

The Gold Standard

Simplified Methodology for Efficient Cookstoves

Version ~~12.010~~

February, 2013*

(Minor corrections to the methodology were made in March 2020)

Table of Contents

Section I: Source and Applicability	3
Section II: Baseline methodology	3
1. Project Boundary	3
2. Baseline Scenario	4
3. Project Scenario	4
4. Calculation of emissions reduction(s)	4
5. Leakage	6
Section III: Monitoring Methodology	7
1. Monitoring Procedure	7
2. Data and Parameters monitored over the crediting period	8
Section IV: Annexes	10
Annex A Sample Survey Questionnaire	10

Section 1: Source and Applicability

This methodology is applicable to the micro-scale programmes and micro-scale activities¹ introducing new wood fired cookstoves that reduce use of non-renewable fire wood or switch² from non-renewable to renewable fire wood to meet thermal energy requirement for household cooking.

A project proponent implements the [micro-scale](#) activity or [micro-scale](#) programme of activities. The individual households and institutions do not act as project proponents.

The following conditions apply:

1. This methodology is applicable,
 - i. If the baseline fuel is only fire wood; and
 - ii. If the baseline stove 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; and
 - iii. If the project stove is single pot or multi pot portable or in-situ cook stoves with specified efficiency of at least 20%.
2. The project boundary can be clearly identified, and the cookstoves counted in the proposed project activity are not included in another voluntary market or CDM project activity (i.e. no double counting takes place). The project proponent must have a mechanism in place together with appropriate mitigation measures to prevent double counting.
3. The project proponent must clearly communicate that the entity is claiming ownership rights and selling of the emission reductions resulting from the project activity. This must be communicated to the efficient cookstoves producers, retailers and end users by contract or clear written assertions in the transaction paperwork³.
4. The use of the baseline cookstove as a backup or auxiliary technology in parallel with the improved cookstove introduced by the project activity is permitted as long as a mechanism is put into place to encourage the removal of the old cookstove (e.g. discounted price for the improved cookstove) and the definitive discontinuity of its use. The project documentation must provide a clear description of the approach chosen and the monitoring plan must allow for a good understanding of the extent to which the baseline technology is still in use after the introduction of the improved technology, whether the existing baseline cookstove is not surrendered at the time of the introduction of the improved technology, or whether a new baseline cookstove is acquired and put to use by targeted end users during the project crediting period. The success of the mechanism put into place must therefore be monitored, and the approach must be adjusted if proven unsuccessful. If the baseline cookstove remains in use in parallel with the project cookstove, corresponding emissions must of course be accounted for as part of the project emissions, using the guidance given in Section III.

Section II: Baseline Methodology

1. Project Boundary

¹ Please refer to [Microscale project requirements and Microscale Programme of Activity Requirements in Annex A of the Programme of Activity Requirements, Annex T – Standalone Micro-scale Scheme Rules and Annex U – Micro-scale Programme Rules for project eligibility criteria under Gold Standard Micro-Scale project scheme](#)

² If the project activity involves only non-renewable to renewable fire wood fuel switch, the project proponents shall also provide evidences to demonstrate that the indoor air pollution (IAP) level is not worsened compared to the baseline. Please refer to the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, Section 1 Source and applicability.

³ For example, leaflets distributed with the products alerting end-users to the waiving of their carbon rights in exchange for pricing of the improved cookstove which discounts its true cost (waiver forms signed by end users are another example).

Gold Standard¹

The project proponent must provide clear definitions of project boundary, target area, and fuel production and collection area.

The *project boundary* is the physical, geographical site of baseline and project cookstoves and fuel collection area.

The *target area* is defined by a single country or across multiple adjacent countries in single sub-region, where use of considered baseline cookstove is assessed to be prevalent and uniform across political borders. The target area provides an outer limit to the project boundary in which the project has a target population.

2. Baseline Scenario:

The baseline scenario is non-renewable fire wood consumption to meet thermal energy requirement for household cooking.

In project activity, all cookstoves are installed at the start of project activity or installed progressively, the baseline is considered by-default fixed till the end of useful life of the cookstoves introduced in the project activity or the registered crediting period, whichever occurs earlier. If the project cookstove is replaced with cookstove of similar efficiency prior to the end of crediting period, the same baseline shall be applicable till the end of useful life of the replaced cookstoves or the registered crediting period, whichever occurs earlier. In all cases, whenever the project proponent applies a renewable crediting period, the baseline must be reassessed as per the latest version of the methodology and Gold Standard rules on renewal of crediting period.

