies: 23% of the respondents (23 respondents out of 100) stated to use other technologies in addition to the project stoves. Three stone fires were used by 18 respondents for cooking activities and by 5 respondents for space heating purposes. Electric stoves were used instead by 2 respondents for cooking activities. (figure 9)

In all the cases, the project stoves were used anyhow as the primary cooking method. The total number cooked meals were estimated by the respondents to be averagely 3.2 meals/day/family from which averagely 92.5% where cooked with the project stoves and 7.5% with the other stoves (figure 10).

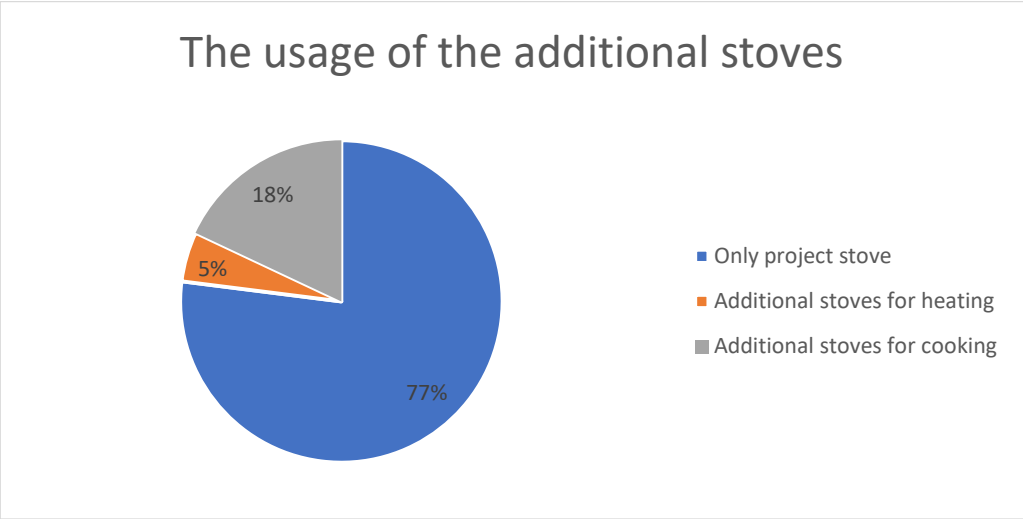

Figure 9: the percentages of respondents using the additional stoves

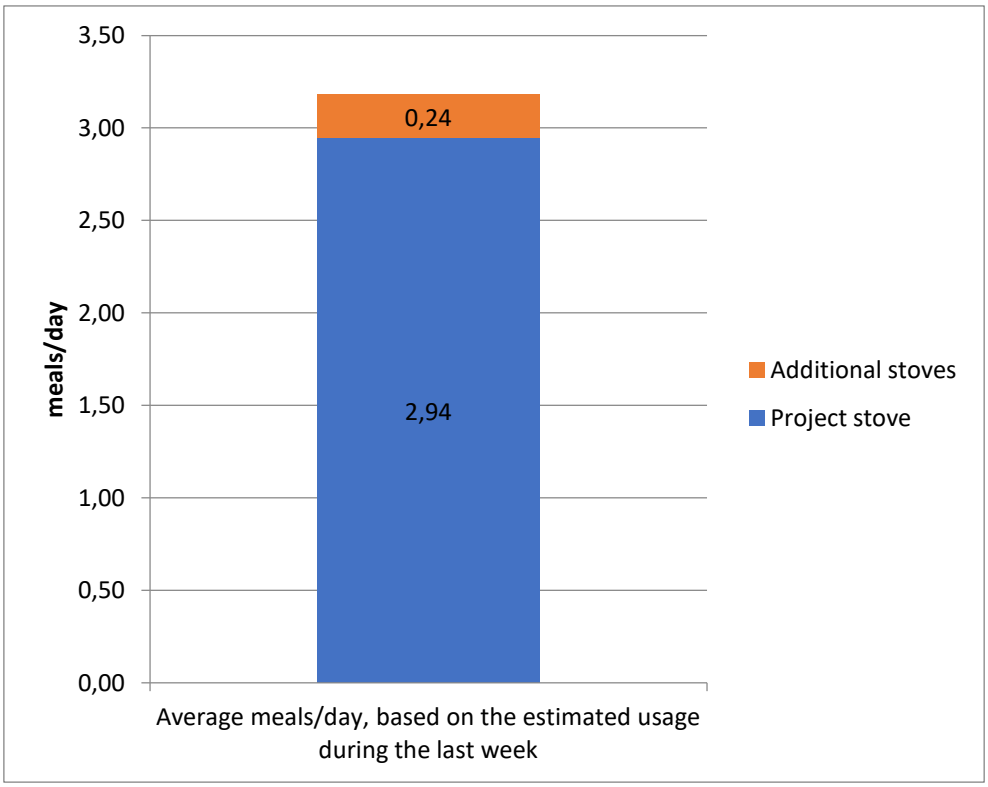

Figure 10: daily meals cooked averagely with project and additional stoves estimated based on the usage of one week

Fuel consumption in project situation: All 100 respondents stated to use wood for cooking activities. All 100 respondents (100%) also estimated to consume currently less wood than before. In line with this, 100% respondents stated to spend currently less money or time for fuel collection compared to the baseline situation. In addition to the wood, 3% (3 respondents out of 100) used also charcoal and 2% (2 respondents out of 100) electricity for cooking. No any other fuels, like kerosene or LPG, were identified to be used.

Air quality in project situation: All 100 respondents (100%) estimated to have had less respiratory problems and itchy eyes and moreover they have noted a reduction in smoke emission after starting

the usage of the project stove. No one of the respondents stated to have currently more (or even the same amount) of respiratory problems or itchy eyes as in the baseline situation.

Monitoring Survey Conclusions:

The values used in the emission reduction calculations are discussed below and summarized in the table 4.

