CLEAN DEVELOPMENT MECHANISM

CDM-SSCWG42-A04

Draft Small-scale Methodology

AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass

Version 06.0 - Draft

Sectoral scope(s):03

COVER NOTE

1. Procedural background

1. The methodology AMS-II.G comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of efficient thermal energy generation units utilizing non-renewable biomass (e.g. complete replacement of existing biomass-fired cook stoves or ovens or dryers with more efficient appliances), or retrofitting of existing units reducing the use of non-renewable biomass for combustion.

2. The draft revision of the methodology AMS-II.G was prepared by the small-scale working group (SSC WG) considering the following issues:

   (a) Submission SSC_543 regarding the fraction of non-renewable biomass;

   (b) Submission SSC_671 regarding inclusion of multiple types of different cook stoves;

   (c) Submission SSC_674 on the use of qualitative surveys to determine the amount of woody biomass;

   (d) Submission SSC_684 regarding sample size requirements for thermal efficiency testing;

   (e) Submission SSC_695 regarding thermal efficiency monitoring requirements.

3. A call for public input on the draft revision of AMS-II.G was launched by EB 73. The call for public input was open from 3 June 2013 to 18 June 2013; one input was received.

2. Purpose

4. The draft methodology proposed in this document aims to:

   (a) Include simplified approaches to simplified approaches to determine the thermal efficiency of project devices;

   (b) Include default values for baseline fuel wood consumption;

   (c) Introduce changes based on previous clarifications listed in the above.

5. The purpose of the call for public input is to allow the SSC WG to take into account feedback/comments received on the revision of the methodologies.

3. Key issues and proposed solutions

6. None.

4. Impacts

7. The proposed revision will facilitate the implementation of clean development mechanism (CDM) project activities and component project activities (CPAs) distributing efficient cook stoves, which are very relevant for the least developed countries (LDCs) and other regions that are underrepresented in the CDM.

5. Subsequent work and timelines

8. The SSC WG recommended that the Executive Board (hereinafter referred to as the Board) launch a call for public input on the draft revision of the "AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass". After receiving public inputs on the document, the SSC WG will continue working on the revision of the approved methodology, at its 43rd meeting, for recommendation to the Board.

6. Recommendations to the Board

9. The SSC WG recommended that the Board launch a call for public inputs on the draft revision to AMS-II.G.

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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)	Introduction of efficient thermal energy generation units utilizing non-renewable biomass (e.g. complete replacement of existing biomass-fired cook stoves or ovens or dryers with more efficient appliances), or retrofitting of existing units reducing the use of non-renewable biomass for combustion
Type of GHG emissions mitigation action	Energy efficiency

2. Scope, applicability, and entry into force

2.1. Scope

2. This category comprises efficiency improvements in thermal applications of non-renewable biomass. Examples of applicable technologies and measures include the introduction of high efficiency biomass fired cook stoves or ovens or dryers to replace the existing devices and/or energy efficiency improvements in existing biomass fired cook stoves or ovens or dryers[1].

3. The methodology is applicable to single pot or multi pot portable or in-situ cook stoves with rated efficiency of at least 20 per cent. The efficiency of the project devices shall be based on certification by a national standards body or an appropriate certifying agent recognized by that body. Alternatively, manufacturer specifications on efficiency based on water boiling test (WBT) may be used.

4. Project participants shall be 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.

2.2. Applicability

5. The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.

2.3. Entry into force

6. Not applicable.

2.4. Normative references

7. Project participants shall apply the “General guidelines for SSC CDM methodologies”, “Guidelines on the demonstration of additionality of small-scale project activities” and “General guidance on leakage in biomass project activities” (attachment C to

[1] Implementation of Greenfield applications is not covered in this methodology.

appendix B) available at: <http://cdm.unfccc.int/Reference/Guidclarif/index.html#meth> mutatis mutandis.

3. Definitions

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

9. The definitions of demonstrably renewable woody biomass and non-renewable biomass provided in paragraphs 22 and 23 shall apply.

4. Baseline methodology

4.1. Project boundary

10. The project boundary is the physical, geographical site of the efficient devices that burn biomass.

4.2. Emission reductions

11. It is assumed that in the absence of the project activity, the baseline scenario would be the projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices.

12. Emission reductions are calculated as:

$$ER_y = \sum_i ER_{y,i} \qquad \text{Equation (1)}$$

Where:

i	=	Indices for the situation where more than one type of project device is introduced to replace the pre-project devices[2]
ER_y	=	Emission reductions during year *y* in t CO_2e
$ER_{y,i}$	=	Emission reductions by project device of type *i* during year *y* in t CO_2e

[2]. For example, in some instances, full replacement of the pre-project device would require the implementation of more than one project device (e.g. one stove suitable for cooking and the other stove suitable for cooking/boiling water).

