CLEAN DEVELOPMENT MECHANISM

CDM-MP83-A06

Draft Small-scale Methodology

AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user

Version 11.0

Sectoral scope(s): 01

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Executive Board of the clean development mechanism (CDM) (hereinafter referred to as the Board), at its 105th meeting, requested the Methodologies Panel (MP) to continue working on the issue of stove stacking to develop best practice examples for inclusion in the methodologies "AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user" and "AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass", and recommend revision to these methodologies at a future meeting, after taking into account input from experts and stakeholders.

2. Purpose

2. The purpose of this revision is to respond to the mandate from the Board in paragraph 1 above and to incorporate the previous clarifications approved by the Board in relation to this methodology.

3. Key issues and proposed solutions

3. The proposed revision:

   (a) Provides guidance to address the issue of stove stacking (i.e. use of multiple stoves and fuels in the project households);

   (b) Expands the scope of methodology to cover electric cookstoves that uses electricity generated from renewable sources;

   (c) Clarifies that emission reductions cannot be claimed only due to fuel-switch aspect and proposed project activities shall introduce renewable energy based technologies displacing the use of non-renewable biomass;

   (d) Sets a cap for wood-to-charcoal conversion factor; and

   (e) Sets a cap for average annual consumption of woody biomass per person.

4. Impacts

4. Improvements in methodological requirements will facilitate the implementation of CDM project activities and PoAs in the household cookstove sector, which have strong relevance for least developed countries and other regions that are underrepresented in the CDM.

5. Subsequent work and timelines

5. The methodology is recommended by the MP for consideration by the Board at its 108th meeting. No further work is envisaged.

6. Recommendations to the Board

6. The MP recommends that the Board adopt this draft revised methodology, to be made effective at the time of the Board's approval.

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1. Introduction

1. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical project(s)	Generation of thermal energy by introducing renewable energy technologies for end users that displace the use of non-renewable biomass. Examples of these technologies include, but are not limited to cookstoves using processed renewable biomass, biogas stoves, bio-ethanol ~~solar~~ cookers, electric cookstoves powered by renewable energy ~~or passive solar homes.~~
Type of GHG emissions mitigation action	Renewable energy: Displacement of more GHG-intensive, non-renewable biomass-fuelled applications by introducing renewable energy technologies

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology comprises of activities to displace the use of non-renewable biomass by introducing renewable energy technologies[1] to households/ communities/ institutions[2] (hereinafter referred as end-users). Examples of these technologies include, but are not limited to:

(a) Cookstoves using processed renewable biomass such as briquettes, pellets, and woodchips;

(b) Biogas stoves,

(c) Bio-ethanol stoves,

(d) ~~solar~~ Electric cookstovers[3] [4] including induction cookstoves (hereafter electric cookstoves) that receive electricity from an integrated renewable energy generating device, grid or mini-grid that is 100% powered by renewable energy sources.

[1] Emission reductions cannot be claimed only due to fuel-switch aspect and proposed project activities shall introduce new renewable energy based technologies, i.e. technology switch is also involved.

[2] Institutions such as schools, prisons and hospitals.

[3] Electric cookstoves ~~such as~~ including induction ~~type~~ cookstoves using only the grid electricity, i.e. without an integrated renewable energy system or net-metering factility are not eligible under this methodology. ~~Project proponents are encouraged to submit a new Type III small-scale methodology.~~

[4] ~~Solar~~ Electric cookstoves using direct current (D.C.) heating element or using an alternate current heating element with associated equipment (e.g. solar panel, building-integrated wind turbines or household rooftop wind turbines, charge controller, storage battery, balance of systems) are ~~also~~ eligible under this methodology.

(e) Electric cookstoves powered by renewable energy systems that are also connected to the grid via net-metering, where the annual electricity generated by the renewable energy system is more than the annual electricity amount consumed by the electric cookstoves.

(f) ~~Passive solar homes~~.

3. For electric cookstoves using option in paragraph 2(d) with integrated renewable energy device and paragraph 2(e) with grid connected renewable energy system employing net metering, project participants shall demonstrate that the primary use of renewable energy generating system is to meet the cooking electricity demand (i.e. by showing that all of the electricity generated is used by the cooking device or if there are other uses such as for lighting it is limited to a maximum of 20% per cent of electricity generated on an annual basis).

2.2. Applicability

4. Project participants are able to show that non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.

5. The methodology is applicable for technologies displacing use of non-renewable biomass by renewable energy.

6. Project participants or coordinating and managing entities shall describe in the PDD/PoA-DD the proposed method for distribution of project devices and how the double counting of emission reductions has been addressed, for example, using methods such as unique identifications of product and end-user locations (e.g. programme logo), to prevent double counting of emission reductions from the project devices (e.g. between end users, distributors and producers of stoves, producers of renewable energy, producers of processed renewable biomass).

7. For project activities introducing bio-ethanol cookstoves, project participants or coordinating and managing entities shall demonstrate that the bioethanol cookstoves are designed, constructed and operated to the requirements (e.g. with regard to safety) of a relevant national or local standard or comparable literature. Latest guidelines issued by a relevant national authority or an international organisation may also be used.

~~8. The CDM-PDD or CDM-PoA-DD/CPA-DD shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).~~

Box 1. Non-binding best practice example 1

As per the standard for sampling and surveys for CDM project activities and programme of activities (sampling standard), the listing/recording of information of all end-users by PPs/CMEs/DOEs is important to ~~shall~~ ensure that samples are randomly selected and are representative of the population.

~~The listing/recording of information of all end-users is important to meet the requirement above.~~ That is, if ex post monitoring survey conducted to confirm that the devices are still installed and operating is based on sample survey, the sample selection should be on a random basis to ensure results are unbiased estimates of the parameters and each device would have an equal chance to qualify in a sample.

These requirements also enable identification of the devices that are distributed only through the specific CDM project activity under consideration, particularly if multiple projects are underway. Furthermore, in the case of programme of activities (PoAs), the requirements ensure avoidance of double counting within the PoA (the same device belonging to two different CPAs of the same PoA); and double counting in situations external to the PoA (the same household belonging to two different PoAs for the same technology).

Thus, unique identification of product (e.g. programme logo, serial number) and end-user locations (e.g. database of all end-users including their names, addresses, telephone numbers) avoids double counting as well as allows implementation of unbiased and reliable sample schemes.

~~9. The CDM-PDD or CDM-PoA-DD/CPA-DD shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others also claim credit for emission reductions from the project devices.~~

2.3. Entry into force

10. The date of entry into force is the date of the publication of the EB ~~105~~ # meeting report on ~~28 November 2019~~ DD Month YYYY.

2.4. Applicability of sectoral scopes

11. For validation and verification of CDM projects and programme of activities by a designated operational entity (DOE) using this methodology, application of sectoral scope 01 is mandatory and sectoral scopes 13 and 15 are conditional.