Eligible project families: All the project families stated to have used firewood as their cooking fuel in the baseline situation. In addition to three stone fires, a small part of the project families (averagely 3%) had used traditional charcoal stoves in the baseline situation. Moreover, the monitoring survey relieved two project families (corresponding 2% of the sample) using currently electricity as their secondary cooking fuel and therefore its conservatively assumed that also electricity was used already in baseline even though the families had not indicated the electricity directly as their baseline fuel within this monitoring survey or within the previous monitoring survey made in 2016.

As the used Gold Standard methodology is applicable only for the baseline of firewood usage, conservatively only 95% (100% - 3% - 2% = 95%) of the stoves distributed and listed in the project database is considered eligible.

Usage rate ($U_{p,y}$): 100% of the respondents use the project stoves as their main cooking technology in daily basis.

Discount factor to account for efficiency loss of project cookstoves (DF_n): The default value of the methodology (0.99) can be used as the monitored stoves were found all in good condition.

Discount factor to account for the baseline stove use in project scenario ($DF_{P,stove,y}$): Averagely 92.5% of all the meals cooked are prepared with the project stoves, therefore, discount factor ($DF_{P,stove,y}$) for this monitoring period is set as 7.5%.

Sustainable development issues associated with the project activity: The sustainable development monitoring is discussed in separate Sustainable Development Verification Report[13].

Table 4: Summary of the values used for the emission reduction calculations

	1st verification	2nd Verification
Eligible project families	96%	95%
Usage rate ($U_{p,y}$)	96%*	100%
Discount factor factor to account for efficiency loss of project cookstoves (DF_n)	0.99	0.99
Discount factor to account for the baseline stove use in project scenario ($DF_{P,stove,y}$)	3%	7.5%

*In the 1st verification period 100% of the families were found to use daily the project stove but conservatively (based on the unclarities in the stove ID numbers indicated the monitoring database) the usage rate was set as 96%.

