



**Monitoring report form for CDM programme of activities
(Version 02.0)**

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT

Title of the PoA	Energy Efficient Stoves Program (EESP)	
UNFCCC reference number of the PoA	9769	
Version numbers of the PoA-DD applicable to this monitoring report	04	
Version number of this monitoring report	03	
Completion date of this monitoring report	30/06/2018	
Monitoring period number	04	
Duration of this monitoring period	17/10/2016 - 16/10/2017 (first and last date included)	
Monitoring report number for this monitoring period	01	
Coordinating/managing entity	World Vision Australia	
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)
	Federal Democratic Republic of Ethiopia	Yes
Sectoral scopes	(3) Energy Demand	
Applied methodologies and standardized baselines	Applied methodologies: AMS-II.G "Energy efficiency measures in thermal applications of non- renewable biomass" Version 5.0. Applied Standardized baselines: N/A	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	N/A	104,950
Amount of GHG emission reductions or net anthropogenic GHG removals	139,588	

estimated ex ante for this monitoring period in the CPA-DDs for the CPAs covered in this monitoring report	
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PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

The goal of the SSC-PoA is to distribute and install fuel efficient cook stoves to rural households cooking with firewood in the Federal Democratic Republic of Ethiopia. The stoves reduce the amount of non-renewable biomass used by households, therefore decreasing Greenhouse Gas (GHG) emissions.

The CPA implementers – World Vision Ethiopia and World Vision Australia are responsible for transporting and distributing stoves to households, and also providing training on how to use and maintain the stoves effectively.

World Vision Australia is also the Coordinating/Managing Entity (CME) for the PoA. During this monitoring period, no new stoves were distributed, however, old Tikikil stoves that ended its operating life were replaced under CPA 1, CPA 2 and CPA3. In this monitoring period, 13,092 Tikikil stoves under CPA 1; 11,812 Tikikil Stoves under CPA 2; 1,670 Tikikil Stoves under CPA 3 were replaced as those stoves reached their end of operating life. Details of the Tikikil stoves that were replaced during this monitoring period are outlined in the tables below:

CPA	District/Location	Number of Tikikil Stove Replaced
CPA 1	Adaberga	3230
	Enemorana Ener	2273
	Guraghe	1453
	Nono	2504
	Wonchi	350
	Yaya Gullele	3282
	Total	13,092

CPA	District/Location	Number of Tikikil Stove Replaced
CPA 2	Boset	950
	Digeluna Tijo	920
	Enemorena Ener	881
	Guraghe	951
	Jeju	1704
	Shashemene	1314
	Tullo	985
	Wonchi	3837
	Yaya Gullele	270
	Total	11,812

CPA	District/Location	Number of Tikikil Stove Replaced
CPA 3	Jeju	63
	Digeluna Tijo	249
	Tullo	84
	Sokoru	993
	Shashemene	190
	Boset	91
	Total	1670

In total, 49,819 Tikikil stoves and 49,819 Mirt stoves have been distributed collectively under CPA 1, CPA 2 and CPA 3 until the end of fourth monitoring period, out of which, 18,377 (Tikikil) and 18,377 (Mirt) stoves have been distributed under CPA 1; 15,890 (Tikikil) and 15,890 (Mirt) stoves have been distributed under CPA 2; 15,552 (Tikikil) and 15,552 (Mirt) stoves have been distributed under CPA 3. Until the end of the third monitoring period, 15,423 Mirt and 15,423 Tikikil Stoves were captured and recorded in the CPA 3 cook stove distribution database. However, in this monitoring period 129 Mirt and 129 Tikikil Stoves that were distributed during the third monitoring period but were not captured in the database have been included into the database. Therefore, the total number of Mirt and Tikikil stoves reported under this Monitoring Period for CPA 3 are 15,552 (Mirt) and 15,552 (Tikikil).

Stove producers are contracted to manufacture standardized stoves for each CPA. The CPA implementers are responsible for monitoring the distribution and installation of stoves in each CPA to ensure that each stove meets pre-determined quality standards and has a unique identification number.

World Vision Ethiopia and World Vision Australia are the project implementers of CPA 1, CPA 2 and CPA 3. World Vision Australia is the project implementer as well as the CME of the PoA. The project has utilised a cooperative mechanism for stove distribution. Stove user cooperatives were set up to enable people to purchase stoves at a subsidised price and in installments. Each CPAs were provided fuel-efficient stoves to households using fuel wood. These project stoves have replaced inefficient traditional open fire cooking.

“Tikikil” stove was designed by GIZ and the design is based on a traditional rocket stove, which achieves efficient combustion of fuel at a high temperature by ensuring that there is a good air draft into the fire, controlled use of fuel, complete combustion of volatiles, and efficient use of the resultant heat.

“Mirt” stove was designed by the Ethiopian Rural Energy Development and Promotion Centre (EREDPC) in conjunction with GIZ in response to the need for an improved stove that could cook the staple Ethiopian food of Injera along with the secondary needs of roasting grain.

The Mirt stove is made of cement and pumice (a volcanic ash) that binds well with cement and is a good insulator. A mould is used to create the cement components of the stove, which was then transported to the household where the pumice was used to install the stove within the kitchen.

The CPAs have reduced the consumption of energy by implementing energy efficient cook stoves that consumes less (fuel wood), thus reducing the greenhouse gas emissions associated with cooking food on inefficient, traditional open fires.

In this monitoring period, 104,950 tCO_{2-e} (CPA 1+CPA2+CPA 3) was reduced by the implementation of the project activities in Ethiopia.

A.1.1. Corresponding generic component project activities (CPAs)

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
<p>Title/ identification number of the generic CPAs not provided in the registered PoA-DD</p> <p>Each Generic CPA involves the distribution and installation of a number of stoves to households in the project boundary with annual energy savings of up to 180 GWh thermal.</p> <p>Version number of Generic CPA-DD: 04 (same as registered PoA-DD)</p>	04	(3) Energy Demand	AMS-II.G “Energy efficiency measures in thermal applications of non-renewable biomass” Version 5.0.

A.1.2. CPAs included in the PoA

Title and UNFCCC reference number of the CPA	Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Crediting period type and duration	Covered in this monitoring report? (yes/no)
CPA 9769-0001: Energy Efficient Stoves Program CPA 1	Generic CPA-DD (Version 04)	04	Crediting period type: Fixed Duration: 17/10/2013 – 16/10/2023	Yes
CPA 9769-0002 : Energy Efficient Stoves Program CPA 2	Generic CPA-DD (Version 04)	04	Crediting period type: Fixed Duration: 28/04/2014 – 27/04/2024	Yes
CPA 9769-0003 : Energy Efficient Stoves Program CPA 3	Generic CPA-DD (Version 04)	04	Crediting period type: Fixed Duration: 30/05/2014 – 29/05/2024	Yes

A.2. Coordinating/managing entity

World Vision Australia

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

World Vision Australia, contracted Additional Energy Limited to oversees the CPA implementation, ensuring that their technical and administrative processes meet the requirements under the PoA. World Vision Australia has implemented the PoA with the same set framework as originally described in the PoA-DD

Additional Energy Limited has conducted following activities on behalf of the CME:

- Carry out a quality check on CPAs to be included in the Programme of Activities.
- Collect and compile monitoring records from all the CPA entities.
- Coordinate monitoring activities and data management during the lifetime of the PoA.
- Prepare and submit monitoring reports and facilitate the verification of the same.

The CPA implementers - World Vision Ethiopia and World Vision Australia are responsible to collate and record the data. All records and user agreements are stored in both electronic and hard copy format at the local level by the CPA implementers. The data is provided to the CME and stored in an electronic database. The electronic database is used to store information in relation to each user, who has purchased a stove, where the household is located within CPA, price and model of the stove, date of purchase, etcetera.

Double counting is avoided through the use of a unique serial number permanently embedded on or near each stove (depending on stove make/model) under every CPA included in the PoA, which is cross referenced to personal information of each participant.

B.2. Post-registration changes to PoA

B.2.1. Corrections

N/A

B.2.2. Inclusion of monitoring plan

N/A

B.2.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

N/A

B.2.4. Changes to programme design

N/A

PART II Monitoring of CPAs

This Monitoring Report covers all the three CPAs included in this monitoring period. These CPAs have the same project boundary and follow the generic CPA as identified in section A.1.1, Part I of this monitoring report. The following sections therefore represent all these three CPAs.

SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

By the end of fourth monitoring period the CPA implementers have distributed following number of cook stove under each CPAs.

CPAs	Mirt stoves distributed	Tikikil stoves distributed
CPA 1	18,377	18,377
CPA 2	15,890	15,890
CPA 3	15,552	15,552

“Tikikil” stove was designed by GIZ and the design is based on a traditional rocket stove, which achieves efficient combustion of fuel at a high temperature by ensuring that there is a good air draft into the fire, controlled use of fuel, complete combustion of volatiles, and efficient use of the resultant heat.



Figure 1: Tikikil Stove

“Mirt” stove was designed by the Ethiopian Rural Energy Development and Promotion Centre (EREDPC) in conjunction with GIZ in response to the need for an improved stove that could cook the staple Ethiopian food of Injera along with the secondary needs of roasting grain. It is suitable for both domestic and industrial use and it significantly reduces the amount of smoke within the kitchen as opposed to the three stone open fire.