3. Project Scenario:

A project scenario is adoption of efficient cookstove to meet thermal energy requirement for household cooking by the end users in the target area.

The project proponent may identify multiple project scenarios given that different types of project cookstove(s) installed in single project activity. For example, the same baseline scenario for inefficient cookstoves could be compared to separate project scenarios for different efficient cookstove models in the project activity or vice versa.

4. Calculation of Emission reduction(s):

The emissions reductions are calculated as follows:

$$ER_y = \sum_{t=0}^{t_{loy}} N_{P,y} * P_y * U_{P,y} * (f_{NRB,y} * EF_{b,fuel,CO_2} + EF_{b,fuel,non_CO_2}) * (1 - DF_{b,Stove,y}) \dots\dots\dots(1)$$

Where:

- N_{P,y} Number of project cookstoves of each age group operational in the year y
- P_y Quantity of fire wood 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 surveys (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 value⁴ or apply the default f_{NRB} value provided by the CDM Executive

⁴ The procedure for determining f_{NRB} shall be based on the latest version of the methodology “Technologies and practices to displace decentralized thermal energy consumption”, available at <http://www.cdmgoldstandard.org/project-certification/gs-methodologies>

	Board and endorsed by the host country DNA ⁵ .
$EF_{b,fuel,CO_2}$	CO ₂ emission factor of fire wood that is substituted or reduced. (Default value for wood fuel 1.747 tCO ₂ /ton of wood)
$EF_{b,fuel,non_CO_2}$	Non-CO ₂ emission factor of fire wood that is substituted or reduced. (Default value for wood fuel 0.53 tCO ₂ /ton of wood)
$DF_{b,Stove,y}$	Usage of baseline cookstove during the year y (fraction) in project scenario
x	y – 1
y	Year of the crediting period

4.1 Determination of quantity of biomass saved (P_y):

Quantity of fire wood that is saved (P_y) is estimated as follows:

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

Where:

$B_{b,y}$	Quantity of fire wood consumed in baseline scenario during year y (tonnes per household per year)
$\eta_{p,y}$	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 cookstove 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

4.2 Determination of quantity of fire wood consumed in the baseline ($B_{b,y}$) –

The fire wood consumed is the estimated average annual consumption of fire wood per household (tonnes/year), which may be derived using any of the following options –

- Historical data, or
- Survey of local usage, or
- Minimum service level

For option a, the project proponents shall make sure that historical data is relevant to the target population and appropriately justified.

For option b, a survey is to be carried out amongst the end users to determine baseline fire wood consumption prior to implementation of the project activity. The survey should be conducted following simple random sampling approach and the minimum sample size should be determined as per the guidelines below;

- Project target population < 300: Minimum sample size 30
- Project target population 300 to 1000: Minimum sample size 10% of group size
- Project target population > 1000 Minimum sample size 100

A sample survey questionnaire (survey format A) is provided in Annex A for information to be collected through surveys.

For option c, the project proponent may use the minimum service level as default baseline biomass consumption i.e., 0.5 tonnes per capita per year⁶. The household size shall be determined using credible references/literature or target population specific surveys. The survey should be conducted following simple random sampling approach and the minimum sample size should be determined as per the guidelines provided under option b above.

⁵ Default values of fraction of non-renewable biomass available at <http://cdm.unfccc.int/DNA/fNRB/index.html>

⁶ http://www.unmillenniumproject.org/documents/MP_Energy_Low_Res.pdf

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

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

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

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
- 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

The efficiency of project cookstove shall be determined by an independent expert entity in the field or laboratory following the [Controlled Cooking Test \(CCT\) Water Boiling Test \(WBT\)](#) protocol (available at

<https://www.cleancookingalliance.org/binary-data/DOCUMENT/file/000/000/399-1.pdf>

~~<http://www.peiaonline.org/node/1050>~~).

To determine the project cookstove efficiency, three sample runs shall be carried out on at least three randomly selected project cookstoves. The average of the nine results shall be taken as the efficiency for the project cookstove (η_p).

5. Leakage:

Leakage⁷ related to non-renewable biomass saved by the project activity is not considered for micro scale project activities. However, for micro-scale programme of activities (mPOA) the net emission reductions (ER_y) shall be discounted by a factor of 0.95 to account for leakages related to non-renewable biomass saved by the project activity.