3. Normative references

12. Project participants shall apply the “Guideline: General guidelines for SSC CDM methodologies”, “TOOL21: Demonstration of additionality of small-scale project activities” and “TOOL19: Demonstration of additionality of microscale project activities” available at: <http://cdm.unfccc.int/Reference/Guidclarif/index.html#meth> and <https://cdm.unfccc.int/Reference/tools/index.html> mutatis mutandis.

13. This methodology also refers to the latest approved versions of the following approved standards, tools and methodologies:

(a) “AMS-I.I.: Biogas/biomass thermal applications for households/small users”;

(b) “AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass”;

(c) "AMS-III.F.: Avoidance of methane emissions through composting";

(d) "AMS-III.G.: Landfill methane recovery";

(e) "AMS-III.H.: Methane recovery in wastewater treatment";

(f) "AMS-III.BG.: Emission reduction through sustainable charcoal production and consumption";

(g) "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";

(h) "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation";

(i) "TOOL16: Project and leakage emissions from biomass";

(j) "TOOL30: Calculation of the fraction of non-renewable biomass";

(k) "Standard: Sampling and surveys for CDM project activities and programme of activities".

4. Definitions

14. The definitions contained in the Glossary of CDM terms shall apply.

15. The following definition shall also apply:

(a) **Batch** - is defined as the population of the device of the same type commissioned during a certain period of time (e.g. week or month) in a certain calendar year. To establish the date of commissioning, the Project Participant may opt to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch.

Box 2. Non-binding best practice example 2

Project proponents may define the batch for a period that is shorter than a full year.

However, it should be noted that once batches are defined it would be necessary to calculate the emission reductions separately for each batch of project devices, as denoted by index j in equations of the methodology (e.g. equation 1).

For sample-based surveys, as long as the requirements in the methodology and sampling standard are met, whether or in what way the batches are considered is subject to the discretion of the project participant and survey design (e.g. it depends on the parameter, type of survey method chosen, frequency of survey, data collection method).

5. Baseline methodology

5.1. Project boundary

16. The project boundary is the physical, geographical site of the use of biomass or the renewable energy.

5.2. Additionality

17. Additionality ~~is~~ shall be demonstrated using one of the options below:

5.2.1. Option 1 (Positive list)

18. Demonstrate ex-ante that the penetration[5] of renewable energy based thermal energy technologies (e.g. biogas stoves~~, solar cookers~~) is equal to or less than 5 per cent of the technologies/measures providing similar services in the region[6] in order to be considered as automatically additional.

19. The penetration shall be determined using one of the following options:

    (a) Official statistics or reports, relevant industry association reports or peer-reviewed literature;

    (b) Results of a sampling survey conducted by project participants or a third party as per the latest version of "Standard: Sampling and surveys for CDM project activities and programme of activities"; covering technologies/measures providing similar services as the project technology/measure.

20. To determine the penetration using the above paragraph, the most recent data available at the time of submission of the CDM-PDD or CDM-CPA-DD for validation/inclusion, shall be used, and the data vintage used shall not include data older than three years prior to: (a) the start date of the CDM project activity; or (b) the start of validation/inclusion, whichever is earlier.

5.2.2. Option 2

21. Demonstrate additionality applying the "TOOL21: Demonstration of additionality of SSC project activities."

5.2.3. Option 3

22. Demonstrate additionality applying the "TOOL19: Demonstration of additionality of microscale project activities."

5.3. Baseline emissions

23. It is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.

24. Baseline emissions would be calculated as:

$$BE_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\_fuel} \quad \text{Equation (1)}$$

[5] Refers to proportion of stock of functional equipment at the user end, also termed as market saturation.

[6] Region/Applicable geographical area - should be the entire host country. If the project participants opt to limit the applicable geographical area to a specific geographical area (such as province, region, etc.) within the host country, then they shall provide justification on the essential distinction between the identified specific geographical area and rest of the host country.

Where:

BE_y	=	Baseline emissions during the year *y* in tCO_2e
B_y	=	Quantity of woody biomass that is substituted or displaced ~~in~~(tonnes)
$f_{NRB,y}$	=	Fraction of woody biomass used in the absence of the project activity in year *y* that can be established as non-renewable biomass (fNRB)[7]
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne)
$EF_{projected\_fossil\ fuel}$	=	Emission factor ~~for~~ of fossil fuels projected to substitute ~~the substitution of~~ non-renewable woody biomass by similar consumers (tCO_2e/TJ).

25. For the emission factor ~~for~~ of fossil fuels projected to substitute ~~the substitution of~~ non-renewable woody biomass by similar consumers, either the default regional values in table 2 below or a value calculated using Equation (2) may be used.

Table 2. Regionwise[8] default values of the fossil fuel emission factor (CO_2 and non-CO2 GHG emissions)

	Fossil fuel emission factor (tCO2e/TJ) incl. CH_4 and N_2O emissions
Middle East and North Africa	63.9
East Asia and the Pacific	85.7
Europe and Central Asia	57.8
Latin America and the Caribbean	68.6
South Asia	64.4
Sub-Saharan Africa	73.2

26. Project participants may estimate the emission factor for the substitution of non-renewable woody biomass by similar consumers[9] for their project or PoA by applying equation (2) below:

$$EF_{projected\_fossil\ fuel} = \sum_j x_j \times \left[EF_{FF,j,CO2} + \left(EF_{FF,j,CH4} \times GWP_{CH4}\right) + \left(EF_{FF,j,N2O} \times GWP_{N2O}\right)\right] \quad \text{Equation (2)}$$

Where:

x_j	=	Percentage share of fossil fuel use[10] (a fraction representing the share of fossil fuel type *j* in total fossil fuel used in the region/country or project area for cooking)

[7] Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/methodologies/standard_base/index.html>.

[8] Refer to Appendix 1 for the definition of the regions which is primarily based on the "developing regions" classification used by the United Nations Development Programme but tailored to the purpose of this CDM methodology (Retrieved on 27.11.19 from http://hdr.undp.org/en/content/developing-regions).

[9] The use of electricity together with the related grid emission factor shall be considered unless its share is less than 5%, in which case it may be disregarded for calculation of the fuel emission factor.

[10] For example, percentage share of kerosene, LPG and coal in total fossil fuel used in the country X is 10%, 70% and 20%, then the parameter value for x_j should be 0.1, 0.7 and 0.2 respectively.

$EF_{FF,j,CO2}$	=	CO_2 emission factor for the fossil fuel *j*. Use a value in the table 3 below (tCO_2/TJ)
$EF_{FF,j,CH4}$	=	CH_4 emission factor for the fossil fuel *j*. Use a value in the table 3 below (tCH_4/TJ)
$EF_{FF,j,N2O}$	=	N_2O emission factor for the fossil fuel *j*. Use a value in the table 3 below (tN_2O/TJ)
GWP_{CH4}	=	Global Warming Potential of CH_4 valid for the commitment period
GWP_{N2O}	=	Global Warming Potential of N_2O valid for the commitment period

Table 3. Default emission factors (kg of GHG per TJ on a Net Calorific Basis)

Fuel	Default CO_2 Emission Factor	Default CH_4 Emission Factor	Default N_2O Emission Factor
Kerosene	71,900	10	0.6
Liquefied Petroleum Gases (LPG)	63,100	5	0.1
Coal	94,600	300	1.5

***Source*:** Table 2.5, Chapter 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories

27. The value of fNRB shall be calculated using either of the following two options:

(a) **Ex ante:** the fNRB value is determined once at the validation stage, thus no monitoring and recalculation of the fNRB value during the crediting period is required;[11]

(b) **Ex post:** the fNRB,y value is determined for the year "y" in the crediting period, requiring the fNRB value to be updated annually, following a consistent calculation procedure throughout the crediting period.