Figure 2: Mirt Stove

The Mirt stove is made of cement and pumice (a volcanic ash) that binds well with cement and is a good insulator. A mould is used to create the cement components of the stove, which was then transported to the household where the pumice was used to install the stove within the kitchen.

For CPA 1, stove distribution commenced from 9 September 2012.

For CPA 2, stove distribution commenced from 23 November 2012.

For CPA 3, stove distribution commenced from 9 February 2014.

Double counting is avoided through the use of a unique serial number permanently embedded on or near each stove (depending on stove make/model) under every CPA included in the PoA, which is cross referenced to personal information of each participant.

In order to avoid double counting, the CPA implementer has provided a unique stove ID for each new stoves. Unique IDs of both replaced (i.e. old stoves) and the new stoves are recorded in the project database including the date of replacement, name and address of the stove beneficiaries. In order to avoid the future usage of replaced Tikikil stoves by the project beneficiaries, the relevant cooperative groups have collected the replaced stoves (i.e. old stoves) from the project households.

In this monitoring period, 104,950 tCO_{2-e} (CPA1 +CPA2+CPA 3) were reduced by the implementation of the project activities in Ethiopia. Breakdown of the emissions reduction is outline below for each CPAs.

CPAs	Emissions Reduction (tCO _{2-e})
CPA 1	35,378
CPA 2	34,355
CPA 3	35,217
Total	104,950

C.2. Location of CPAs

All CPAs with this POA are located within the Host country, the Federal Democratic Republic of Ethiopia; Individual CPAs are located as follows:

CPA 9769-0001:

Area	GPS Coordinates
Ada Berga	9°24'22.68" N 38°26'07.56" E
Enemorena Ener	8°01'29.18" N 37°46'08.92" E
Guraghe	8°12'00.83" N 38°05'05.64" E
Nono	8°31'53.91" N 37°25'19.67" E
Wonchi	8°40'21.52" N 37°55'15.08" E
Yaya Gulele	9°34'54.97" N 38°36'20.35" E

CPA 9769-0002:

Area	GPS Coordinates
Ada Berga	9°24'22.68" N 38°26'07.56" E
Enemorena Ener	8°01'29.18" N 37°46'08.92" E
Guraghe	8°12'00.83" N 38°05'05.64" E
Nono	8°31'53.91" N 37°25'19.67" E
Wonchi	8°40'21.52" N 37°55'15.08" E
Yaya Gulele	9°34'54.97" N 38°36'20.35" E
Boset	8°34'55.50" N 38°29'23.04" E
Jeju	8°17'25.74" N 39°35'15.81" E
Tulo	9°6'42.34" N 41°1'44.83" E
Digeluna Tijo	7°43'57.57" N 39°29'35.58" E

CPA 9769-0003:

Area	GPS Coordinates
Tulo	9°6'42.34" N 41°1'44.83" E
Enemorena Ener	8°01'29.18" N 37°46'08.92" E
Boset	8°34'55.50" N 38°29'23.04" E
Digeluna Tijo	7°43'57.57" N 39°29'35.58" E
Sokoru	8°08'14.68" N 37°33'07.94" E
Shashemene	7°12'0.45" N 38°36'0.75" E
Jeju	8°17'25.74" N 39°35'15.81" E

C.3. Post-registration changes to CPAs**C.3.1. Temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies or standardized baselines**

N/A

C.3.2. Corrections

N/A

C.3.3. Changes to the start date of the crediting period

N/A

C.3.4. Inclusion of monitoring plan

N/A

C.3.5. Permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

N/A

C.3.6. Changes to project design

N/A

SECTION D. Description of monitoring system of CPAs

The CPA implementers - World Vision Ethiopia and World Vision Australia are responsible for recording of project specific data. Each stove purchaser signs a user agreement purchase contract, where the date, name of purchases, address where the stove is being used, and stove ID are recorded. This enables the user to be uniquely identified.

The World Vision Ethiopia project site officers record Cook Stove distribution information firstly in the paper form. The World Vision Ethiopia project officers then digitise the paper recording by inputting all project related data onto the excel database.

World Vision Ethiopia records the following parameters into the excel database:

Particular	
1	Customer ID
2	Customer Cooperative Membership Number
3	Customer Name and Address
4	Name of the Stove Distributor/ Cooperatives
5	Stove Distribution Location
6	Signed User Agreement (Agreement between CPA developer and those who will purchase/receive) stoves

7	Number and type of Stove distributed
8	Identification number of each type of Stove
9	Unit Price of each type of Stove
10	Type of non-operational Stove
11	Identification number of non-operational stove
12	Stove replacement data (If applicable)
13	Customer details (customer name, customer cooperative membership number and address), if different than previously submitted details

World Vision Ethiopia then submit the recorded data to the CME. CME reviews the data and in the case of any inconsistency found, the CME request the World Vision Ethiopia to review or correct the data. The following diagram depicts the information flow between World Vision Ethiopia and the CME.

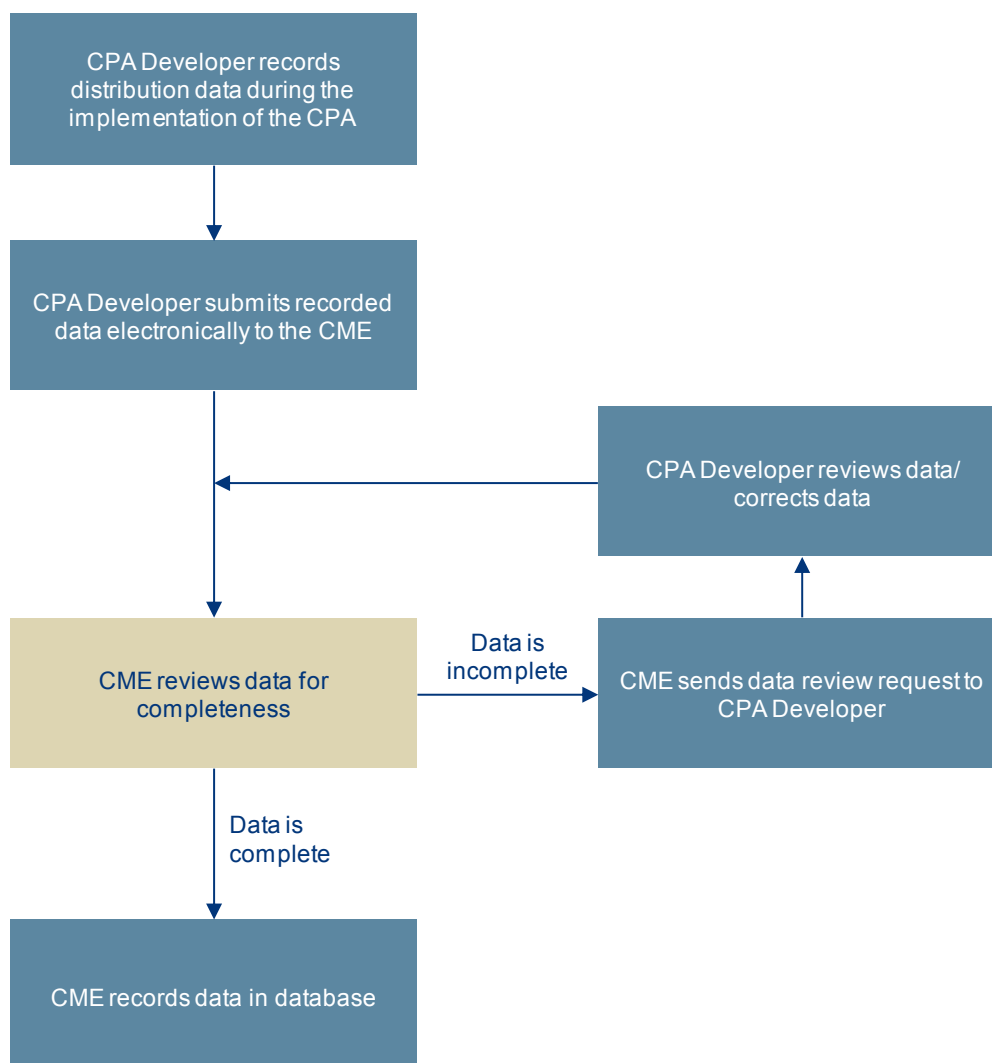


Diagram 1: Information Flow

In order to ensure that the baseline stoves are no longer used within the project boundary, all

project households are required to sign an agreement stating that they are no longer allowed to use the baseline stove for cooking food.

As the householders sometime may use the baseline stove for non-cooking purposes such as the production of alcohol, therefore the proportion of fuel wood ($FW_{\text{proportion}}$) consumed by cooking for each stove type is factored into the calculation of $B_{y, \text{Device, Mirt}}$ (49.91% for Injera baking) and $B_{y, \text{Device, Tikikil}}$ (41.50% for other cooking) to ensure that the emissions arising from cooking activities only are considered for emissions reduction calculations.