[13] 2nd SD Verification Report ver02 (2017) has been uploaded to GS Registry

SECTION D. Data and parameters

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

Data/parameter:	**$EF_{b,fuel,CO2}$**
Unit	tCO_2/tonne of firewood
Description	CO_2 emission factor arising from use of firewood in baseline scenario
Source of data	IPCC default value, table 1.4 of chapter 1 of Vol.2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied)	1.747
Choice of data or measurement methods and procedures	Default value deemed valid by the applied methodology (see page 8 of the methodology)
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments	Fixed for entire crediting period

Data/parameter:	**$EF_{b,fuel,non-CO2}$**
Unit	tCO_2/tonne of firewood
Description	Non-CO_2 emission factor arising from use of firewood in baseline scenario
Source of data	IPCC default value, table 2.9 of chapter 2 of Vol.2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied)	0.455
Choice of data or measurement methods and procedures	Default value deemed valid by the applied methodology (see page 8 of the methodology)
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments	Fixed for entire crediting period

Data/parameter:	**η_b**
Unit	Fraction
Description	Efficiency of the cookstove being used in the baseline scenario
Source of data	Default value of the applied methodology
Value(s) applied)	0.10
Choice of data or measurement methods and procedures	Default value of 10% is deemed valid by the applied methodology as the baseline stoves are three stone fires: “A default value of 10% shall be used if the replaced cookstoves is a three stone fire, or a conventional device without a grate or a chimney i.e. with no improved combustion air supply or flue gas ventilation.” (section 4.1. of the methodology)
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments	Fixed for entire crediting period

Data/parameter:	**η_p**
Unit	Fraction
Description	Efficiency of the cookstove being used in the project scenario
Source of data	Water Boiling test (WBT)
Value(s) applied)	0.27

Choice of data or measurement methods and procedures	Efficiency test made in accordance with section 4.3 of the applied methodology (test conducted by independent expert, following the Water Boiling Test protocol)[14]
Purpose of data	Calculation of project emissions or actual net GHG removals by sinks
Additional comments	Fixed for entire crediting period

Data/parameter:	**$f_{NRB,y}$**
Unit	Fractional non-renewability
Description	Non-renewable status of wood fuel during year y
Source of data	A default country specific fraction for Ethiopia available on the CDM website (http://cdm.unfccc.int/DNA/fNRB/index.html)
Value(s) applied)	0.88
Choice of data or measurement methods and procedures	The default NRB value provided by the CDM executive board and endorsed by the host country DNA is deemed valid by the applied methodology (see page 8 of the methodology)
Purpose of data	Calculation of project emissions or actual net GHG removals by sinks
Additional comments	The project activity may choose to update the f_{NRB} during the crediting period. The possible updates on the default country specific fraction of non-renewable woody biomass (f_{NRB}) value available on the CDM website will be controlled annually.

Data/parameter:	**$B_{b,y}$**
Unit	Tonnes firewood per household per year (tons/hh/year)
Description	Firewood consumption for cooking in the baseline
Source of data	Calculated based on default value of “Minimum service level” of the applied methodology
Value(s) applied)	2.5
Choice of data or measurement methods and procedures	Default value baseline biomass consumption of 0.5 tons/person/year for is deemed valid by the applied methodology (see the page 6 of the methodology). Moreover, in accordance with the methodology (page 6) the household size shall be determined by using credible references/literature or target population specific survey. The justification of the household size (5 persons/household) determination is described in section B.6.1. According the above the average annual consumption of firewood per household can be estimated to be 2.5 tons/year (0.5 tons/person/year * 5 persons/household = 2.5 tons/household/year).
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments	Fixed for entire crediting period

[14] The Water Boiling Test results (“WBT sample 1-3”) provided to Gold Standard during the validation
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D.2 Data and parameters monitored