28. Project participants shall determine the proportion of the use of woody biomass and other fuels for cooking before the start of the project activity and at the renewal of each crediting period through a sample-based survey as per "Standard: Sampling and surveys for CDM project activities and programme of activities". In doing so where at the renewal of the crediting period;

(a) If there is no change in the proportions of the various fuels identified for the previous crediting period, no adjustement is necessary in the parameter B_y.

(b) Where the proportion of woody biomass has decreased, the actual new value shall be used when applying options in paragraph 27(a) to (c) below.

(c) When applying the option from paragraph 27(d) below, per centage decrease in the share of woody biomass shall be used to adjust the parameter $HG_{p,y}$ (Quantity

[11] The ex ante value may not be changed until the end of the crediting period, even if the default national value applied previously as endorsed by the DNA at the time of validation may have expired before the end the crediting period.

of thermal energy generated by the new renewable energy technology in the project in year y) downward.

29. B_y is determined by using one of the following options below, except for the case of electric cookstoves, where only option (d) is eligible:

(a) Calculated as the product of the number of households multiplied by the estimate of average annual consumption of woody biomass per household that is displaced by the project activity (tonnes/household/year);

$$B_y = N_{HH} \times (BC_{BL,HH,y} - BC_{PJ,HH,y}) \quad \text{Equation (3)}$$

Where:

N_{HH}	=	Number of households in the project activity, number
$BC_{BL,HH,y}$	=	Average annual consumption of woody biomass per household before the start of the project activity and at the renewal of each crediting period (tonnes/household/year)
$BC_{PJ,HH,y}$	=	~~If it is found that pre-project devices were not completely displaced but continue to be used to some extent, a~~Average annual consumption of woody biomass per household in the pre-project devices during the project activity (tonnes/household/year). This paramtere shall be considered if it is found that pre-project devices were not completely displaced but continue to be used to some extent.

(b) Calculated as the product of the number of persons served per household multiplied by the number of households and the estimate of average annual consumption of woody biomass per person that is displaced by the project activity (tonnes/person/year);

$$B_y = N_{HH} \times N_{p,HH} \times (BC_{BL,PP,y} - BC_{PJ,PP,y}) \quad \text{Equation (4)}$$

Where:

$N_{p,HH}$	=	Average number of persons served per household, number
$BC_{BL,PP,y}$	=	Average annual consumption of woody biomass per person before the start of the project activity and at the renewal of each crediting period (tonnes/person/year)
$BC_{PJ,PP,y}$	=	~~If it is found that pre-project devices were not completely displaced but continue to be used to some extent, a~~Average annual consumption of woody biomass per person in the pre-project devices during the project activity (tonnes/person/year). This paramtere shall be considered if it is found that pre-project devices were not completely displaced but continue to be used to some extent.

(c) Calculated as the product of the number of persons served per institution[12] multiplied by the number of institutions and the estimate of average annual consumption of woody biomass per person that is displaced by the project activity (tonnes/person/year);

[12] Institutions such as schools, prisons and hospitals.

$$B_y = \sum_{1}^{i} N_{p,I,y,i} \times N_{I,i} \times \left(BC_{BL,PP,y} - BC_{BJ,PP,y}\right)$$ Equation (5)

Where:

$N_{p,I,y,i}$ = Average number of persons served per institution in year *y*, number

$N_{I,i}$ = Number of institutions type *i* prior to project implementation, number

(d) Calculated from the thermal energy generated in the project activity as:

$$B_y = \sum_{i}^{n} HG_{p,y} \div \left(NCV_{biomass} \times \eta_{old,i}\right)$$ Equation (6)

Where:

$HG_{p,y}$ = Quantity of thermal energy generated by the new renewable energy technology in the project in year *y* (TJ)

$\eta_{old,i}$ = Efficiency of pre-project device per type of device *i*

Box 3. Non-binding best practice example 3

When estimating B_y using options (a) to (d) in paragraph 27, project participants should conduct a survey to determine the usage of different fuels/stoves by end-users in the project area before the start of the project activity and at the renewal of each crediting period, as per Appendix 2 of this document. For the renewal of the crediting period, the end-users that have been included in the project activity shall not be included in the sample.

Illustration below is for a project activity switching from inefficient woody biomass stove to electric stove.

Fuel/Stove type	Average amount of consumption **before the start of the project activity/during crediting period**	Average amount of consumption **at the renewal of first/second crediting period**
Inefficient woody biomass stove	2.5 tonnes/household/year	2.0/1.5 tonnes/household/year
LPG stove	a kg or cylinders/household/year	a1 / a2 kg or cylinders/household/year
Kerosene stove	b Liters/household/year	b1 / b2 Liters/household/year
Electric stove	ZZ kWh/household/year	ZZ1 / ZZ2 kWh/household/year
Others	-	-

When using option in paragraph 27(a), a value of 2.5 will be used for $BC_{BL,HH,y}$ for the first crediting period anda new value of 2.0 will be applied for $BC_{BL,HH,y}$ for the second crediting period based on the result of the survey conducted at the renewal of crediting period.

When using option in paragraph 27(d), the parameter $HG_{p,y}$ will be discounted based on the proportion of baseline fuels displaced.

When conducting the survey, project participants should take into account the following considerations:

- Direct measurement of the use of each fuel in the field (e.g. weighing the amount of woody biomass, metering LPG) is more accurate and is the preferred option; where direct measurement can not be implemented, it is good practice to provide the rationale/justifications.
- Asking the number of meals cooked with each fuel or the number of times each fuel is used to cook in a certain period in the questionnaire-based baseline survey may also be used for estimating the proportion of the baseline fuels displaced, where it can be demonstrated that direct measurement is not feasible.

The project participants should demonstrate the actual implementation of sampling approach to estimate the proportion of baseline fuels displaced and its compliance with the reliability requirements (i.e. confidence/precision) according to “Standard: Sampling and surveys for CDM project activities and programme of activities”.