To ensure that the stove beneficiaries are using project stoves, the CPA implementers utilise the existing cooperative structure to monitor and encourage the use of project stove. Once the stoves are distributed, installed and the stove beneficiaries are trained on use and maintenance of the stove, a team of cooperative members visit each household within that village to ensure that the beneficiaries have disposed their baseline stove/s and are using project stoves for cooking. The household visit by the cooperative members also assists the stove beneficiaries in addressing any operational issues with the project stoves. The cooperative team makes such visit within one month from the date of project-stove distribution. Through the household visits, the cooperatives ensure that stove beneficiaries are using project stoves and they comply with the user agreement.

In the instances where a replacement stove is required by a purchaser, due to damage or theft, the household will be provided with a new stove (same model as the original stove) with an updated identification number to ensure no double counting of emission reductions. If a change of ownership occurs within the project area, then the old owner is replaced by the new one. All change of ownership and new ownership details are recorded in the electronic database as well as a copy of the user agreement kept at the CPA implementer's office.

The functionality Check survey was conducted by World Vision Ethiopia project staff in compliance with registered monitoring plan. The Project Efficiency Sample Group (PESG) survey was outsourced to the third party and was conducted jointly by Ministry of Water and Electricity Ethiopia and Ministry of Environment, Forestry and Climate Change. Once both surveys were completed, World Vision Ethiopia sent the survey findings to the CME. CME then used the finding of the survey in the emission reduction calculation and prepares the Monitoring Report.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

CPA 9769-0001:

Data/Parameter	$f_{\text{NRB},y}$
Unit	%
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
Source of data	Using government data or default country specific fraction of non-renewable biomass (fNRB) values available on the CDM website.
Value(s) applied	88%
Choice of data or measurement methods and procedures	Default country specific fraction of non-renewable biomass (fNRB) value for the Federal Democratic Republic of Ethiopia available on the CDM website. http://cdm.unfccc.int/DNA/fNRB/index.html
Purpose of data/parameter	Calculation of baseline emissions

Additional comments	-
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Data/Parameter	NCV_{biomass}
Unit	TJ/t
Description	Net calorific value of the non-renewable biomass that is substituted on wet basis
Source of data	IPCC default for wood fuel (IPCC value 2006)
Value(s) applied	0.015
Choice of data or measurement methods and procedures	Default value as provided in paragraph 11 of AMS-II.G Version 5.0
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$EF_{\text{projected_fossilfuel}}$
Unit	tCO ₂ /TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	As per footnote 4 of AMS-II.G Version 5.0
Value(s) applied	81.6
Choice of data or measurement methods and procedures	Default value as provided in paragraph 11 of AMS-II.G Version 5.0
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	SC_{old}
Unit	g/kg
Description	Specific fuel consumption of the baseline devices
Source of data	CCT Results: Open Fire (specific fuel consumption). Please refer to page 6 of GTZ-SUN: Energy Mirt stove test report.
Value(s) applied	1031
Choice of data or measurement methods and procedures	The use of a pre-existing test report produced by STZ-SUN: Energy for traditional open fires have been used to determine SC_{old}
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	η_{old}
Unit	%
Description	Efficiency of the system being replaced
Source of data	Paragraph 12 of AMS-II.G Version 5.0

Value(s) applied	10
Choice of data or measurement methods and procedures	This CPA has chosen to apply the default value as given in AMS-II.G Version 5.0 to determine η_{old}
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	L_y
Unit	Fraction
Description	Leakage adjustment factor for period y
Source of data	Paragraph 29 (c) of AMS-II.G Version 5.0
Value(s) applied	0.95
Choice of data or measurement methods and procedures	<p>According to AMS-II.G Version 5.0, leakage related to the non-renewable woody biomass saved by the project activity shall be assessed based on (a) ex post surveys of users and the areas from which this woody biomass is sourced, or alternatively (b), where B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.</p> <p>The methodology also requires leakage to be considered if equipment currently being utilized is transferred from outside the boundary to the project activity. This leakage source can be ruled out of this PoA as all stoves deployed in the program will be new.</p> <p>All CPAs to be included in this PoA will use the default net to gross adjustment factor of 0.95 to account for leakages.</p>
Purpose of data/parameter	Calculation of leakage
Additional comments	-

Data/Parameter	$N_{eater, household}$
Unit	-
Description	Average number of eaters (residents) per household
Source of data	UN Data
Value(s) applied	6
Choice of data or measurement methods and procedures	<p>An average household size of 6 based on a fertility rate of 4.8 live births per woman in 2011, as per UN Data available at: http://data.un.org/Data.aspx?q=Fertility+rate&d=WDI&f=Indicator_Code%3aSP.DYN.TFRT.IN</p>
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$FW_{\text{proportion, Mirt}}$
Unit	%
Description	The proportion of household fuel wood consumed by stove type i
Source of data	Letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia
Value(s) applied	49.91
Choice of data or measurement methods and procedures	Official letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia confirming the survey results from the Woody Biomass Inventory and Strategic Planning Project (WBISPP) for Injera baking.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$FW_{\text{proportion, Tikikil}}$
Unit	%
Description	The proportion of household fuel wood consumed by stove type i
Source of data	Letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia
Value(s) applied	41.50
Choice of data or measurement methods and procedures	Official letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia confirming the survey results from the Woody Biomass Inventory and Strategic Planning Project (WBISPP) for other types of cooking.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$HC_{\text{fuelwood, usage, y}}$
Unit	Tonnes
Description	Host country national fuel wood consumption in tonnes during year y.
Source of data	UN Data (http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW%3btrID%3a06) and the wood density factor as given by the FAO (http://www.fao.org/docrep/009/j8227e/j8227e11.htm#P1131_70563)
Value(s) applied	55,325,475

Choice of data or measurement methods and procedures	This is calculated based on national household fuel wood consumption of 76,311,000m ³ (national consumption in 2007 multiplied by the wood density factor of 0.725t/m ³ - http://www.fao.org/docrep/009/j8227e/j8227e11.htm#P1131_70563) It is important to note that the fuel wood consumption per capita is an average value for all Ethiopian households, whether they are using fuel wood or not and is therefore conservative.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	HC _{population,y}
Unit	-
Description	Host country national population in year y.
Source of data	Official national census statistics
Value(s) applied	73,750,932
Choice of data or measurement methods and procedures	This is the population of Ethiopia at the time of the last census in 2007 (http://unstats.un.org/unsd/demographic/products/vitstats/seratab2.pdf)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

CPA 9769-0002:

Data/Parameter	f _{NRB,y}
Unit	%
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
Source of data	Using government data or default country specific fraction of non-renewable biomass (fNRB) values available on the CDM website.
Value(s) applied	88%
Choice of data or measurement methods and procedures	Default country specific fraction of non-renewable biomass (fNRB) value for the Federal Democratic Republic of Ethiopia available on the CDM website. http://cdm.unfccc.int/DNA/fNRB/index.html
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	NCV _{biomass}
Unit	TJ/t
Description	Net calorific value of the non-renewable biomass that is substituted on wet basis
Source of data	IPCC default for wood fuel (IPCC value 2006)
Value(s) applied	0.015

Choice of data or measurement methods and procedures	Default value as provided in paragraph 11 of AMS-II.G Version 5.0
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$EF_{\text{projected_fossilfuel}}$
Unit	tCO ₂ /TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	As per footnote 4 of AMS-II.G Version 5.0
Value(s) applied	81.6
Choice of data or measurement methods and procedures	Default value as provided in paragraph 11 of AMS-II.G Version 5.0
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	SC_{old}
Unit	g/kg
Description	Specific fuel consumption of the baseline devices
Source of data	CCT Results: Open Fire (specific fuel consumption). Please refer to page 6 of GTZ-SUN: Energy Mirt stove test report.
Value(s) applied	1031
Choice of data or measurement methods and procedures	The use of a pre-existing test report produced by STZ-SUN: Energy for traditional open fires have been used to determine SC_{old}
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	η_{old}
Unit	%
Description	Efficiency of the system being replaced
Source of data	Paragraph 12 of AMS-II.G Version 5.0
Value(s) applied	10
Choice of data or measurement methods and procedures	This CPA has chosen to apply the default value as given in AMS-II.G Version 5.0 to determine η_{old}
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	L_y
Unit	Fraction
Description	Leakage adjustment factor for period y
Source of data	Paragraph 29 (c) of AMS-II.G Version 5.0
Value(s) applied	0.95
Choice of data or measurement methods and procedures	<p>According to AMS-II.G Version 5.0, leakage related to the non-renewable woody biomass saved by the project activity shall be assessed based on (a) ex post surveys of users and the areas from which this woody biomass is sourced, or alternatively (b), where B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.</p> <p>The methodology also requires leakage to be considered if equipment currently being utilized is transferred from outside the boundary to the project activity. This leakage source can be ruled out of this PoA as all stoves deployed in the program will be new.</p> <p>All CPAs to be included in this PoA will use the default net to gross adjustment factor of 0.95 to account for leakages.</p>
Purpose of data/parameter	Calculation of leakage
Additional comments	-