Data/parameter:	**$U_{p,y}$**
Unit	Percentage
Description	Usage rate in project scenario p during year y
Measured/calculated/default	Measured
Source of data	Annual usage survey/monitoring survey
Value(s) of monitored parameter	100%
Monitoring equipment	Usage survey
Measuring/reading/recording frequency:	The usage survey is carried out annually as described in section B.7.2
Calculation method (if applicable):	N/A
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of project emissions or actual net GHG removals by sinks
Additional comments:	A usage parameter is derived for each age group of project cookstove being credited

Data/parameter:	**$N_{p,y}$**
Unit	Number of project cookstove credited (units)
Description	Cookstove in the project database for project scenario p through year y
Measured/calculated/default	Measured
Source of data	Sales record
Value(s) of monitored parameter	4,955
Monitoring equipment	Stove selling database
Measuring/reading/recording frequency:	Continuous monitoring. The number of project cook stoves is recorded in the total sales record which maintained as described in section B.7.2
Calculation method (if applicable):	N/A
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of project emissions or actual net GHG removals by sinks
Additional comments:	Only 96% of the project cookstoves listed in the “Sales Record database” are considered eligible based on the Monitoring Survey findings describe in section C above.

Data/parameter:	**DF_n**
Unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstoves
Measured/calculated/default	Default
Source of data	Annual monitoring / applied methodology
Value(s) of monitored parameter	0.99
Monitoring equipment	Monitoring survey
Measuring/reading/recording frequency:	Annual monitoring. The physical conditions of the cookstoves is monitored as described in section B.7.2.

Calculation method (if applicable):	N/A
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of project emissions or actual net GHG removals by sinks
Additional comments:	This default value can be used if stoves are found in good condition during annual surveys. For each year, the stoves of the age-group x-y should be physically verified. In the case of progressive installations, stove of age-group 0-1 shall also be physically verified each year through a random sampling approach. The survey format B (Annex A of the applied methodology) will be followed to capture the required information. Minimum number of sample size shall be selected following the guidelines provided in section 4.2, option (b) of the applied methodology. During annual survey if it is found that the project cookstoves are not in working conditions, the proportionate population of project cookstoves should be excluded from the project database, until these cookstoves are replaced with new cookstoves.

Data/parameter:	**$DF_{P,stove,y}$**
Unit	Fraction
Description	Discount factor to account for the baseline stove use in project scenario p during the year y
Measured/calculated/default	Measured
Source of data	Annual monitoring.
Value(s) of monitored parameter	0.075
Monitoring equipment	Annual monitoring
Measuring/reading/recording frequency:	Annual monitoring. The use of baseline stove in the project activity is monitored as described in section B.7.2.
Calculation method (if applicable):	N/A
QA/QC procedures:	Transparent data analysis and reporting
Purpose of data:	Calculation of project emissions or actual net GHG removals by sinks
Additional comments:	The discount factor for baseline-stove use may be determined based on number of meals cooked using the baseline stoves. The required information shall be captured through sample-surveys carried out following a random sampling approach for each age-group of the project stove. The minimum number of samples sizes shall be selected following the guidelines provided in section 4.2, option (b) of the applied methodology. The survey format B (Annex A of the applied methodology) will be followed to capture the required information. The impact of seasonal variations on use of baseline stove should be considered as part of the monitoring survey.

A.1. Implementation of sampling plan

(a) Description of implemented sampling design

The sampling for this monitoring period was based on simple random sample method and it was selected within the stoves recorded in the Stove Selling Database[15]. Totally 105 project families were interviewed but 4 families were left out from the further analysis because of the unconformities found in the stove ID number. Total sample of 101 is being anyhow in line with the applied methodology requiring a minimum sample size of 100 for the target population larger than 1000.

It can be noted that during this monitoring period there is present only one age-vintage (age 0-1) of the project technologies as all the project stoves have been installed within 1 year of the start of the crediting period.