30. For electric cookstoves only the option in paragraph 27(d) is eligible and the quantity of thermal energy generated shall be calculated as follows:

$$HG_{p,y} = EC_{AVG,y} \times N_{o,i,j} \times n_{y,i,j} \times 3.6 \times 10^{-6} \times \eta_{new,i,j} \quad \text{Equation (7)}$$

Where:

$EC_{AVG,y}$	=	Average consumption of electricity by electric cooking appliance(s) in year *y* per household / institution (kWh)
$N_{0,i,j}$	=	Number of project devices of type *i* and batch *j* commissioned
$n_{y,i,j}$	=	Proportion of commissioned project devices of type *i* and batch *j* ($N_{0,i,j}$) that remain operating in year *y* (fraction)
3.6×10^{-6}	=	Factor to convert kWh to TJ
$\eta_{new,i,j}$	=	Efficiency of the project device type of device *i* and batch *j*

31. The loss in efficiency of the project devices *i* in each batch *j* due to aging shall be accounted for during the monitoring period. For the option in paragraph 27(d), one of the following options below shall be chosen to account for the loss in efficiency – this option should be identified and fixed ex ante for the entire crediting period, and indicated in the CDM-PDD/CDM-PoA-DD at the time of registration.

(a) Determine[13] the rate of efficiency drop for a representative sample of the first batch of project device *i* in year *y* and assume that the same rate of loss in efficiency applies to all other batches. In other words, it may be assumed that the loss of efficiency measured in a representative sample of the first batch of project devices *i* applies to all subsequent batches. The efficiency of the project devices in the first batch has to be monitored annually through representative samples and this rate of loss in efficiency may be applied correspondingly to all batches; or

(b) Determine the loss in efficiency annually from a representative sample of each batch and use the actual measured loss rate.

32. Project participants and coordinating/managing entities are allowed to replace the project cookstoves whose lifetime has ended with the same type of new project cookstoves for the existing projects/CPAs, as long as they are replaced within the crediting period. However, creating a new CPA or a new project for the same purpose is not allowed.

~~If the life span of devices is less than the crediting period, it shall be demonstrated that the devices shall be replaced after the life span has ended. In such cases, if it cannot be demonstrated that the project devices will be replaced with new devices, no emission reductions can be claimed beyond the life span of the project devices.~~

33. At the end of the life span of project devices, one of the following three options shall be demonstrated:

(a) Project devices are replaced with the same or more efficient devices;

[13] Example: For the representative sample of Batch 1, if the efficiency of a new project device is 30% and at the end of Year 1 the efficiency is monitored to be 29%, the loss rate is (30%-29%)/1=1%. Therefore, this 1% loss rate is to be assumed and applied for all the devices in the first batch and subsequent batches for first year of operation.

(b) Project devices are retrofitted/repaired, i.e. essential parts of the stoves (e.g. the burning chamber) are replaced so as to meet the additional conditions described below.

(c) If none of the conditions above can be demonstrated, no emission reductions can be claimed for the stoves.

34. If project devices are retrofitted/repaired before or at the end of the devices' estimated life span, emission reductions may be claimed for these devices during the extended lifetime only if the details of the retrofits/repairs undertaken (e.g. parts replaced, specifications followed, personnel conducting the repairs and date of retrofitting) on each device are documented, and in addition, one of the following options is implemented:

(a) Extended lifetime is demonstrated through a warranty from the original manufacturer, or a guarantee from a company with demonstrated experience in cookstove repair that assures the performance of the stove in its entirety comparable to the original device including with regard to efficiency, safety and indoor emissions; or

(b) Extended lifetime or the durability of the retrofitted device is demonstrated through a durability test performed according to requirements in ISO 19867-1 for durability or a comparable national standard. Certification by a relevant national standard body or an appropriate certifying agent recognized by that body (with reference to Data/Parameter Table 19 of the methodology) may be supplied based on sample tests specified by the standard applied.

35. Where charcoal is used as the fuel by baseline (old) or project (new) devices, the quantity of woody biomass shall be determined by using a default wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis).[14] Alternatively, credible local conversion factors determined from a field study or literature may be applied. However, the conversion factor applied should not be more than 8.

5.4. Project emissions

36. The project emissions (PE_y) from cultivation, use and processing of biomass shall be calculated using the latest version of "TOOL16: Project and leakage emissions from biomass". In doing so, the following sources of project emissions shall be considered as applicable, bearing in mind that some sources may be only relevant for specific fuels (e.g. production of bioethanol):

(a) CO_2 emissions from on-site consumption of fossil fuels due to the project activity, calculated using the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", including the consumption of fossil fuels for any processing of feedstock. In case of electric cookstoves, any project emissions due to use of backup fuels (e.g diesel) shall also be accounted for;

(b) CO_2 emissions from electricity consumption by the project activity using the latest version of "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", including the consumption of electricity for any processing of feedstock;

[14] Refer to:<http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf>.The term 'wet basis' assumes that the wood is 'air-dried' as is specified in the IPCC default table.

(c) Methane emission from solid waste disposal or waste water calculated as per provisions in AMS-III.G. (landfill); AMS-III.F. (composting) and AMS-III.H. (waste water treatment) in cases where the waste is disposed in anaerobic conditions;

(d) Project emissions related to cultivation of feedstock are calculated using the latest version of the tool "TOOL16: Project and leakage emissions from biomass";

(e) Project emissions from transportation are estimated using the latest version of the tool "TOOL12: Project and leakage emissions from transportation of freight," if the transportation distance is more than 200 km; otherwise they can be neglected.

5.5. Leakage emissions

37. Leakage emissions (LE_y) shall be calculated using the latest version of "TOOL16: Project and leakage emissions from biomass".

38. Leakage emissions due to production of processed renewable biomass and bioethanol (e.g. CO_2 emissions due to consumption of fossi fuels and electricity) shall be calculated using the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" and "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".

39. Leakage emissions related to the non-renewable woody biomass saved by the project activity shall be assessed based on ex post surveys of users and the areas from which this woody biomass is sourced (using 90/30 precision for a selection of samples). The following potential source of leakage shall be considered: The use/diversion of non-renewable woody biomass saved under the project activity by non-project ~~households~~ end-users that previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass used by the non-project ~~households~~ end-users that is attributable to the project activity, then B_y is adjusted to account for the quantified leakage. Alternatively, B_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

40. Project activities switching from baseline device using firewood to efficient project device using charcoal or switching from firewood to processed biomass (briquette, pellets, and woodchips) shall take into account the leakage effects related to the charcoal or processed biomass production.

41. A default value of 0.030 t CH_4/t charcoal may be used in accordance with "AMS-III.BG.: Emission reduction through sustainable charcoal production and consumption."