Data/Parameter	$N_{eater, household}$
Unit	-
Description	Average number of eaters (residents) per household
Source of data	UN Data
Value(s) applied	6
Choice of data or measurement methods and procedures	<p>An average household size of 6 based on a fertility rate of 4.8 live births per woman in 2011, as per UN Data available at: http://data.un.org/Data.aspx?q=Fertility+rate&d=WDI&f=Indicator_Code%3aSP.DYN.TFRT.IN</p>
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$FW_{\text{proportion, Mirt}}$
Unit	%
Description	The proportion of household fuel wood consumed by stove type i
Source of data	Letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia
Value(s) applied	49.91
Choice of data or measurement methods and procedures	Official letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia confirming the survey results from the Woody Biomass Inventory and Strategic Planning Project (WBISPP) for Injera baking.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$FW_{\text{proportion, Tikikil}}$
Unit	%
Description	The proportion of household fuel wood consumed by stove type i
Source of data	Letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia
Value(s) applied	41.50
Choice of data or measurement methods and procedures	Official letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia confirming the survey results from the Woody Biomass Inventory and Strategic Planning Project (WBISPP) for other types of cooking.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$HC_{\text{fuelwood, usage, y}}$
Unit	Tonnes
Description	Host country national fuel wood consumption in tonnes during year y.
Source of data	UN Data (http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW%3btrID%3a06) and the wood density factor as given by the FAO (http://www.fao.org/docrep/009/j8227e/j8227e11.htm#P1131_70563)
Value(s) applied	55,325,475

Choice of data or measurement methods and procedures	This is calculated based on national household fuel wood consumption of 76,311,000m ³ (national consumption in 2007 multiplied by the wood density factor of 0.725t/m ³ - http://www.fao.org/docrep/009/j8227e/j8227e11.htm#P1131_70563) It is important to note that the fuel wood consumption per capita is an average value for all Ethiopian households, whether they are using fuel wood or not and is therefore conservative.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	HC _{population,y}
Unit	-
Description	Host country national population in year y.
Source of data	Official national census statistics
Value(s) applied	73,750,932
Choice of data or measurement methods and procedures	This is the population of Ethiopia at the time of the last census in 2007 (http://unstats.un.org/unsd/demographic/products/vitstats/seratab2.pdf)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

CPA 9769-0003:

Data/Parameter	f _{NRB,y}
Unit	%
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
Source of data	Using government data or default country specific fraction of non-renewable biomass (f _{NRB}) values available on the CDM website.
Value(s) applied	88%
Choice of data or measurement methods and procedures	Default country specific fraction of non-renewable biomass (f _{NRB}) value for the Federal Democratic Republic of Ethiopia available on the CDM website. http://cdm.unfccc.int/DNA/fNRB/index.html
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	NCV _{biomass}
Unit	TJ/t
Description	Net calorific value of the non-renewable biomass that is substituted on wet basis
Source of data	IPCC default for wood fuel (IPCC value 2006)

Value(s) applied	0.015
Choice of data or measurement methods and procedures	Default value as provided in paragraph 11 of AMS-II.G Version 5.0
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$EF_{\text{projected_fossilfuel}}$
Unit	tCO ₂ /TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	As per footnote 4 of AMS-II.G Version 5.0
Value(s) applied	81.6
Choice of data or measurement methods and procedures	Default value as provided in paragraph 11 of AMS-II.G Version 5.0
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	SC_{old}
Unit	g/kg
Description	Specific fuel consumption of the baseline devices
Source of data	CCT Results: Open Fire (specific fuel consumption). Please refer to page 6 of GTZ-SUN: Energy Mirt stove test report.
Value(s) applied	1031
Choice of data or measurement methods and procedures	The use of a pre-existing test report produced by STZ-SUN: Energy for traditional open fires have been used to determine SC_{old}
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	η_{old}
Unit	%
Description	Efficiency of the system being replaced
Source of data	Paragraph 12 of AMS-II.G Version 5.0
Value(s) applied	10
Choice of data or measurement methods and procedures	This CPA has chosen to apply the default value as given in AMS-II.G Version 5.0 to determine η_{old}
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	L_y
Unit	Fraction
Description	Leakage adjustment factor for period y
Source of data	Paragraph 29 (c) of AMS-II.G Version 5.0
Value(s) applied	0.95
Choice of data or measurement methods and procedures	<p>According to AMS-II.G Version 5.0, leakage related to the non-renewable woody biomass saved by the project activity shall be assessed based on (a) ex post surveys of users and the areas from which this woody biomass is sourced, or alternatively (b), where B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.</p> <p>The methodology also requires leakage to be considered if equipment currently being utilized is transferred from outside the boundary to the project activity. This leakage source can be ruled out of this PoA as all stoves deployed in the program will be new.</p> <p>All CPAs to be included in this PoA will use the default net to gross adjustment factor of 0.95 to account for leakages.</p>
Purpose of data/parameter	Calculation of leakage
Additional comments	-

Data/Parameter	$N_{eater, household}$
Unit	-
Description	Average number of eaters (residents) per household
Source of data	UN Data
Value(s) applied	6
Choice of data or measurement methods and procedures	<p>An average household size of 6 based on a fertility rate of 4.8 live births per woman in 2011, as per UN Data available at: http://data.un.org/Data.aspx?q=Fertility+rate&d=WDI&f=Indicator_Code%3aSP.DYN.TFRT.IN</p>
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$FW_{\text{proportion, Mirt}}$
Unit	%
Description	The proportion of household fuel wood consumed by stove type i
Source of data	Letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia
Value(s) applied	49.91
Choice of data or measurement methods and procedures	Official letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia confirming the survey results from the Woody Biomass Inventory and Strategic Planning Project (WBISPP) for Injera baking.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$FW_{\text{proportion, Tikikil}}$
Unit	%
Description	The proportion of household fuel wood consumed by stove type i
Source of data	Letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia
Value(s) applied	41.50
Choice of data or measurement methods and procedures	Official letter from the Alternative Energy Technology Promotion And Dissemination Directorate, Ministry of Water and Energy, The Federal Democratic Republic of Ethiopia confirming the survey results from the Woody Biomass Inventory and Strategic Planning Project (WBISPP) for other types of cooking.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$HC_{\text{fuelwood, usage, y}}$
Unit	Tonnes
Description	Host country national fuel wood consumption in tonnes during year y.
Source of data	UN Data (http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW%3btrID%3a06) and the wood density factor as given by the FAO (http://www.fao.org/docrep/009/j8227e/j8227e11.htm#P1131_70563)
Value(s) applied	55,325,475

Choice of data or measurement methods and procedures	This is calculated based on national household fuel wood consumption of 76,311,000m ³ (national consumption in 2007 multiplied by the wood density factor of 0.725t/m ³ - http://www.fao.org/docrep/009/j8227e/j8227e11.htm#P1131_70563) It is important to note that the fuel wood consumption per capita is an average value for all Ethiopian households, whether they are using fuel wood or not and is therefore conservative.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	HC _{population,y}
Unit	-
Description	Host country national population in year y.
Source of data	Official national census statistics
Value(s) applied	73,750,932
Choice of data or measurement methods and procedures	This is the population of Ethiopia at the time of the last census in 2007 (http://unstats.un.org/unsd/demographic/products/vitstats/seratab2.pdf)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

E.2. Data and parameters monitored

CPA 9769-0001:

Data/Parameter	N _{y,Mirt}
Unit	-
Description	Number of Mirt stoves that are operating in year y
Measured/calculated/default	Calculated
Source of data	Database records (to determine the total number of stoves distributed, and the number of days that stoves have been operational) and the results of the Project Operationality Sample Group (POSG).
Value(s) of monitored parameter	17,236
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Annually

Calculation method (if applicable)	<p>$N_{y,Mirt}$ is calculated as follows:</p> $N_{y,Mirt} = N_{y, Mirt,distributed} \times POSG_{operational,Mirt} \times (t_{y,Mirt,average}/365)$ <p>Where:</p> <p>$N_{y, Mirt,distributed}$ = The number of Mirt stoves that are distributed and operational during year y, as per the electronic database.</p> <p>$POSG_{operational,Mirt}$ = The fraction of Mirt stoves that are operational as determined by the POSG</p> <p>$t_{y,Mirt,average}$ = The average number of days that all Mirt stoves are operational during year y. To account for potential delays in between distribution and utilisation of Mirt stoves, the number of days will be taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period. For example, for a Mirt stove distributed on the 7th of September 2013 the number of days will be counted from the 1st of October up until the end of the crediting period.</p>
QA/QC procedures	All records of stoves distributed will be stored in a secure database. Survey results will be stored in an electronic database for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	$N_{y,Tikikil}$
Unit	-
Description	Number of Tikikil stoves that are operating in year y
Measured/calculated/default	Calculated
Source of data	Database records (to determine the total number of stoves distributed, and the number of days that stoves have been operational) and the results of the Project Operationality Sample Group (POSG).
Value(s) of monitored parameter	13,187
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Yearly