(a) For cook stoves:

$$ER_{y,i} = \sum_{a=1}^{a=y} B_{y,savings,i,a} \times N_{y,i,a} \frac{\mu_{y,i}}{365} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossilfuel} - LE_y \quad \text{Equation (2)}$$

(b) For ovens or dryers:

$$ER_{y,i} = B_{y,savings,i} \times N_{y,i} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossilfuel} - LE_y \quad \text{Equation (3)}$$

Where:

a	=	'*a'* is the indices for the age (in years) of the cook stoves that are operating in the year '*y*' of the crediting period. At any year *y* of the crediting period (e.g. y=1, 2, 3… 7 or 10) there will be a population of $N_{y,i,a}$ operational devices of the type *i* with age varying from a=1 (the cook stoves installed during the current year *y*) up to the age a=y (the cook stoves installed during the first year of the crediting period). Since the lifetime of cook stoves is often shorter than the length of the crediting period and cook stoves are likely to show significant efficiency losses over time, this aspect needs to be captured through the monitoring plan
$B_{y,savings,i,a}$	=	Quantity of woody biomass that is saved in tonnes per cook stove device of type *i* and age *a* in year *y*
$B_{y,savings,i}$	=	Quantity of woody biomass that is saved in tonnes per oven or drier of type i in year y
$f_{NRB,y}$	=	Fraction of woody biomass saved by the project activity in year *y* that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (fNRB) values available on the CDM website.[3] The parameter value may be fixed ex ante at the beginning of each crediting period.
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, based on the gross weight of the wood that is 'air-dried')

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

$EF_{projected\_fossilfuel}$ = Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 t CO_2/TJ[4]

$N_{y,i,a}$ = Number of project devices of type *i* and age *a* operating in year *y*, determined as per paragraph 28

$\mu_{y,i}$ = Number of days of utilization of the project device during the year '*y*'. Its value may be considered as 365 where it can be demonstrated that the pre-project device has been decommissioned and is no longer used, otherwise it shall be determined as per paragraph 20

LE_y = Leakage emissions in the year *y*, please refer to the section 4.3 below

13. $B_{y,savings,i,a}$ for cook stoves is estimated using one the following methods:

14. Option 1: kitchen performance test (KPT):

$$B_{y,savings,i,a} = B_{old,i} - B_{a=1,i,KPT} \times \Delta B_{y,i,a} \quad \text{Equation (4)}$$

Where:

$B_{old,i}$ = Annual quantity of woody biomass that would be used in the absence of the project activity to generate thermal energy equivalent to that provided by the project device type *i*, if the project device operates throughout the year *y*. Value in tonnes per year per device of type *i*, determined as per paragraph 17 below

$B_{a=1,i,KPT}$ = Annual quantity of woody biomass used in tonnes per device of type *i*, measured as per the KPT protocol, for the initial efficiency determined in the year of its installation (a=1). The KPT shall be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the KPT procedures specified by the partnership for clean indoor air (PCIA): <http://www.pciaonline.org/node/1049)>

[4] This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50 per cent weight is assigned to coal as the alternative solid fossil fuel (96 t CO_2/TJ) and a 25 per cent weight is assigned to both liquid and gaseous fuels (71.5 t CO_2/TJ for kerosene and 63.0 t CO_2/TJ for liquefied petroleum gas (LPG).

$\Delta B_{y,i,a}$ = Factor to consider the efficiency loss of the project device type i due to its aging at the year *y*, expressed as follows:

$$\Delta B_{y,i,a} = \frac{B_{a,i,KPT}}{B_{a=1,i,KPT}}$$

where $B_{a,i,KPT}$ is the biomass consumption of the device '*i*' with age '*a*' determined using the KPT (in tonnes per year per device) and $B_{a=1,i,KPT}$ is the biomass consumption of the device at its first year of operation. $\Delta B_{y,i,a}$ may be determined through sample surveys of project device type *i* with the same age at each year of the crediting period. Alternatively, the monitoring may determine annually the biomass consumption of the devices installed at the first year of the crediting period , through the crediting period and the efficiency loss of this population may be used to correct the initial efficiency of the population of stoves installed later on . For example, the loss rate of year 2016 for the project device of type *i* installed in 2015 can be considered the same as that of year 2014 for the project device of the same type installed in 2013. In this way, the monitoring at any year *y* will consist of the determination of the biomass consumption for the devices installed during the current year (the initial value $B_{a=1,i,KPT}$ for the population commissioned ~~during this year~~), and the values of $B_{a,i,KPT}$ and of $\Delta B_{y,i,a}$ for oldest population (i.e. the devices from the first year that have now reached the age a=y)