5.6. Emission reductions

42. Emission reductions are to be estimated based on the equation below.

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (11)}$$

Where:

ER_y = Emission reductions in year *y*, tonnes CO_2eq

5.7. Data and parameters not monitored

43. In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter table 1.

Data / Parameter:	x_j
Data unit:	Fraction
Description:	Percentage share of fossil fuel use (a fraction representing the share of fossil fuel type *j* in total fossil fuel used in the region/country or project area for cooking)
Source of data:	Published literature, official reports or statistics, surveys
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$f_{NRB,y}$
Data unit:	-
Description:	Fraction of woody biomass saved by the project activity during year *y* that can be established as non-renewable biomass
Source of data:	-
Measurement procedures (if any):	As per "TOOL30: Calculation of the fraction of non-renewable biomass"
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	N_{HH}
Data unit:	Number
Description:	Number of households in the project activity
Source of data:	-
Measurement procedures (if any):	Established ex ante prior to start of the project activity
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	$BC_{BL,HH,y}$
Data unit:	tonnes/household/year
Description:	Average annual consumption of woody biomass per household before the start of the project activity and at the renewal of each crediting period
Source of data:	-

Measurement procedures (if any):	Determined ex ante using one of the following options: (a) $N_{p,HH}$ x ~~times~~ $BC_{BL,PP,y}$; or (b) Historical data or a sample survey conducted as per the latest version of the "Standard: Sampling and surveys for CDM project activities and programme of activities;" or (c) Country or region specific values approved through the "procedure for development, revision, clarification and update of standardized baselines", which are available on the CDM website <http://cdm.unfccc.int/methodologies/standard_base/index.html>
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	$N_{p,HH}$
Data unit:	Number
Description:	Average number of persons served per household prior to project implementation
Source of data:	Established ex ante prior to project implementation based on records of households served by the project
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	$BC_{BL,PP,y}$
Data unit:	tonnes/person/year
Description:	Average annual consumption of woody biomass per person before the start of the project activity and at the renewal of each crediting period
Source of data:	-
Measurement procedures (if any):	Determined ex ante using one of the following options: (a) A default value of 0.5 tonnes/person per year[15]. If project proponents wish to use the default value for insitutions (e.g. schools, prisons), the value should be adjusted, based on the number of meals cooked.[16]; (b) Historical data or a sample survey conducted as per the latest version of the "Standard: Sampling and surveys for CDM project activities and programme of activities". If the value determined is more than 0.9 tonnes/capita per year, it is capped to the value of 0.9 under this option.

[15] Refer to "Annex 5 - Information note on the rationale for default factors used in AMS-I.E. and AMS-II.G." of the SSC WG 42 meeting report.

[16] For example, in case of day schools, only one meal may be prepared by schools and provided to students and staff, except school holidays.

	(c) Country or region specific values approved through the "procedure for development, revision, clarification and update of standardized baselines," which are available on the CDM website http://cdm.unfccc.int/methodologies/standard_base/index.html
Any comment:	Cap of 0.9 tonnes/capita per year is not applicable to the values determined through the procedures for standardised baseline.

Data / Parameter table 7

Data / Parameter:	$\eta_{old,i}$
Data unit:	~~(i) Default 0.1 or 0.2 (please see details below);~~ ~~(ii) Establish prior to start of implementation based on survey~~ Fraction
Description:	Efficiency of pre-project device
Source of data:	-
Measurement procedures (if any):	The parameter may be established based on a representative sample survey of the pre-project devices and fixed ex ante (i.e. there is no need to determine baseline efficiency for each individual household when including in the project activity database). The survey is to be conducted in line with the "Standard for sampling and surveys for CDM project activities and programmes of activities". The representative sampling survey may ask whether the pre-project device is a traditional three-stone fire or another conventional device with no improved combustion air supply or flue gas ventilation. In that case, it is possible not to conduct efficiency tests and to use the following default efficiency values to calculate the weighted average. (i) 0.1 for a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; (ii) 0.2 for other types of devices. Conducting efficiency tests on pre-project devices is not a mandatory requirement under this methodology. Further, project participants may also conservatively assume that the efficiency of all pre-project devices is 0.2 in which case there is no need to conduct a survey to determine the weighted average efficiency referred above. ~~Use weighted average values (taking the amount of woody biomass consumed by each device as the weighting factor) if more than one type of device is being replaced.~~
Monitoring frequency:	~~Fixed for each individual household when included in the project activity database~~ This parameter may be established prior to implementation of a project activity.

QA/QC procedures:	-
Any comment:	In case Option (d) in paragraph 28 above is chosen for baseline calculations

6. Monitoring methodology

44. During project activity implementation, the following data shall be recorded:

(a) Number of new devices distributed under the project activity, identified by the type of devices and the date of commissioning (See Data / Parameter table 10 and 11);

(b) Data to unambiguously identify the recipient of the new devices distributed under the project activity (e.g. name, address, phone number).

45. Relevant parameters shall be monitored and recorded during the crediting period as indicated in section 6.1 below. The applicable requirements specified in the "General guidelines for SSC CDM methodologies" are also an integral part of the monitoring guidelines specified below and therefore shall be followed by the project participants.

46. In order to assess the leakages, monitoring shall include data on the amount of woody biomass saved under the project activity that is used by non-project households/users (who previously used renewable energy sources). Other data on non-renewable woody biomass use required for leakage assessment shall also be collected.

47. Monitoring ~~should~~ shall confirm the displacement or substitution of the non-renewable woody biomass at each location, and shall describe the method in the monitoring reports.

6.1. Data and parameters monitored

Data / Parameter table 8.

Data / Parameter:	$N_{0,i,j}$
Data unit:	Number
Description:	Number of commissioned project devices of type *i* and batch *j*
Source of data:	Monitoring
Measurement procedures (if any):	As per paragraph 42.
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 9.

Data / Parameter:	$n_{y,i,j}$
Data unit:	Fraction
Description:	Proportion of commissioned project devices of type *i* and batch *j* ($N_{0,i,j}$) that remain operating in year *y*
Source of data:	Monitoring

Measurement procedures (if any):	Measured directly or based on a representative sample. The "Standard: Sampling and surveys for CDM project activities and programme of activities" shall be used for determining the sample size to achieve 90/10 confidence/precision levels. Separate samples shall be taken for each batch.
Monitoring frequency:	At least once every two years (biennial)
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 10.

Data / Parameter:	**Date of commissioning of project device of type *i***
Data unit:	Date
Description:	Actual date of commissioning of the project device
Source of data:	Internal records
Measurement procedures (if any):	-
Monitoring frequency:	Fixed and recorded at the time of commissioning/distribution
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 11.

Data / Parameter:	**Date of commissioning of batch *j***
Data unit:	Date
Description:	To establish the date of commissioning, the Project Participant may opt to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Source of data:	Internal records
Measurement procedures (if any):	
Monitoring frequency:	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
QA/QC procedures:	-
Any comment:	To be reported in the monitoring report

Data / Parameter table 12.

Data / Parameter:	**Renewable energy supplied to electric cookstoves from grid, mini grid or stand alone source**
Data unit:	MWh
Description:	(i) When applying paragraph 2(d), confirmation is required to demonstrate that electric cookstoves receive electricity from a standalone renewable energy system or grid or mini-grid that is 100% powered by renewable energy sources. This may be based on metered data of electricity consumed by electric stoves, information on connected power plants of the grid or mini grid; (ii) When applying paragraph 2(e), this parameter is determined based on the (i) metered data of renewable energy supplied by the renewable energy associated with the electric cookstoves, (ii) metered data on amount of electricity exported to the grid, and (iii) metered data on electricity imported from the grid
Source of data:	Utility data or mini-grid operator's data, energy meter on the renewable energy system and where applicable energy meter on the bidirection inverter connected to renewable energy system and the grid
Measurement procedures (if any):	-
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 13.

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/tonne
Description:	Net calorific value of the non-renewable woody biomass, briquettes or charcoal used in project devices
Source of data:	-
Measurement procedures (if any):	IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried' may be used if fuel used in project device is also woody biomass. If briquette is used as project fuel, NCV shall be measured annually
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 14.