(b) Collected data

The used questionnaire and the collected raw data are presented in separate files[16,17]

(b) Analysis of the collected data

The analysis of the collected monitoring data is presented in Section C of this report.

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

As the monitoring is made through Survey of local usage (Option b of the section 4.2. of the applied methodology) there is no need to determine confidence/precision level.

[15] Stove Selling Database ver02 has been uploaded to GS Registry (note: no changes from the 1st verification)
[16] Monitoring Questionnaire has been uploaded to GS Registry
[17] "2nd Monitoring Raw Data and Analysis ver02 (2017)" and "Examples of Filled Monitoring Forms (2017)"

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 the Section E.2. below.

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

The emission reductions are calculated with the following equation:

$$ER_y = \sum_{0\text{to}1}^{x\text{to}y} N_{P,y} * P_y * U_{P,y} * (f_{NRB,y} * EF_{b,fuel,CO2} + EF_{b,fuel,non\_CO2}) * (1 - DF_{b,Stove,y}) \quad \text{.....(1)}$$

Where:

$N_{P,y}$	Number of project cookstoves of each age group operational in the year y
P_y	Quantity if firewood that is saved in the year y (tonnes per household in year y)
$U_{P,y}$	Usage rate for project cookstoves in year y, based on adoption rate and drop off rate revealed by usage survey (fraction)
$f_{NRB,b,y}$	Fraction of biomass, used in year y for baseline scenario, which can be established as non-renewable. The project proponents shall estimate project specific national/regional value or apply the default f_{NRB} value provided by CDM Executive Board and endorsed by the host country DNA.
$EF_{b,fuel,CO2}$	CO_2 emission factor of firewood that is substituted or reduced. (Default value for wood fuel 1.747 tCO_2/ton of wood)
$EF_{b,fuel,non\_CO2}$	Non-CO_2 emission factor of firewood that is substituted or reduced. (Default value for wood fuel 0.455 tCO_2/ton of wood)
$DF_{b,Stove,y}$	Discount factor to account for the baseline stove use in project scenario p during the year y
x	y-1
y	Year of the crediting period

Determination of quantity of biomass saved (P_y)
Quantity of firewood that is saved (P_y) is estimated as follows:

$$P_y = B_{b,y} * (1-\eta_b/\eta_{p,y}) \quad \text{.....(2)}$$

Where:

$B_{b,y}$	Quantity of firewood consumed in baseline scenario during year y

$\eta_{p,y}$ Efficiency of project cookstove in year y (fraction)

η_b Efficiency of the baseline cookstove being replaced (fraction). A default value of 10% shall be used if the replaced cookstoves is a three stone fire, or a conventional device without a grate or a chimney i.e. with no improved combustion air supply or flue gas ventilation.

Determination of quantity of firewood consumed in the baseline ($B_{b,y}$)

The quantity of firewood consumed in the baseline is determined based on the estimated average annual consumption of firewood per household (tones/year). For this purpose the option (c) "Minimum service level" (0.5 tons per capita per year) of the applied methodology is chosen as described in the registered PDD. In accordance with the methodology, the household size shall be determined in this case by using credible references/literature or target population specific survey.

As described in the registered PDD and according to the data of Ethiopia's Central Statistical Agency (CSA), the mean households size in Ethiopia, in 2012, was 5.0 persons/household in rural and 3.0 persons/household in urban areas[18]. For estimating the baseline wood consumption in the project area, it is chosen conservatively to use the national mean household size of rural areas (5.0 persons/household). This can be considered conservative choice in respect to the results of the Baseline Survey (included 587 households), according to which the majority of the families (64%) living in the project area are having 6 or more family members[19] and according to the national average fertility rate of 4.6 live births per woman in 2010-2015 as per UN Data.[20]

According to the above, the average annual consumption of firewood per household can be estimated to be 2.5 tons/year (0.5 tons/person/year * 5 persons/household = 2.5 tons/household/year).