Data and Parameters not monitored over the crediting period:

Data/ Parameter	$EF_{b,fuel,CO_2}$
Data Unit:	tCO ₂ /tonne of fire wood
Description:	CO ₂ emission factor arising from use of fire wood in baseline scenario
Source of data:	1.747 tCO ₂ /ton of fire wood, IPCC default values, table 1.4 of chapter 1 of Vol. 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Measurement procedures (if any):	
Any comment:	

⁷ The project activity stimulates increased use of a high emission fuel either for cooking or for other purposes outside the project boundary (as would be the case for example if efficient cooking stimulated an increase in NRB consumption - possibly because the NRB fuel becomes cheaper due to the project activity).

Data/ Parameter	$EF_{fuel,non-CO_2}$
Data Unit	tCO ₂ /tonne of fire wood
Description	Non-CO ₂ emission factor arising from use of fire wood in baseline scenario
Source of data	0. 53455 tCO ₂ /tonne of fire wood, IPCC default values, Table 2.9 of Chapter 2 of Vol. 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Measurement procedures (if any):	
Any comment:	

Gold Standard

Data/ Parameter	η_b
Data Unit	Fraction
Description	Efficiency of the cookstove being used in the baseline scenario
Source of data	10%
Measurement procedures (if any):	
Any comment:	

Data/ Parameter	η_p
Data Unit	Fraction
Description	Efficiency of the cookstove being used in the project scenario
Source of data	Determined once as per Section 4.3 above
Measurement procedures (if any):	WBT protocol
Any comment:	

Data/ Parameter	$f_{NRB,y}$
Data Unit	Fractional non renewability renewability
Description	Non-renewability status of wood fuel during year y
Source of data	Project specific national/ regional values or apply the default NRB value provided by the CDM executive board and endorsed by host country DNA ⁸
Measurement procedures (if any):	
Any comment:	The project activity may choose to update the f_{NRB} during the crediting period.

Data/ Parameter	$B_{b,y}$
Data Unit	Tonnes fire wood per household per year
Description	Fire wood consumption for cooking in the baseline
Source of data	-
Measurement procedures (if any):	<ul style="list-style-type: none"> - Historical data - Survey of local usage, or - Minimum service level: A default value for fire wood consumption i.e., 0.5 tonnes/capita/year can be applied as discussed in section 4.2 option c above.
Any comment:	A default value for fire wood consumption i.e., 0.5 tonnes/capita/year can be applied as discussed in section 4.2 option c above.

Section III. Monitoring methodology

1. Monitoring procedure

A. Sale Record:

The project proponent must maintain and update the total sales record and project database continuously. The record should be backed up electronically. The required data includes;

- i. Date of Sale and of installation⁹
- ii. Geographic area of sale
- iii. Model/type of project cookstove(s) sold

⁸ <http://cdm.unfccc.int/DNA/fNRB/index.html>

⁹ [Date of installation should be associated with conservative assessment as to date of sale and commencement of use of the project cookstove](#)

- iv. ~~iii.~~ 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 name and addresses collected must be as many as commensurate with representative sampling, i.e. the names and addresses or phone numbers where possible) within sales record shall be large enough so that surveys can be based on representative, randomly selected samples.

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 emission reduction calculations can be conducted appropriately section by section.

C. Ongoing Monitoring Studies:

- i. Monitoring shall 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.

A usage survey must be conducted to estimate the drop off rates as project cookstove may not be adopted or may be disposed of and potentially replaced by a baseline stove again. Prior to the verification, a usage survey for each cookstove age-group 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 age₀₋₁. If cookstoves of age 0-1 and age 1-2 are being credited (as part of first request for issuance), usage parameter must be established for age-group 0 -1 and 1-2, respectively through 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 usage survey as the usage rate for cookstoves of age group 0-1 can be applied from the previous issuance.

The minimum sample size for project cookstove of each age-group to conduct the usage survey should be in line with the guidelines provided in section 4.2 option b.

- ii. Where replacements are made, monitoring shall also ensure that the efficiency of the new cookstove is similar to the appliances being replaced.
- iii. The project must also monitor the use of baseline stoves in the project activity.
- iv. The project must also monitor physical conditions of the cookstoves Survey format B can be used for carrying out monitoring surveys

Data and Parameters monitored over the crediting period:

Data/ Parameter	Up,y
Data Unit	Percentage
Description	Usage rate in project scenario p during year y
Source of data	Annual usage survey/Monitoring survey
Monitoring frequency:	Annual
QA/QC procedures:	Transparent data analysis and reporting
Any comment:	A usage parameter is derived for each age group of project cookstove being credited.