Data / Parameter:	$f_{NRB,y}$
Data unit:	-
Description:	Fraction of woody biomass saved by the project activity during year *y* that can be established as non-renewable biomass
Source of data:	-

Measurement procedures (if any):	As per "TOOL30: Calculation of the fraction of non-renewable biomass"
Monitoring frequency:	Yearly~~, if project proponents opt for annual monitoring instead of fixing the value ex-ante at the beginning of each crediting period~~
QA/QC procedures:	-
Any comment:	Applicable, only if project proponents opt for annual monitoring instead of fixing the value ex ante at the beginning of each crediting period

Data / Parameter table 15.

Data / Parameter:	$BC_{PJ,HH,y}$
Data unit:	tonnes/household/year
Description:	Average annual consumption of woody biomass per household in the pre-project devices during the project activity~~, if it is found that pre-project devices were not completely displaced but continue to be used to some extent~~
Source of data:	Surveys
Measurement procedures (if any):	Monitoring shall consist of estimation of all project devices or a representative sample thereof, at least once every two years (biennial)
Monitoring frequency:	At least once every two years (biennial)
QA/QC procedures:	-
Any comment:	This paramter shall be considered if it is found that pre-project devices were not completely displaced but continue to be used to some extent.

Data / Parameter table 16.

Data / Parameter:	$BC_{PJ,PP,y}$
Data unit:	tonnes/person/year
Description:	Average annual consumption of woody biomass per person in the pre-project devices during the project activity~~, if it is found that pre-project devices were not completely displaced but continue to be used to some extent~~
Source of data:	Surveys
Measurement procedures (if any):	Monitoring shall consist of estimation of all project devices or a representative sample thereof, at least once every two years (biennial)
Monitoring frequency:	At least once every two years (biennial)
QA/QC procedures:	-
Any comment:	This paramter shall be considered if it is found that pre-project devices were not completely displaced but continue to be used to some extent.

Data / Parameter table 17

Data / Parameter:	$N_{p,I,y,i}$
Data unit:	Number
Description:	Average number of persons served per institution
Source of data:	-
Measurement procedures (if any):	Average number of persons served per institution shall be based on survey undertaken as per "Standard: Sampling and surveys for CDM project activities and programme of activities". This parameter shall be monitored every year. If the monitoring period is shorter or longer than one year, the result may be extrapolated for the monitoring period
Monitoring frequency:	Monitored annually ex post
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 18

Data / Parameter:	$HG_{p,y}$
Data unit:	TJ
Description:	Quantity of thermal energy generated by the new renewable energy technology in the project in year *y*
Source of data:	-
Measurement procedures (if any):	For a biogas digester, it shall be monitored as per the requirements stipulated in the Table 1 of "AMS-I.I.: Biogas/biomass thermal applications for households/small users". Alternatively, project proponents may use a default biogas generation value of 0.13 $Nm^3.m^{-3}.day^{-1}$ (i.e. volume of biogas generated in normal conditions of temperature and pressure per unit useful volume of the digester per day) for regions/countries where annual average ambient temperature is higher than 20°C. For the case of ethanol cookstoves, the related requirements from AMS-I.I. for determining thermal energy generated in the case of processed renewable biomass (refer to paragraph 13 of the methodology version 4.0) may be adopted. The preferred approach to determine the thermal energy output of the stoves would be through monitoring the amount of ethanol used for cooking by the households (if required, on a sample basis), the NCV and density of the ethanol, and the efficiency of the project stoves determined according to the requirements of AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass for $\eta_{new,i,j}$. The manufacturers rated thermal capacity of the stoves and the monitored utilization hours entails uncertainties since, e.g. stoves may be operating at partial capacity. Therefore, for this option, it may be necessary to determine the average capacity utilization of stoves through surveys For electric cookstoves, refer to Equation 7
Monitoring frequency:	Yearly

QA/QC procedures:	-
Any comment:	Applicable if the option from paragraph 27(d) is chosen for baseline calculations

Data / Parameter table 19.

Data / Parameter:	$EC_{AVG,y}$
Data unit:	kWh
Description:	Average consumption of electricity by electric cooking appliance(s) in year *y* per household/institution
Source of data:	-
Measurement procedures (if any):	Measured using meters or data loggers that are either in-built or attached separately to the electric cooking appliances. A representative sample based on "Standard: Sampling and surveys for CDM project activities and programme of activities" shall be used for determining the sample size to achieve 90/10 confidence/precision levels. Separate samples shall be taken for each batch.
Monitoring frequency:	Annual
QA/QC procedures:	Data logger measuring the average electricity consumption of the electric cooking appliance(s) shall be in conformity with industry standard and calibrated according to relevant national requirements.
Any comment:	-

Data / Parameter table 20.

Data / Parameter:	$\eta_{new,i,j}$
Data unit:	Fraction
Description:	Efficiency of the device of each type *i* and batch *j*
Source of data:	-
Measurement procedures (if any):	Efficiency shall be measured/estimated as per the following: (i) Certification by a national standards body or an appropriate certifying agent recognized by that body; or (ii) Manufacturer specifications on efficiency based on water boiling test (WBT) adapted for electrical cooking appliances/electric pressure cookers where the testing should be conducted in accordance with national standards (if available) or international standards or guidelines); or (iii) Procedure as detailed under Appendix 3 of this document if the project involves electric cooking appliances; For all the above options, the sampling test of stoves shall be conducted following a 90/10 precision in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities". However, the following simplified approach may be used, when the efficient cookstoves are produced by a manufacturer with a recognized management system in place (e.g. ISO certification) to ensure that the individual equipment produced

	do not vary beyond the range of acceptance limits (e.g. characteristics such as materials, critical dimensions): ○ Conduct a sample test on three cookstoves with three tests conducted for each stove. The test can be carried out by project proponents by themselves or stove manufacturers; ○ If the standard deviation of the nine test results indicated above is very small and 90/10 precision requirement is met (in this case, the value of the t-distribution for 90 per cent confidence shall be used instead of Z value), the efficiency determined is acceptable, otherwise more sample tests would be required until 90/10 precision is met.
Monitoring frequency:	(i) Recorded at the time of commissioning/distribution; (ii) Adjusted for the loss of efficiency as paragraph 31
QA/QC procedures:	-
Any comment:	In case option (d) in paragraph 29 is chosen for baseline calculations

6.2. Representative sampling methods

48. A statistically valid sample of the locations where the systems are deployed, with consideration, in the sampling design, of occupancy and demographics differences can be used to determine parameter values used to determine emission reductions, as per the relevant requirements for sampling in the "Standard: Sampling and surveys for CDM project activities and programme of activities". When biennial inspection is chosen a 95 per cent confidence interval and a 10 per cent margin of error requirement shall be achieved for the sampling parameter. On the other hand, when the project proponent chooses to inspect annually, a 90 per cent confidence interval and a 10 per cent margin of error requirement shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/10 precision is not achieved, the lower bound of a 90 per cent or 95 per cent confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/10 precision.