Calculation method (if applicable)	<p>$N_{y,Tikikil}$ is calculated as follows:</p> $N_{y,Tikikil} = N_{y,Tikikil,distributed} \times POSG_{operational,Tikikil} \times (t_{y,Tikikil,average}/365)$ <p>Where:</p> <p>$N_{y,Tikikil,distributed}$ = The number of Tikikil stoves that are distributed and operational during year y, as per the electronic database.</p> <p>$POSG_{operational,Tikikil}$ = The fraction of Tikikil stoves that are operational as determined by the POSG</p> <p>$t_{y,Tikikil,average}$ = The average number of days that all Tikikil stoves are operational during year y. To account for potential delays in between distribution and utilisation of Tikikil stoves, the number of days will be taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period. For example, for a Tikikil stove distributed on the 7th of September 2013 the number of days will be counted from the 1st of October up until the end of the crediting period.</p>
QA/QC procedures	All records of stoves distributed will be stored in a secure database. Survey results will be stored in an electronic database for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	$\eta_{new,Tikikil,y}$
Unit	%
Description	Efficiency of the Tikikil stove being deployed as part of the project activity in year y
Measured/calculated/default	Measured
Source of data	Results of the Water Boiling Test (WBT) conducted by Ministry of Water and Electricity Ethiopia, Ministry of Environment, Forestry and Climate Change. Please refer to "Final Report on WBT Results for Tikikil Stoves In 40 Sample Households".
Value(s) of monitored parameter	25.413%
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Yearly
Calculation method (if applicable)	<p>Water Boiling Test (WBT) v.3.0. of Shell Foundation's Household Energy Program was used to carry out the WBT.</p> <p>The results of the WBT were taken from a representative sample under the Project Efficiency Sample Group (PESG).</p>
QA/QC procedures	Results of the WBT under the PESG will be stored in an electronic database and will be stored for a minimum of 2 years after the end of the crediting period of the CPA. Monitoring equipment i.e. Infrared Thermometer (IR), Weighing Balance and Probe Thermometer used for the test were calibrated.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$SC_{new,Mirt,y}$
Unit	g/kg
Description	Specific fuel consumption in year y of the Mirt stove as part of the project that is fuel consumption per quantity of item/s processed (e.g. food cooked)
Measured/calculated/default	Measured
Source of data	The specific fuel consumption rate for Mirt stove monitored in the current monitoring period is 329.7 g/kg which is lower than the monitored values during the first MP (464.2 g/kg), second MP (476.75 g/kg) and third MP (328.53 g/kg). Therefore, to be conservative, ex-ante specific fuel consumption rate value of Mirt Stove i.e. 508g/kg (that results into lower ER claim) has been applied for this monitoring period”.
Value(s) of monitored parameter	329.7 (For ER estimation ex-ante value of 508 g/kg has been used, please refer to the above statement)
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Yearly
Calculation method (if applicable)	Controlled Cooking Test (CCT) protocol, version 2.0, by the Shell Foundation was used to carry out the CCT. The results of the CCT were taken from a representative sample under the Project Efficiency Sample Group (PESG).
QA/QC procedures	Results of the CCT under the PESG will be stored in an electronic database and will be stored for a minimum of 2 years after the end of the crediting period of the CPA. Monitoring equipment i.e. Infrared Thermometer (IR), Weighing Balance and Probe Thermometer used for the test were calibrated.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Results of the Controlled Cooking Test (CCT) for this monitoring period was conducted by Ministry of Water and Electricity Ethiopia, Ministry of Environment, Forestry and Climate Change. Please refer to the report “Final Report on Controlled Cooking Test (CCT) Results On Mirt Stoves in 40 Sample Households”

CPA 9769-0002:

Data/Parameter	$N_{y,Mirt}$
Unit	-
Description	Number of Mirt stoves that are operating in year y
Measured/calculated/default	Calculated
Source of data	Database records (to determine the total number of stoves distributed, and the number of days that stoves have been operational) and the results of the Project Operationality Sample Group (POSG).
Value(s) of monitored parameter	15,286
Monitoring equipment	Not applicable

Measuring/reading/recording frequency	Annually
Calculation method (if applicable)	<p>$N_{y,Mirt}$ is calculated as follows:</p> $N_{y,Mirt} = N_{y, Mirt,distributed} \times POSG_{operational,Mirt} \times (t_{y,Mirt,average}/365)$ <p>Where:</p> <p>$N_{y, Mirt,distributed}$ = The number of Mirt stoves that are distributed and operational during year y, as per the electronic database.</p> <p>$POSG_{operational,Mirt}$ = The fraction of Mirt stoves that are operational as determined by the POSG</p> <p>$t_{y,Mirt,average}$ = The average number of days that all Mirt stoves are operational during year y. To account for potential delays in between distribution and utilisation of Mirt stoves, the number of days will be taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period. For example, for a Mirt stove distributed on the 7th of September 2013 the number of days will be counted from the 1st of October up until the end of the crediting period.</p>
QA/QC procedures	All records of stoves distributed will be stored in a secure database. Survey results will be stored in an electronic database for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	$N_{y,Tikikil}$
Unit	-
Description	Number of Tikikil stoves that are operating in year y
Measured/calculated/default	Calculated
Source of data	Database records (to determine the total number of stoves distributed, and the number of days that stoves have been operational) and the results of the Project Operationality Sample Group (POSG).
Value(s) of monitored parameter	14,266
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Yearly

Calculation method (if applicable)	<p>$N_{y,Tikikil}$ is calculated as follows:</p> $N_{y,Tikikil} = N_{y,Tikikil,distributed} \times POSG_{operational,Tikikil} \times (t_{y,Tikikil,average}/365)$ <p>Where:</p> <p>$N_{y,Tikikil,distributed}$ = The number of Tikikil stoves that are distributed and operational during year y, as per the electronic database.</p> <p>$POSG_{operational,Tikikil}$ = The fraction of Tikikil stoves that are operational as determined by the POSG</p> <p>$t_{y,Tikikil,average}$ = The average number of days that all Tikikil stoves are operational during year y. To account for potential delays in between distribution and utilisation of Tikikil stoves, the number of days will be taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period. For example, for a Tikikil stove distributed on the 7th of September 2013 the number of days will be counted from the 1st of October up until the end of the crediting period.</p>
QA/QC procedures	All records of stoves distributed will be stored in a secure database. Survey results will be stored in an electronic database for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	$\eta_{new,Tikikil,y}$
Unit	%
Description	Efficiency of the Tikikil stove being deployed as part of the project activity in year y
Measured/calculated/default	Measured
Source of data	Results of the Water Boiling Test (WBT) conducted by Ministry of Water and Electricity Ethiopia, Ministry of Environment, Forestry and Climate Change. Please refer to "Final Report on WBT Results for Tikikil Stoves In 40 Sample Households".
Value(s) of monitored parameter	25.413%
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Yearly
Calculation method (if applicable)	Water Boiling Test (WBT) v.3.0. of Shell Foundation's Household Energy Program was used to carry out the WBT. The results of the WBT were taken from a representative sample under the Project Efficiency Sample Group (PESG).
QA/QC procedures	Results of the WBT under the PESG will be stored in an electronic database and will be stored for a minimum of 2 years after the end of the crediting period of the CPA. Monitoring equipment i.e. Infrared Thermometer (IR), Weighing Balance and Probe Thermometer used for the test were calibrated.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$SC_{new,Mirt,y}$
Unit	g/kg

Description	Specific fuel consumption in year y of the Mirt stove as part of the project that is fuel consumption per quantity of item/s processed (e.g. food cooked)
Measured/calculated/default	Measured
Source of data	The specific fuel consumption rate for Mirt stove monitored in the current monitoring period is 329.7 g/kg which is lower than the monitored values during the first MP (464.2 g/kg), second MP (476.75 g/kg) and third MP (328.53 g/kg). Therefore, to be conservative, ex-ante specific fuel consumption rate value of Mirt Stove i.e. 508g/kg (that results into lower ER claim) has been applied for this monitoring period".
Value(s) of monitored parameter	329.7 (For ER estimation ex-ante value of 508 g/kg has been used, please refer to the above statement)
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Yearly
Calculation method (if applicable)	Controlled Cooking Test (CCT) protocol, version 2.0, by the Shell Foundation was used to carry out the CCT. The results of the CCT were taken from a representative sample under the Project Efficiency Sample Group (PESG).
QA/QC procedures	Results of the CCT under the PESG will be stored in an electronic database and will be stored for a minimum of 2 years after the end of the crediting period of the CPA. Monitoring equipment i.e. Infrared Thermometer (IR), Weighing Balance and Probe Thermometer used for the test were calibrated.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Results of the Controlled Cooking Test (CCT) for this monitoring period was conducted by Ministry of Water and Electricity Ethiopia, Ministry of Environment, Forestry and Climate Change. Please refer to the report "Final Report on Controlled Cooking Test (CCT) Results On Mirt Stoves in 40 Sample Households"

CPA 9769-0003:

Data/Parameter	$N_{y,Mirt}$
Unit	-
Description	Number of Mirt stoves that are operating in year y
Measured/calculated/default	Calculated
Source of data	Database records (to determine the total number of stoves distributed, and the number of days that stoves have been operational) and the results of the Project Operationality Sample Group (POSG).
Value(s) of monitored parameter	15,284
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Annually