Data/ Parameter	N _{p,y}
-----------------	------------------

Gold Standard

Data Unit	Number of project cookstove credited (units)
Description	Cookstove in the project database for project scenario p through year y
Source of data	Total sales record
Monitoring frequency:	Continuous
QA/QC procedures:	Transparent data analysis and reporting
Any comment:	The total sales record is divided based on project scenario to create the project database

Data/ Parameter	DF_n
Data Unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstoves
Source of data	Default value: 0.99 i.e., 1% efficiency loss per year
Monitoring frequency:	Annual
QA/QC procedures:	Transparent data analysis and reporting
Any comment:	<p>This default 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 random sampling approach. Please follow the survey format B to capture the required information. Minimum number of sample size shall be selected following the guidelines provided in section 4.2, option b.</p> <p>During annual surveys if it is found that the project cookstoves are not in working conditions, proportionate population of project cookstoves should be excluded from the project database, until these cookstoves are not replaced with new cookstoves. A site visit by an Objective Observer with relevant technical background would be required at the time of first internal verification and then subsequently after every 2 years from the previous issuance.</p>

Data/ Parameter	$DF_{P, stove, y}$
Data Unit	Fraction
Description	Discount factor to account for the baseline stove use in project scenario p during the year y
Source of data	Monitoring surveys
Monitoring frequency:	Annual
QA/QC procedures:	Transparent data analysis and reporting
Any comment:	The discount factor for baseline-stove use may be determined based on number of meals cooked using baseline stove. The required information shall be captured through sample surveys carried out following random sampling approach for each age-group of the project stove. Minimum number of sample size shall be selected following the guidelines provided in section 4.2, option b. Please refer to the survey format B, Annex A for sample questions to capture this information.

Annex A: Sample Survey Questionnaire

Survey Format A. Baseline fuel consumption pattern

Name of Surveyor				
Date of survey		mm/dd/yyyy		
I. End- User profile				
Name				
Gender	Male		Female	
Family Members	Adult		Children	
Address				
Contact details	Phone no.		Mobile no.	
II. End User's fuel consumption pattern prior to the project implementation				
a.	Cooking device	Primary	Secondary	Other
b.	Place for cooking	Indoor	Open	Semi-open
c.	Type of fuel used	Yes/No	Quantity	Unit
	Wood			kg/month or year
	LPG			kg or Cylinders/ month or year
	Kerosene			liters/ month or year
	Charcoal			kg/month or year
	Coal			kg/month or year
	Electricity			kWh/ month or year
	Other fuels			kg or liters or m ³ /month or year

Note:

In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms units mentioned above. This very much depends on the local practice of measurement. The project participants should include such local measurement unit in the questionnaire. In some cases, the measurement unit could also be in terms of money. Therefore the project participant shall provide further guidelines on how the conversion of these reported values to required units (mass or volume) should be carried out.

Survey Format B. Project Survey

Name of Surveyor				
Date of survey		mm/dd/yyyy		
I. End- User profile				
Name				
Gender	Male		Female	
Family Members	Adult		Children	
Address				
Contact details	Phone no.		Mobile no.	
II. End User's fuel consumption pattern post project implementation				
a.	Cooking device			
i.	Model Name/ number			
ii.	Year of Installation			mm/year
iii.	Do you use the project cookstove?*			Yes/no
iv.	If yes, Is your stove in good condition?***			Yes/no
v.	Do you use baseline cookstove also?			Yes/no
vi.	If yes, How many meals did you prepare using baseline cookstove last week or last month ?****			meals/ week or month
b.	Place for cooking	Indoor	Open	Semi-open

Note

* The question is to address the parameter i.e., usage factor

** The project proponent may rephrase the question keeping in mind the objective i.e., whether or not the project cookstove is in useable condition. If the project cookstove is not in usable condition, the PP shall exclude such stoves from project database for the whole crediting year and subsequent years. The PP may include such stoves again on replacing them with new cookstove of similar efficiency,

***The question is to derive the value for parameter “Discount factor to account the baseline stove use in project scenario ($DF_{b, stove, y}$)”. The project proponent may rephrase this question and correlate with the parameter on annual basis.

Document history:

Version	Date	Description
1.0	March 2020	<ul style="list-style-type: none">• Correction in testing protocol for determination of project stove efficiency• Correction in emission reduction calculation equation• Update of value of the ex-ante parameter “Non-CO₂ emission factor arising from use of fire wood in baseline scenario”• Other miscellaneous edits
1.0	February 2013	Initial version