6.3. Project activity under a programme of activities

49. The use of this methodology in a project activity under a programme of activities (PoA) is legitimate if the following leakages are estimated and accounted for, where applicable, ~~if required,~~ on a sample basis using a 90/30 precision for the selection of samples, and accounted for:

(a) Use of non-renewable woody biomass saved under the project activity to justify the baseline of other CDM project activities can also be a potential source of leakage. If this leakage assessment quantifies a portion of non-renewable woody biomass saved under the project activity that is then used as the baseline of other CDM project activities, then B_y is adjusted to account for the quantified leakage;

(b) Increase in the use of non-renewable woody biomass outside the project boundary to create non-renewable woody biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass outside the project boundary, then B_y is adjusted to account for the quantified leakage;

(c) As an alternative to subparagraphs (a) and (b) above, B_y can be multiplied by a net to gross adjustment factor of 0.95[17] to account for leakages, in which case surveys are not required.

50. The following further conditions apply for the fNRB value applied in a component project activity (CPA) of a PoA. The choice between (a) conduct own studies to determine the local fNRB value[18] as per "TOOL30: Calculation of the fraction of non-renewable biomass" and then apply those values in the CPAs; and (b) use default national values approved by the Board (see footnote 8)[19,20] shall be made ex ante. A switch from national value, i.e. choice (b) to local values, i.e. choice (a) is permitted, under the condition that the selected approach is consistently applied to all CPAs.[21]

51. If the generic CPA consists solely of units that qualify as "microscale CDM units"[22] as defined in the "TOOL19: Demonstration of additionality of microscale project activities", the conditions to ensure that CPAs that will be included meet the small-scale or microscale thresholds and remain within those thresholds throughout the crediting period of the CPAs are not required.

[17] Paragraph 37 and paragraph 49(c) of the methodology allow the use of a net to gross adjustment factor of 0.95 in lieu of conducting a survey to account for leakage emissions. In the case of a CPA opting to apply the adjustment factor, the adjustment factor is only applied once, i.e. either paragraph 37 and paragraph 49(c) is applied. Also, the adjustment factor does not need to be applied twice for option (a) and (b).

[18] If the project boundary covers the entire country, then it is permitted that studies be conducted at the national level to determine the fNRB value under option (a) as mentioned under paragraph 48 of this methodology.

[19] In the absence of a national value, the default globally applicable fNRB value of 0.3 may be treated as national value.

[20] After registration of a PoA that applies the default conservative value of 0.30, if a national value is approved by the Board, CMEs may request a post-registration change to use that national value.

[21] The determination of fNRB of all CPAs under the PoA shall follow the option that is defined by the PoA-DD. This includes new CPAs to be included to the POA and the approach has to be consistent amongst all CPAs. The new fNRB value should be calculated as per Tool 30 and the value obtained by correctly applying the tool may be applied irrespective of whether it is lower, equal or higher than the default value mentioned in the Tool.

[22] Refer to the latest vesion of TOOL 19 on the CDM website. In accordance with version 9.0 of TOOL 19, to qualify as microscale unit, it is required to demonstrated that: (a) renewable energy technology up to 5 MW installed capacity is achieved; and (b) end users of the technology/measure are households, communities or SMEs; and (c) penetration of clean and energy efficient cookstoves is equal to or less than 5 per cent of the technologies/measures (providing similar services) in the region.

Appendix 1. Definition of regions

1. The table below lists the NA-I countries into six regions primarily based on the definition of "developing regions" used by the United Nations Development programme (http://hdr.undp.org/en/content/developing-regions) but with some modifications for the purpose of this CDM methodology. This classification is for the limited purpose of determining a simple regional default value for fossil fuel emission factor (i.e. emission factor for the substitution of non-renewable woody biomass by similar consumers) for optional use by the project developers under equation 1 of this methodology.

Table 1. Classification for developing regions

Developing region	Countries
Middle East and North Africa	Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen, *Israel*
East Asia and the Pacific	Cambodia, China, Fiji, Indonesia, Kiribati, Democratic People's Republic of Korea, Lao People's Democratic Republic, Malaysia, Marshall Islands, Federated States of Micronesia, Mongolia, Myanmar, Nauru, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Viet Nam, *Cook Islands, Brunei Darussalam, Republic of Korea, Niue, Singapore*
Europe and Central Asia	Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Montenegro, Serbia, Tajikistan, The Republic of North Macedonia, Turkmenistan, Uzbekistan, *San Marino*
Latin America and the Caribbean	Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Plurinational State of Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Bolivarian Republic of Venezuela
South Asia	Afghanistan, Bangladesh, Bhutan, India, Islamic Republic of Iran, Maldives, Nepal, Pakistan, Sri Lanka
Sub-Saharan Africa	Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde,Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, Eswatini (Kingdom of), United Republic of Tanzania, Togo, Uganda, Zambia, Zimbabwe

Appendix 2. Non-binding survey questionnaire

1. Survey format A: Baseline fuel consumption pattern

1.1. General information[1]

Title of project activity/CPA/PoA	
Name of Surveyor	
Date of survey	mm/dd/yyyy
Period of measurements (for consumption rate)	mm/dd/yyyy to mm/dd/yyyy

1.2. Household profile

Name (Household representative)	
Household size (total number of people)	
- Adult	
- Children	
Address	
Phone number (if available)	

1.3. Stove description prior to the project implementation

(mark x with type of stove used) [2]

"A three-stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. Without a grate or chimney".	
Any other type of stove	

1.4. Household fuel consumption pattern prior to the project implementation[3]

How many meals did you prepare last week or last month?	Meals/week or month

1.4.1. Fuel use for cooking

	Yes/No	Quantity of usage	Unit
Charcoal			kg/month or year
Wood			kg/month or year
LPG			kg or Cylinders/month or year
Kerosene			Litres/month or year

[1] Selection of households should be based on a sampling plan.

[2] An "X" shall be filled in in one of the two alternatives. If the stoves does not have a chimney or a grate, then "X" should be filled out for "Any other type of stoves." Such a stove would then be considered an improved cookstove.

[3] In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms units mentioned above. In many places the volume of firewood (e.g. the volume capacity and level of filling of the transporting/storage room) is measured, not its weight. 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 spent on purchasing the fuel. Therefore, the project participant shall provide further guidelines for how the conversion of these reported values to required units (mass or volume) should be carried out (e.g. If a household uses a bag of charcoal every 10 days, then the monthly average can be calculated if the weight (or volume and bulk density) of the full bag can be determined).