Calculation method (if applicable)	<p>$N_{y,Mirt}$ is calculated as follows:</p> $N_{y,Mirt} = N_{y, Mirt,distributed} \times POSG_{operational,Mirt} \times (t_{y,Mirt,average}/365)$ <p>Where:</p> <p>$N_{y, Mirt,distributed}$ = The number of Mirt stoves that are distributed and operational during year y, as per the electronic database.</p> <p>$POSG_{operational,Mirt}$ = The fraction of Mirt stoves that are operational as determined by the POSG</p> <p>$t_{y,Mirt,average}$ = The average number of days that all Mirt stoves are operational during year y. To account for potential delays in between distribution and utilisation of Mirt stoves, the number of days will be taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period. For example, for a Mirt stove distributed on the 7th of September 2013 the number of days will be counted from the 1st of October up until the end of the crediting period.</p>
QA/QC procedures	All records of stoves distributed will be stored in a secure database. Survey results will be stored in an electronic database for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	$N_{y,Tikikil}$
Unit	-
Description	Number of Tikikil stoves that are operating in year y
Measured/calculated/default	Calculated
Source of data	Database records (to determine the total number of stoves distributed, and the number of days that stoves have been operational) and the results of the Project Operationality Sample Group (POSG).
Value(s) of monitored parameter	15,012
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Yearly

Calculation method (if applicable)	<p>$N_{y,Tikikil}$ is calculated as follows:</p> $N_{y,Tikikil} = N_{y,Tikikil,distributed} \times POSG_{operational,Tikikil} \times (t_{y,Tikikil,average}/365)$ <p>Where:</p> <p>$N_{y,Tikikil,distributed}$ = The number of Tikikil stoves that are distributed and operational during year y, as per the electronic database.</p> <p>$POSG_{operational,Tikikil}$ = The fraction of Tikikil stoves that are operational as determined by the POSG</p> <p>$t_{y,Tikikil,average}$ = The average number of days that all Tikikil stoves are operational during year y. To account for potential delays in between distribution and utilisation of Tikikil stoves, the number of days will be taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period. For example, for a Tikikil stove distributed on the 7th of September 2013 the number of days will be counted from the 1st of October up until the end of the crediting period.</p>
QA/QC procedures	All records of stoves distributed will be stored in a secure database. Survey results will be stored in an electronic database for a minimum of 2 years after the end of the crediting period of the CPA.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	$\eta_{new,Tikikil,y}$
Unit	%
Description	Efficiency of the Tikikil stove being deployed as part of the project activity in year y
Measured/calculated/default	Measured
Source of data	Results of the Water Boiling Test (WBT) conducted by Ministry of Water and Electricity Ethiopia, Ministry of Environment, Forestry and Climate Change. Please refer to "Final Report on WBT Results for Tikikil Stoves In 40 Sample Households".
Value(s) of monitored parameter	25.413%
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Yearly
Calculation method (if applicable)	<p>Water Boiling Test (WBT) v.3.0. of Shell Foundation's Household Energy Program was used to carry out the WBT.</p> <p>The results of the WBT were taken from a representative sample under the Project Efficiency Sample Group (PESG).</p>
QA/QC procedures	Results of the WBT under the PESG will be stored in an electronic database and will be stored for a minimum of 2 years after the end of the crediting period of the CPA. Monitoring equipment i.e. Infrared Thermometer (IR), Weighing Balance and Probe Thermometer used for the test were calibrated.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$SC_{new,Mirt,y}$
Unit	g/kg

Description	Specific fuel consumption in year y of the Mirt stove as part of the project that is fuel consumption per quantity of item/s processed (e.g. food cooked)
Measured/calculated/default	Measured
Source of data	The specific fuel consumption rate for Mirt stove monitored in the current monitoring period is 329.7 g/kg which is lower than the monitored values during the first MP (464.2 g/kg), second MP (476.75 g/kg) and third MP (328.53 g/kg). Therefore, to be conservative, ex-ante specific fuel consumption rate value of Mirt Stove i.e. 508g/kg (that results into lower ER claim) has been applied for this monitoring period".
Value(s) of monitored parameter	329.7 (For ER estimation ex-ante value of 508 g/kg has been used, please refer to the above statement)
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Yearly
Calculation method (if applicable)	Controlled Cooking Test (CCT) protocol, version 2.0, by the Shell Foundation was used to carry out the CCT. The results of the CCT were taken from a representative sample under the Project Efficiency Sample Group (PESG).
QA/QC procedures	Results of the CCT under the PESG will be stored in an electronic database and will be stored for a minimum of 2 years after the end of the crediting period of the CPA. Monitoring equipment i.e. Infrared Thermometer (IR), Weighing Balance and Probe Thermometer used for the test were calibrated.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Results of the Controlled Cooking Test (CCT) for this monitoring period was conducted by Ministry of Water and Electricity Ethiopia, Ministry of Environment, Forestry and Climate Change. Please refer to the report "Final Report on Controlled Cooking Test (CCT) Results On Mirt Stoves in 40 Sample Households"

E.3. Implementation of sampling plan

Project Operationality Sample Group (POSG) is monitored at the CPA level. The POSG survey was conducted from 30 January 2018 to 3 March 2018.

The objective of POSG sampling was to determine:

- i) the proportion of Mirt and Tikikil project cook stoves still operating within the CPA during the crediting period to determine $N_{y,Mirt}$ and $N_{y,Tikikil}$. The proportion of operating Mirt and Tikikil cook stoves was monitored with 90% confidence and 10% precision as annual sampling was selected. The Project Operationality Sample Group (POSG) determined the number of operational Mirt and Tikikil cook stoves.

Sampling Method

Simple random sampling was applied to randomly select sample size required for obtaining representative samples for the Mirt and Tikikil stoves for POSG.

Sample Size Calculation:

POSG Sample Size:

Annual sampling has been chosen for the POSG, and therefore the sample size for obtaining results with 90% confidence and 10% precision was calculated as per EB69 A5 paragraph 56 using equation below:

$$n = \frac{1.645^2(1-p)}{0.1^2 \times p}$$

271 is the minimum number of sample to be surveyed. However, 290 samples were selected than the required minimum sample size of 271 to addresses site-specific issues such as non- response (e.g. households not available on the sampling day etc).

Sample size calculation spreadsheet has been submitted to the DOE for verification.

PESG Sample Size:

Annual sampling has been chosen for the PESG, and therefore the sample size (for groups of CPAs) for obtaining results with 95% confidence and 10% precision has been calculated as per EB69 A5 paragraph 87 using equation below:

$$n = \frac{1.96^2 \times V}{0.1^2}$$

30 is the minimum number of sample to be surveyed. However, 40 samples were selected than the required minimum sample size of 30 to addresses site-specific issues such as non- response (e.g. households not available on the sampling day etc).

Sample size calculation spreadsheet has been submitted to the DOE for verification.

POSG Survey:

CPA 1:

A random sample of 290 households were selected using random number generator for spot checks to determine the number of Mirt and Tikikil stoves that were operational. More number of samples was selected than the required minimum sample size of 271 to addresses site-specific issues such as non- response (e.g. households not available on the sampling day etc). Please note that as multiple stove types (i.e. Mirt and Tikikil) had been distributed to each household within CPA 1, the sample size randomly selected is the number of households to be surveyed where both the Mirt and Tikikil stoves was checked for operability within each household. The CPA implementer World Vision Ethiopia conducted the POSG survey for CPA 1.

CPA 2:

A random sample of 290 households were selected using random number generator for spot checks to determine the number of Mirt and Tikikil stoves that were operational. More number of samples was selected than the required minimum sample size of 271 to addresses site-specific issues such as non- response (e.g. households not available on the sampling day etc). Please note that as multiple stove types (i.e. Mirt and Tikikil) had been distributed to each household within CPA 2, the sample size randomly selected is the number of households to be surveyed where both the Mirt and Tikikil stoves was checked for operationality within each household. The CPA implementer World Vision Ethiopia conducted the POSG survey for CPA 2

CPA 3:

A random sample of 290 households were selected using random number generator for spot checks to determine the number of Mirt and Tikikil stoves that were operational. More number of samples was selected than the required minimum sample size of 271 to addresses site-specific issues such as non- response (e.g. households not available on the sampling day etc). Please note that as multiple stove types (i.e. Mirt and Tikikil) had been distributed to each household within CPA 3, the sample size randomly selected is the number of households to be surveyed where both the Mirt and Tikikil stoves was checked for operationality within each household. The CPA implementer World Vision Ethiopia conducted the POSG survey for CPA 3

1. POSG Sample Data Tikikil Stove (CPA 1):

CPA 1 Population (Households)	18,377
Sample (n)	290
Number of Tikikil Stove that are functional	281
Functionality Rate of Tikikil Stove	0.9689655

Reliability Check:

The Reliability checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4

A confidence interval for a proportion: sample proportion ± z-value x standard error of the proportion.

For 90% confidence value of z = 1.6449

Standard error of the proportion = $\sqrt{(1-f) \frac{pq}{n}}$ (Equation 2)

Where,

f is the sampling fraction (n/CPA 1 population)= 0.02

p is the sample proportion = 0.968965517

q is the proportion of cook stoves that are not operational = 0.031034483

n is the sample size = 290

Using Equation 2,

Standard Error of Proportion= 0.010102373

In terms of the standard error of the percentage= 1.010237253

The precision associated with a proportion = z-value x standard error of the proportion
 = +/- 0.016617393

The ratio of this relative to the proportion of cook stoves that are still operational
 = 0.017149622= 1.71%

Since, the relative precision is 1.71%the data are within the required precision of 10%.

