

The Gold Standard Simplified Methodology for Efficient Cookstoves

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Section I: Source and Applicability

This methodology is applicable to micro-scale programmes and micro-scale activities¹ that introduce new wood burning cookstoves to reduce the use of non-renewable firewood or switch² from non-renewable to renewable firewood to meet thermal energy requirements for household cooking.

A project proponent implements the activity or Programme of Activities (PoA). The individual households and institutions do not act as project proponents.

The following conditions apply:

1. This methodology is applicable, if:
 - i. the baseline fuel is only firewood; and
 - ii. 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. the project stove is a single pot or multi pot portable or an in-situ cookstove with a 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 any other 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 if the entity is claiming the ownership rights to sell the emission reductions resulting from the project activity. This must be communicated to the 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. a discounted price for the improved cookstove) and there is a definitive discontinuity of its use. The project documentation must provide a clear description of the approach chosen and the monitoring plan must provide 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

¹ Please refer to [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).

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 be accounted for as part of the project emissions, using the guidance given in Section III.

Section II: Baseline Methodology

1. Project Boundary

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

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

The *target area* is defined by a single country or across multiple adjacent countries in a single sub-region where usage of the 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 the consumption of non-renewable firewood to meet thermal energy requirements for household cooking.

In the project activity, cookstoves are installed at the start of the project activity or installed progressively, the baseline is considered by-default fixed until the end of the cookstoves (introduced in the project activity) useful life or the registered crediting period, whichever occurs earlier. If the project cookstove is replaced with a cookstove of similar efficiency prior to the end of the crediting period, the original baseline shall be applicable till the end of the replaced cookstoves useful life 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 (Annex Z).

3. Project Scenario

A project scenario is the adoption of an efficient cookstove, by the end users in the target area, to meet thermal energy requirements for household cooking. Different types of efficient cookstoves can be installed in a single project activity, creating multiple project scenarios. The same baseline scenario for inefficient cookstoves could be compared to each of these separate project scenarios for the different efficient cookstove models in the project activity.

4. Calculation of Emission reduction(s)

The emissions reductions are calculated as follows:

$$ER_y = \sum_{t=0}^{x+y} N_{P,y} * P_y * U_{P,y} * (f_{NRB,y} * EF_{b,fuel,CO2} + EF_{b,fuel,non_CO2}) * (1 - DF_{b,Stove,y}) \dots \dots \dots (1)$$

Where:

- $N_{P,y}$ Number of project cookstoves of each age group operational in the year y
- P_y Quantity of firewood that is saved in the year y (tonnes per household in year y)
- $U_{P,y}$ Usage rate for project cookstoves in year y, based on adoption rate and drop off rate revealed by usage 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 Board and endorsed by the host country DNA⁵.
- $EF_{b,fuel,CO2}$ CO₂ emission factor of firewood that is substituted or reduced. (Default value for wood fuel 1.747 tCO₂/ton of wood)
- $EF_{b,fuel,non_CO2}$ Non-CO₂ emission factor of firewood that is substituted or reduced. (Default value for wood fuel 0.455 tCO₂/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 firewood 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 firewood 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 firewood consumed is the estimated average annual consumption of firewood per household (tonnes/year), which may be derived using any of the following options:

- a. Historical data; or

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>

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

- b. Survey of local usage; or
- c. Minimum service level; or
- d. Field performance test (e.g. kitchen performance test (KPT))

For option (a), the project proponents need to 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 firewood 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 is provided in Annex A. This provides a guide to what type of information needs to be collected throughout the surveys.

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

For Option (d), the baseline performance field test (BFT) measures real, observed performance of the baseline cookstove in the field. Consumption must be measured with a representative sample of end users under each defined baseline scenario using the baseline cookstove. A 90/10 confidence/precision must be met to use the mean value for baseline fuel consumption. A minimum sample size of 30 is recommended.

The project proponent shall refer to *Section 7 and Annex 4* of Technologies and Practices to Displace Decentralized Thermal Energy Consumption methodology for further guidelines (<http://www.cdmgoldstandard.org/project-certification/gold-standard-methodologies>) on field performance tests.

Findings of the performance field tests can be submitted post-registration, in time for the verification and prior to the request for issuance. In such a case, the project documentation submitted for validation and registration review must provide the Project Estimation of expected baseline emissions, supported by appropriate and credible sources of information.

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

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

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. In the situation where project stove efficiency is determined using WBT, this is the value determined annually as a result of the test.
- DF_η Discount factor to account for efficiency loss of project cookstove per year of operation (Fraction). The default value for this parameter is 0.99 i.e. 1% efficiency loss/year.
- 0.94 Adjustment factor to account for uncertainty related to project cookstove efficiency test

The efficiency of the project cookstove needs to be determined by an independent expert or entity, in the field or laboratory, following the Water Boling Test protocol (available at <<http://www.pciaonline.org/node/1048>>). 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).