Determination of project cookstove efficiency ($\eta_{p,y}$ and η_p)

Efficiency of project cookstoves in year y ($\eta_{p,y}$) is estimated as follows:

$$\eta_{p,y} = \eta_p * (DF_\eta)^{y-1} * 0.94 \quad \text{.....(3)}$$

Where:

$\eta_{p,y}$ Efficiency of project cookstove in year y (fraction)

η_p Efficiency of project cookstove (fraction) determined at the start of the project activity. In the situation where project stove efficiency is determined using WBT, this is the value determined annually as a result of the test.

DF_η Discount factor to account for efficiency loss of project cookstove per year of operation (Fraction). The default value for this parameter is 0.99 i.e. 1% efficiency loss/year.

0.94 Adjustment factor to account for uncertainty related to project cookstove efficiency test

In accordance with the applied methodology, the efficiency of the project cookstove is determined by an independent expert or entity, in the field or laboratory, following the Water Boiling Test (WBT)

[18] As reported in "Population Stabilisation Report, Ethiopia" published in March 2014 provided to Gold Standard during the validation process

[19] BAGER SAFE ENVIRONMENT FOR HEALTH SERVICES PLC, 2012. A Baseline Report on the assessment of the social and technical acceptability of Fuel Saving Stove (FSS) in Filtu and Liben Woreda.

[20] http://data.un.org/CountryProfile.aspx?crName=Ethiopia (site visited 24/03/2015)

protocol (available at http://www.pciaonline.org/node/1048). As described in registered PDD, the project cookstove efficiency was carried out by independent entity, GIZ, who performed the efficiency test in laboratory in accordance with the above described requirements.

In line with the applied methodology and the registered PDD, the option to make the efficiency test at the time of installation and to use the default factor for determining the efficiency for the latter is chosen to be used.

E.3. Calculation of leakage

In accordance with the applied methodology leakage related to non-renewable biomass saved by the project activity is not considered as the proposed project is a stand-alone micro-scale project activity.

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
2016 (01/04/201-31/12/2016)	17,601	7,800	0	N/A	6,682	6,682*
2017 (01/01/2017-31/03/2017)	5,846	2,612	0	N/A	3,233	3,233
Total	23,446	10,412	0	N/A	9,915	9,915

*The value has been capped to remain within the micro-scale limit of 10,000 tCO_2 during the year 2016.

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)	2016 (01/04/2016-31/12/2016): 7,326 2017 (01/01/2017-31/03/2017): 2,426 Total: 9,752	2016 (01/04/2016-31/12/2016): 6,682 2017 (01/01/2017-31/03/2017): 3,233 Total: 9,915

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

The estimated value calculated ex ante and presented in the registered PDD is different from the actual value calculated for this Monitoring Period mainly due to following aspects:

First of all, in the ex ante estimations the number of the distributed stoves were estimated to be in totally 5,090. The real number of the distributed stoves was instead 4,955 from which only 95% (corresponding 4,707 stoves) has been considered eligible as described in Section C above.

Moreover, the values of used for Usage Rate ($U_{p,y}$) and Discount factor to account for the baseline stove use in project scenario ($DF_{b,Stove,y}$) have been updated for the ex post calculations based on the monitoring results; In ex ante estimations the Usage rate for the first four project years was estimated to be conservatively only 80%, instead, based on the current monitoring the Usage rate was 100%. The discount factor to account for the baseline stove use was instead estimated ex-ante to be 20% while the current monitoring survey confirmed it to be currently 7.5%.

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	Cooperazione Internazionale Fondazione (COOPI)
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Direct fax	
Direct tel.	
Personal e-mail	

Project participant and/or responsible person/ entity	☐ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
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Direct tel.	
Personal e-mail	

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Document information

Version	*Date*	*Description*
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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