A confidence interval for a proportion = sample proportion ± z-value x standard error of the proportion

Upper Confidence value = 0.9855829 (98.56%)

Lower Confidence value = 0.9523481 (95.23%)

We are 90% confident that the true population mean lies between 95.23% to 98.56%, therefore, the sample meets the confidence requirement as the measured mean is 96.897%

2. POSG Sample Data Mirt Stove (CPA 1):

CPA 1 Population (Households)	18,377
Sample (n)	290
Number of Mirt Stove that are functional	272
Functionality Rate of Mirt Stove	0.937931034

Reliability Check:

The Reliability checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4

A confidence interval for a proportion: sample proportion ± z-value x standard error of the proportion.

For 90% confidence value of z = 1.6449

Standard error of the proportion = $\sqrt{(1-f)\frac{pq}{n}}$ (Equation 2)

Where,

f is the sampling fraction	0.02
p is the sample proportion	0.937931034
q is the proportion of cook stoves that are not operational	0.062068966
n is the sample size	290

Using Equation 2,

Using Equation 1, Standard Error of Proportion	0.014056256
In terms of the standard error of the percentage	1.405625636

Precision:

The precision associated with a proportion = z-value x standard error of the proportion
 = +/- 0.023121136

The ratio of this relative to the proportion of cook stoves that are still operational	0.024651211
Therefore, the relative precision is	2.47%

Since, the relative precision is 2.47 % the data are within the required precision of 10%.

A confidence interval for a proportion = sample proportion ± z-value x standard error of the proportion

Upper Confidence value	0.961052171
Lower Confidence value	0.914809898

We are 90% confident that the true population mean lies between 91.48% to 96.11%, therefore, the sample meets the confidence requirement as the measured mean is 93.793%.

3. POSG Sample Data Tikikil Stove (CPA 2):

CPA 2 Population (Households)	15,890
Sample (n)	290

Number of Tikikil Stove that are functional	286
Functionality Rate of Tikikil Stove	0.9862069

Reliability Check:

The Reliability checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4

A confidence interval for a proportion: sample proportion ± z-value x standard error of the proportion.

For 90% confidence value of z = 1.6449

Standard error of the proportion = $\sqrt{(1-f) \frac{pq}{n}}$ (Equation 3)

Where,

f is the sampling fraction	0.02
p is the sample proportion	0.986206897
q is the proportion of cook stoves that are not operational	0.013793103
n is the sample size	290

Using Equation 3,

Standard Error of Proportion= 0.006786039

In terms of the standard error of the percentage= 0.678603923

Precision:

The precision associated with a proportion = z-value x standard error of the proportion
= +/- 0.011162356

The ratio of this relative to the proportion of cook stoves that are still operational	0.011318473
Therefore, the relative precision is	1.13%

Since, the relative precision is 1.13%, the data are within the required precision of 10%.

A confidence interval for a proportion = sample proportion ± z-value x standard error of the proportion

Upper Confidence value	0.9973693
Lower Confidence value	0.9750445

We are 90% confident that the true population mean lies between 97.504% to 99.736%, therefore, the sample meets the confidence requirement as the measured mean is 98.621%.

4. POSG Sample Data Mirt Stove (CPA 2):

CPA 2 Population (Households)	15,890
Sample (n)	290
Number of Mirt Stove that are functional	279
Functionality Rate of Mirt Stove	0.962068966

Reliability Check:

The Reliability checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4

A confidence interval for a proportion: sample proportion ± z-value x standard error of the proportion.

For 90% confidence value of z = 1.6449

Standard error of the proportion = $\sqrt{(1-f) \frac{pq}{n}}$ (Equation 4)

Where,

f is the sampling fraction	0.02
p is the sample proportion	0.962068966
q is the proportion of cook stoves that are not operational	0.037931034
n is the sample size	290

Using Equation 1,

Standard Error of Proportion	0.011114804
In terms of the standard error of the percentage	1.111480372

The precision associated with a proportion = z-value x standard error of the proportion
 = +/- 0.018282741

The ratio of this relative to the proportion of cook stoves that are still operational 0.019003566

Therefore, the relative precision is 1.90%

Since, the relative precision is 1.90%, the data are within the required precision of 10%.

A confidence interval for a proportion = sample proportion ± z-value x standard error of the proportion

Upper Confidence value	0.980351706
Lower Confidence value	0.943786225

We are 90% confident that the true population mean lies between 94.38% to 98.04%, therefore, the sample meets the confidence requirement as the measured mean is 96.207%

5. POSG Sample Data Tikikil Stove (CPA 3):

CPA 3 Population (Households)	15,552
Sample (n)	290
Number of Tikikil Stove that are functional	285
Functionality Rate of Tikikil Stove	0.9827586

Reliability Check:

The Reliability checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4

A confidence interval for a proportion: sample proportion ± z-value x standard error of the proportion.

For 90% confidence value of z = 1.6449

Standard error of the proportion = $\sqrt{(1-f)\frac{pq}{n}}$ (Equation 5)

Where,

- f is the sampling fraction 0.02
- p is the sample proportion 0.982758621
- q is the proportion of cook stoves that are not operational 0.017241379
- n is the sample size 290

Using Equation 5,

Standard Error of Proportion= 0.007572217

In terms of the standard error of the percentage= 0.757221674

Precision:

The precision associated with a proportion = z-value x standard error of the proportion
 = +/- 0.012455539

The ratio of this relative to the proportion of cook stoves that are still operational	0.012674058
Therefore, the relative precision	1.27%

Since, the relative precision is 1.27%, the data are within the required precision of 10%.

A confidence interval for a proportion = sample proportion ± z-value x standard error of the proportion

Upper Confidence value	0.9952142
Lower Confidence value	0.9703031

We are 90% confident that the true population mean lies between 97.03% to 99.52%, therefore, the sample meets the confidence requirement as the measured mean is 98.276%.

6. POSG Sample Data Mirt Stove (CPA 3):

CPA 3 Population (Households)	15,552
Sample (n)	290
Number of Mirt Stove that are functional	281
Functionality Rate of Mirt Stove	0.968965517

Reliability Check:

The Reliablilty checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4

A confidence interval for a proportion: sample proportion ± z-value x standard error of the proportion.

For 90% confidence value of z = 1.6449

Standard error of the proportion = $\sqrt{(1-f) \frac{pq}{n}}$ (Equation 6)

Where,

f is the sampling fraction	0.02
p is the sample proportion	0.968965517
q is the proportion of cook stoves that are not operational	0.031034483
n is the sample size	290

Using Equation 6,

Standard Error of Proportion=0.01008765

In terms of the standard error of the percentage= 1.00876503

Precision:

The precision associated with a proportion = z-value x standard error of the proportion
= +/- 0.007918298

The ratio of this relative to the proportion of cook stoves that are still operational	0.01712463
Therefore, the relative precision	1.71%

Since, the relative precision is 1.71%, the data are within the required precision of 10%.

A confidence interval for a proportion = sample proportion ± z-value x standard error of the proportion

Upper Confidence value	0.985558693
Lower Confidence value	0.952372341

We are 90% confident that the true population mean lies between 95.24%to 98.56%, therefore, the sample meets the confidence requirement as the measured mean is 96.89%.

PESG Survey:

Project Efficiency Sample Group (PESG) is monitored at the PoA level. The PESG survey was conducted from 15 November 2017 to 30 November 2017 and was conducted jointly by Ministry of Water and Electricity Ethiopia and Ministry of Environment, Forestry and Climate Change. All the monitoring equipment i.e. Infrared Thermometer (IR), Weighing Balance, Probe Thermometer, used from CCT and WBT were calibrated. Moisture Meter that was used for the test was brand new therefore didn't require calibration.

In line with the registered monitoring plan, the samples for the PESG are randomly selected from a group of CPAs that implement the same technology type and the same geographical boundary. CPA 9769-0001, CPA 9769-0002 and CPA 9769-0003 implement the same type of cook-stove technology in the same geographical boundary. Therefore, for PESG, samples were randomly selected from the combined group of CPA 9769-0001, CPA 9769-0002 and CPA 9769-0003.

The objective of PESG sampling was to determine:

- i) the mean annual quantity of woody biomass used per Mirt and Tikikil device. This was done by monitoring the thermal efficiency of the Tikikil stove with the parameter $\eta_{new,Tikikil}$, and the specific fuel consumption of the Mirt stove with the parameter $SC_{new,Mirt}$ and applying these values to the equations for calculating $B_{y,savings,Tikikil}$ and $B_{y,savings,Mirt}$. These parameters were monitored with 95% confidence and 10% precision as annual sampling was selected for CPA groups (i.e. CPA 9769-0001, CPA 9769-0002 and CPA 9769-0003). The Project Efficiency Sample Group (PESG) determined the mean thermal efficiency of the Tikikil stove and the mean specific fuel consumption of the Mirt stove.

Sampling Method

Simple random sampling was applied to randomly select sample size required for obtaining representative samples for the Mirt and Tikikil stoves for PESG.

Sample Size for PESG

A sample of 40 households was randomly selected from CPA 9769-0001, CPA 9769-0002 and CPA 9769-0003 using random number generator. Water Boiling Test (WBT) and Control Cooking Test (CCT) were utilised to determine the thermal efficiency of the Tikikil stove and the specific fuel consumption of the Mirt stove respectively. More number of samples was selected than the required minimum sample size of 30 to addresses site-specific issues such as non- response (e.g. households not available on the sampling day etc). Please note that as multiple stove types (i.e. Mirt and Tikikil) had been distributed to each household, the sample size calculated was the number of households to be surveyed and all stove types was monitored within each household.