The project proponent may assess the project cookstove efficiency at the time of installation and use the default factor (eq.3) to derive efficiency in the year y. OR, the project cookstove efficiency ($\eta_{p,y}$) may be determined annually following the WBT protocol. In such a case the project cookstove efficiency shall not be adjusted by the default factor for efficiency loss during the year of operation. The term “ DF_η ” shall be omitted and “ η_p ” shall be replaced. The average project cookstove efficiency will be determined using WBT in year y in equation (3) above to calculate the $\eta_{p,y}$, efficiency of project cookstove in year y.

5. Leakage

Leakage⁷ related to non-renewable biomass saved by the project activity is not considered for micro-scale project activities. However, for a 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 OR it shall be assessed and monitored following the guidelines provided in *Section 6. Leakage of Technologies and Practices to Displace Decentralized Thermal Energy Consumption methodology* (<http://www.cdmgoldstandard.org/project-certification/gs-methodologies>).

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 and Parameters not monitored over the crediting period:

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

Data/ Parameter	$EF_{fuel,non-CO_2}$
Data Unit	tCO ₂ /tonne of firewood
Description	Non-CO ₂ emission factor arising from use of firewood in baseline scenario
Source of data	0.455 tCO ₂ /tonne of firewood, IPCC default values, Table 2.9 of Chapter 2 of Vol. 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Any comment:	

Data/ Parameter	η_b
Data Unit	Fraction
Description	Efficiency of the cookstove being used in the baseline scenario
Source of data	10%
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
Any comment:	

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

Data/ Parameter	$B_{b,y}$
Data Unit	Tonnes firewood per household per year

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

Description	Firewood consumption for cooking in the baseline
Source of data	-
Any comment:	A default value for firewood 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
- iv. Name and telephone number (if available), address:
 - a. Required for all bulk purchasers, i.e. retailers
 - b. All end users; The names and telephone numbers or name and addresses collected must be 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 again by a baseline stove. 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 parameters must be established for age-group 0-1 and 1-2, respectively through a usage survey. If cookstoves of age-group 0-1 and age-group 1-2 are

⁹ Date of installation should be associated with conservative assessment as to date of sale and commencement of use of the project cookstove.

being credited (as part of second request for issuance), usage parameter must be established for age-group 1-2 only through a usage survey as the usage rate for cookstoves of age group 0-1 can be applied from the previous issuance.

To successfully conduct a usage survey, the minimum project cookstove sample size of each age-group 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 the physical conditions of the cookstoves

Survey format B in Annex A can be used for carrying out monitoring surveys

2. Data and Parameters monitored over the crediting period

Data/ Parameter	$U_{p,y}$
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	$N_{p,y}$
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 a random sampling approach. Please follow the survey format B (Annex A) 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, the proportionate population of project cookstoves should be excluded from the project database, until these cookstoves are 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. The Objective Observer shall use the guidance provided in Annex B to carry out field studies.</p>
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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:	<p>The discount factor for baseline-stove use may be determined based on number of meals cooked using the baseline stove. The required information shall be captured through sample surveys carried out following a random sampling approach for each age-group of the project stove. The minimum number of sample sizes 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. The impact of seasonal variation on use of baseline stove should be considered as part of the monitoring survey.</p>

Section IV: Annexes

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
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

* 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 the 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.

****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 information on how the conversion of these reported values to required units (mass or volume) should be carried out.

Annex B: Guidelines for Objective Observer to evaluate the condition of cookstove

Date:								
Location:								
Stove Model:								
Date of Installation of the project cookstove:								
S .no.	Option	Construction material for example clay, metal and other materials	Combustion chamber	Stove top & pot supports	Ash Tray (if any)	Underside and feet	Sides	Other observations. For example if chimney (if any) is broken
A	Intact as it is							
B	Deformed/slight distortion							
C	Torn apart/cracks							

D	Other noticeable changes as compared to new stove							
1. The OO shall take pictures of the project cookstove and shall assess the following by comparing these with a new project stove.								
2. The OO shall also ask following questions (or similar questions) to end user to ensure that the cookstove is in good conditions and is usable.								
a. There is no change in project cookstove usage because of the quality of cookstoves. (Yes/No)								
b. What are the reasons of low usage? For example; stove top and pot supports is broken, efficiency has decreased significantly, the cookstove is broken completely etc. The OO may ask different question to extract this information.								