Coal			kg/month or year
Electricity			kWh/month or year
Other fuels (explain)			

2. Survey format B: Project survey

2.1. General information[4]

Title of project activity/CPA/PoA	
Name of Surveyor	
Date of survey	mm/dd/yyyy
Period of measurements (for consumption rate)	mm/dd/yyyy to mm/dd/yyyy

2.2. Household profile

Name (Household representative)	
Household size (total number of people)	
- Adult	
- Children	
Address	
Phone number (if available)	

2.3. Household fuel consumption pattern post the project implementation

Cooking device	
Model name/number	
Unique ID	
Date of installation	mm/dd/yyyy
Do you use the project cookstove? (Physically check the stove).[5]	Yes/No
- If yes, have you used the stove regularly since you installed it?[6]	Yes/No
- If yes, is your stove in good condition?[7]	Yes/No
- If no, why did you stop using the stove?	
- How many meals did you prepare using project cookstove last week or last month?	Meals/week or month
Do you use your traditional (baseline) cookstove also?	Yes/No

[4] Selection of households should be based on a sampling plan.

[5] The question is to determine if the cookstove is currently in use, i.e. to address the parameter of "usage factor." Physical checks to verify the usage may be done by checking the conditions of stoves, e.g. warm to touch, ashes in grate, and soot on stove.

[6] The question is to determine if the cookstove has been continuously used.

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

- If yes, how many meals did you prepare using traditional (baseline) cookstove last week or last month?[8]	Meals/week or month
Do you use any other stove? (ICS etc.)[9]	Yes/No
If yes, list the types and number of other non-project stoves	
How many times a week do you use the non-project stoves?	
How much do you spend on fuel for cooking/type of cooking device in a week/month?	

2.3.1. Fuel use for cooking[10]

	Yes/No	Quantity of usage	Unit	Money spent on fuel/month/year
Charcoal			kg/month or year	
Wood			kg/month or year	
LPG			kg or Cylinders/month or year	
Kerosene			Liters/month or year	
Coal			kg/month or year	
Electricity			kWh/month or year	
Other fuels (explain)				

[8] The question is to determine if the baseline stove is being used to account for project emissions.

[9] The question is to cross-check if the project cookstove is used for all cooking requirements. It may also detect the situation where a household is taking part in more than one project activity, avoiding double- counting.

[10] In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms units mentioned above. In many places the volume of firewood (e.g. the volume capacity and level of filling of the transporting/storage room) is measured, not its weight. 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 for how the conversion of these reported values to required units (mass or volume) should be carried out (e.g. If a household uses a bag of charcoal every 10 days, then the monthly average can be calculated if the weight (or volume and bulk density) of the full bag can be determined).

Appendix 3. Determination of efficiency of electric cooking appliances

1. Electric cookstoves

1. At a room temperature, take a known mass (m) of water to be heated in standard vessel and record its initial temperature (t_1). The electric cooking appliance under testing is operated at maximum power rating. The water will start boiling after some time, record the final temperature (t_2) of the water and the input electrical energy (total kWh), voltage, and current using a power analyser.

2. The total heat energy absorbed (output) is calculated by using the formula below:

$$Q = \frac{m \times c_p \times \Delta t}{3.6 \times 10^6}$$

Where:

Q	=	Total heat energy absorbed (kWh)
m	=	mass of water (kg)
c_p	=	specific heat capacity of water (4.186 J/kg°C)
Δt	=	change in temperature ($t_2 - t_1$) in °C
3.6×10^6	=	conversion factor from Joule to kWh

3. The efficiency is calculated by using formula

$$Efficiency\ (\eta) = \frac{Q}{Input\ electrical\ energy} \times 100\%$$

2. Electric Pressure cooker (EPC)

4. At a room temperature, take a known mass (m), of water that is heated in the EPC pot. Record the initial temperature of water (t_i). Reset the power meter reading to 'zero'. When the EPC reaches maximum pressure and temperature, record the final temperature (t_f), and the power meter reading (R_1). Then operate the EPC till the water starts boiling and the final power meter reading (R_2) is recorded.

5. The heat energy effectively utilized by the EPC (Q_u), for increasing the pressure of water and steam mixture from room temperature to maximum temperature and pressure is calculated as follows:

$$Q_u = m \times (H_m - H_i)$$

Where:

H_m	=	the enthalpy of water and steam mixture at maximum pressure and temperature t_f (kJ/kg)
H_i	=	the enthalpy of water at room temperature t_i (kJ/kg)

6. The total input electrical energy in kWh, is converted into kilojoule with the formula:

$$Q_t = R_2 \times 3{,}600$$

7. The efficiency is calculated by using formula:

$$efficiency\ (\eta) = \frac{Heat\ energy\ effectivelly\ utilized}{Total\ energy\ input} = \frac{Q_u}{Q_t} \times 100\%$$

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Document information

Version	*Date*	*Description*
11.0	17 November 2020	MP 83, Annex 6 To be considered by the Board at EB 108. The draft version of this document (CDM-MP83-EC02-A01) was available for public input from 9 to 24 October 2020. It received no input. Revision to includes best practice examples for stove stacking.
10.1	5 June 2020	Editorial revisions to correct cross-references throughout the document.
10.0	28 November 2019	EB 105, Annex 7 Revision to: • Introduce regional default fossil fuel emission factors and an alternative for the project participant to calculate the fossil fuel emission factor, as explained in CDM-MP80-A16; • Clarify monitoring requirements; • Incorporate the responses to clarification requests: SSC_739, SSC_744, SSC_745, SSC_746, SSC_749, SSC_756 and SSC_759.
09.0	31 August 2018	EB 100, Annex 10 Revision to include simplified provision for automatic additionality (if market penetration is less than or equal to 5 percent).
08.0	1 November 2017	EB 97, Annex 10 Revision to: • Allow inclusion of bio-ethanol for cookstoves; • Include an example survey form; • Refer to the “TOOL30: Calculation of the fraction of non-renewable biomass”.
07.0	22 July 2016	EB 90, Annex 12 Revision to: • Include the default values for baseline fuel wood consumption per person; • Include the procedures to quantify baseline woody biomass consumption for the entire household and; • Introduce the monitoring table.
06.0	28 November 2014	EB 81, Annex 25 The revision: • Introduces the “TOOL16: Project and leakage emissions from biomass”, streamlines biomass cultivation procedures across small and large scale methodologies; • Removes restrictions for application in a PoA.
05.0	20 July 2012	EB 68, Annex 22

Version	*Date*	*Description*
		Includes: • A reference to the available country specific default values for fNRB; • A default biogas generation rate for regions/countries where annual average ambient temperature is higher than 20°C; and Specifies: • The requirements of using national or local fNRB values for CPAs under a PoA.
04.0	15 April 2011	EB 60, Annex 20 Requirements for leakage estimation simplified, default net gross adjustment factor is included as an option to account for any leakages, emission factor for the projected fossil fuel revised, more options for sampling and survey included.
03.0	17 September 2010	EB 56, Annex 17 To expand the applicability to renewable energy water treatment technologies.
02.0	26 March 2010	EB 53, Annex 18 To include the changes below which are consistent with the changes to AMS-II.G. approved by the Board at its fifty-first meeting: • Further clarification on the eligible technology/measures; • Default efficiency factors for baseline cookstoves; • Procedures for sampling; • Revised procedures for quantity of woody biomass that can be considered as non-renewable; and • Clarifications as to which leakage requirements are appropriate for projects versus PoAs.
01.0	1 February 2008	EB 37, Annex 6 Initial adoption.

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