The WBT and CCT were jointly conducted by Ministry of Water and Electricity Ethiopia and Ministry of Environment, Forestry and Climate Change. The test reports on WBT and CCT has been submitted to the DOE for verification.

Analysis of Data and Reliability Test

1. PESG Sample Data (Mirt Stove):

The CCT test results for Mirt stoves give the Mean Specific Fuel Consumption as 329.70 g/kg. The mean value parameter of interest has been evaluated against 95/10 confidence/precision requirements. The Reliability checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4. The following outlines the reliability test procedure:

Sample Mean (gm/Kg)		329.70
Population ((CPA 9769-0001, CPA 9769-0002 and CPA 9769-0003)		49,819
Sample Size (Mirt Stove)		40
Confidence Interval		0.95
Precision		10%

Standard error of the mean = $\sqrt{(1-f) \frac{s^2}{n}}$ (Equation 1)

Where,

f (is the sampling fraction – the proportion of the population that is sampled)		0.00080
S ² (is the sample variance)		5035.753846
N (is the sample size)		40
s (is the sample standard deviation)		70.96

Using Equation 1,

Standard Error of the mean = 11.21573739

t Value = 2.02269092 (t value has been calculated using Excel formula)

The precision associated with an estimate is: t-value x standard error of the mean

t-value x standard error of the mean = +/- 22.68597018

The ratio relative to the mean specific fuel consumption of Mirt Stove

= 6.88%

Since, the relative precision is 6.88%, the sample data meet the required precision of 10%.

The 95% confidence interval for the population mean is given by the equation

= sample mean ± t-value x standard error of the mean = 307.01 and 352.39

Therefore,

Upper confidence value = 352.39

Lower confidence value = 307.01

We are 95% confident that the true population mean lies between 307.01 gm/ kg to 352.39 gm/kg, therefore the sample meets the confidence requirement as the measured mean is 329.70 gm/kg.

2. PESG Sample Data (Tikikil Stove):

The WBT test results for Tikikil stoves give the Mean Thermal Efficiency of 25.431%. The mean value parameter of interest has been evaluated against 95/10 confidence/precision requirements.

The Reliability checking procedure is based on Guideline on Sampling and surveys for CDM project activities and programmes of activities (Version 04.0), Appendix 4. The following outlines the reliability test procedure:

Sample Mean		0.25413
Population (CPA 9769-0001, CPA 9769-0002 and CPA 9769-0003)		49,819
Sample Size (Tikikil Stove)		40
Confidence Interval		0.95
Precision		10%

Standard error of the mean = $\sqrt{(1-f) \frac{s^2}{n}}$ (Equation 1)

Where,

f (is the sampling fraction – the proportion of the population that is sampled)	0.00080
s (is the sample standard deviation)	0.019800398
s ² (is the sample variance)	0.000392056
N (is the sample size)	40

Using Equation 1,

Standard Error of the mean = 0.003129461

t Value = 2.02269092 (t value has been calculated using Excel formula)

The precision associated with an estimate is: t-value x standard error of the mean

t-value x standard error of the mean = +/- 0.006329932

The ratio relative to the mean specific fuel consumption of Tikikil Stove

= 2.49%

Since, the relative precision 2.49%, the sample data meet the required precision of 10%.

The 95% confidence interval for the population mean is given by the equation

= sample mean \pm t-value x standard error of the mean = 0.2478 and 0.2605

Therefore,

Upper confidence value = 0.2605 (26.05%)

Lower confidence value = 0.2478 (24.78%)

We are 95% confident that the true population mean lies between 24.78% to 26.05%, therefore, the sample meets the confidence requirement as the measured mean is 25.413%

SECTION F. Calculation of emission reductions or net anthropogenic removals

F.1. Calculation of baseline emissions or baseline net removals

The equations in the methodology do not calculate baseline and project emissions separately and instead calculate direct emissions reductions as shown in the equation below:

$$ER_{y,i} = B_{y,savings,i} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossilfuel} \times N_{y,i} \quad (1)$$

Where:

$ER_{y,i}$ Emission reductions by project device of type i during year y in tCO₂e

$B_{y,savings,i}$ Quantity of woody biomass that is saved in tonnes per device of type i

$f_{NRB,y}$ Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (f_{NRB}) values available on the CDM website

$NCV_{biomass}$ Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, wet basis)

$EF_{projected_fossilfuel}$ Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO₂/TJ

$N_{y,i}$ Number of project devices of type i operating in year y

$N_{y,Mirt}$, $N_{y,Tikikil}$ and $N_{y,Tikikil}$ is calculated as follows:

$$N_{y,Mirt} = N_{y,Mirt,distributed} \times POSG_{operational,Mirt} \times (t_{y,Mirt,average}/365)$$

$$N_{y,Tikikil} = N_{y,Tikikil,distributed} \times POSG_{operational,Tikikil} \times (t_{y,Tikikil,average}/365)$$

These equations are stated in Section D.7.1 of the CPA-DD.

Where,

$POSG_{operational,Mirt}$ $POSG_{operational,Mirt}$ = The fraction of Mirt stoves that are operational as determined by the POSG

$POSG_{operational,Tikikil}$ = The fraction of Tikikil stoves that are operational as determined by the POSG

$t_{y,Mirt,average}$ = The average number of days that all Mirt stoves are operational during year y . To account for potential delays in between distribution and utilisation of Mirt stoves, the number of days was taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period.

$t_{y,Tikikil,average}$ = The average number of days that all Tikikil stoves are operational during year y . To account for potential delays in between distribution and utilisation of Tikikil stoves, the number of days will be taken from the 1st day of the next month following the date of distribution of the cook stove up until the end of the monitoring period.

The quantity of woody biomass that is saved in tonnes per Mirt stove is calculated as per equation 5 of AMS-II.G Version 05.0. Option 3 for calculating $B_{y,savings,i}$ has been applied.

Option 3, calculated using equation 5 of AMS-II.G Version 05.0 as follows:

$$B_{y,savings,i} = B_{old,i} \times \left(1 - \frac{SC_{new,i,y}}{SC_{old}} \right) \quad (5)$$

Where:

$B_{old,i}$ Quantity of woody biomass used in the absence of the project activity in tonnes per device of type i

SC_{old} Specific fuel consumption or fuel consumption rate of the baseline devices i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour, respectively. Use weighted average values if more than one type of device is being replaced.

$SC_{new,i,y}$ Specific fuel consumption or the fuel consumption rate in year y of the devices of type i deployed as part of the project i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour respectively. Use weighted average values if more than one type of system is being introduced by the project activity.

The quantity of woody biomass that is saved in tonnes per Tikikil stove is calculated as per equation 5 of AMS-II.G Version 05.0. Option 2, calculated using equation 3 of AMS-II.G Version 5 as follows:

$$B_{y,savings,i} = B_{old,i} \times \left(1 - \frac{\eta_{old}}{\eta_{new,i,y}} \right) \text{Where:}$$

$B_{old,i}$ Quantity of woody biomass used in the absence of the project activity in tonnes per device of type i

η_{old} 1. Efficiency of the system being replaced (fraction), measured using representative sampling methods or based on referenced literature values use weighted average values if more than one type of device is being replaced;

2. A default value of 10% may be optionally used if the replaced device is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; for other types of devices, a default value of 0.2 may be optionally used

¶ new.i,y

Efficiency of the device of type i being deployed as part of the project activity (fraction), as determined annually using the water boiling test (WBT) protocol carried out in accordance with national standards (if available) or international standards or guidelines. Use weighted average values if more than one type of system is being introduced by the project activity.

Please refer to CER calculation spreadsheets for emission reduction and aggregate energy savings achieved by CPA 1, CPA 2 and CPA 3.

F.2. Calculation of project emissions or actual net removals

Project emissions are not calculated because the methodology calculates emission reductions directly.

F.3. Calculation of leakage emissions

Leakage does not need to be calculated separately because it has already been removed as a 0.95 net to gross factor from the parameter Bold, used in direct emissions reductions calculations using Equation 1 under Section H.1.

F.4. Calculation of emission reductions or net anthropogenic removals

CPA UNFCCC reference number	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
CPA 9769-0001	35,378	-	-	-	35,378	35,378
CPA 9769-0002	34,355	-	-	-	34,355	34,355
CPA 9769-0003	35,217	-	-	-	35,217	35,217
Total	104,950	-	-	-	104,950	104,950

F.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the included CPA-DDs

CPA UNFCCC reference number	Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante (t CO ₂ e)
CPA 9769-0001	35,378	46,528
CPA 9769-0002	34,355	46,530
CPA 9769-0003	35,217	46,530
Total	104,950	139,588

F.6. Remarks on increase in achieved emission reductions**CPA 9769-0001**

Emission Reductions for CPA 9769-0001 are lower than the values estimated in ex-ante calculation.

CPA 9769-0002

Emission Reductions for CPA 9769-0002 are lower than the values estimated in ex-ante calculation.

CPA 9769-0003

Emission Reductions for CPA 9769-0003 are lower than the values estimated in ex-ante calculation.

Document information

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