15. Option 2: water boiling test (WBT):[5]

$$B_{y,savings,i,a} = B_{old,i} \times (1 - \frac{\eta_{old}}{\eta_{new,i,a=1} \times \Delta\eta_{y,i,a}} \quad \text{Equation (5)}$$

$$B_{y,savings,i,a} = B_{y+1,new,i,survey} \times (\frac{\eta_{new,i,a=1} \times \Delta\eta_{y,i,a}}{\eta_{old}} - 1) \quad \text{Equation (6)}$$

[5] Based on whether $\eta_{new,i,y}$ or $B_{y,new,i,survey}$ is used for monitoring, either equation (5) or (6) may be used.

Where:

$B_{y+1,new,i,survey}$ = Annual quantity of woody biomass used during the project activity in tonnes per device of type *i*, determined through a sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied:

(a) Pre-project devices have been completely decommissioned and only efficient project devices are exclusively used in the project households;

(b) If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass.

η_{old} = Efficiency of the pre-project device (fraction), determined using one of the following options:

(a) Measured using representative sampling methods or based on literature reporting results of measurements relevant for the type of pre-project devices. 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;

(b) A default value of 0.10 may be optionally used if the pre-project device is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; for other types of devices, a default value of 0.2 may be optionally used. 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

$\eta_{new,i,a=1}$ = Thermal efficiency of the device of type *i* being deployed as part of the project activity (fraction), using the WBT protocol carried out in accordance with national standards (if available) or international standards or guidelines,[6] for the initial efficiency determined in the year of its installation (a=1). If more than one project devices are necessary to replace the pre-project devices, woody biomass consumption should be calculated per device (taking the amount of woody biomass consumed by each device as the weighting factor).

[6] In all cases the testing protocol shall be the same for both the device being replaced and the device being deployed.

$\Delta\eta_{y,i,a}$ = Factor to consider the efficiency loss of the project device type *i* due to its aging at the year *y*, as expressed as follows:

$$\Delta\eta_{y,i,a} = \frac{\eta_{new,i,a}}{\eta_{new,i,a=1}}$$

where $\eta_{new,i,a}$ is the thermal efficiency of the device '*i*' with age '*a*' determined using the WBT and $\eta_{new,i,a=1}$ is the thermal efficiency of the device at its first year of operation. $\Delta\eta_{y,i,a}$ may be determined through sample surveys of project device type *i* with the same age at each year of the crediting period. Alternatively, the monitoring may determine annually the thermal efficiency of the devices installed at the first year of the crediting period, and the efficiency loss of this population may be used to correct the initial efficiency of the population of devices installed later on. For example, the loss rate of year 2016 for the project device of type *i* installed in 2015 can be considered the same as that of year 2014 for the project device of the same type installed in 2013. In this way, the monitoring at any year y will consist of the determination of the thermal efficiency for the devices installed during the current year (the initial value $\eta_{new,i,a=1}$ for the population commissioned during this year), and the values of $\eta_{new,i,a}$ and of $\Delta\eta_{y,i,a}$ for oldest population (i.e. the devices from the first year that have now reached the age a=y).

16. Option 3: controlled cooking test (CCT):

$$B_{y,savings,i,a} = B_{old,i} \times (1 - \frac{SC_{new,i,a=1} \times \Delta SC_{y,i,a}}{SC_{old}})$$ Equation (7)

Where:

SC_{old} = Specific fuel consumption or fuel consumption rate of the pre-project devices, that is fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour, respectively.
Specific fuel consumption or fuel consumption rate are to be determined using the CCT protocol carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the CCT procedures specified by the partnership for clean indoor air (PCIA): <http://www.pciaonline.org/node/1050>).
Use weighted average values if more than one type of device is being replaced (taking the amount of woody biomass consumed by each device as the weighting factor)

$SC_{new,i,a=1}$ = Specific fuel consumption or the fuel consumption rate of the devices of type *i* deployed as part of the project, that is fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour respectively, for the initial efficiency determined in the year of its installation (a=1).
Specific fuel consumption or fuel consumption rate shall be determined using the same CCT protocol used to test the pre-project devices.
If more than one project devices are necessary to replace the pre-project device, woody biomass consumption should be calculated per device (taking the amount of woody biomass consumed by each device as the weighting factor)

$\Delta SC_{y,i,a}$ = Factor to consider the efficiency loss of the project device type *i* due to its aging at the year *y*, as expressed as follows:

$$\Delta SC_{y,i,a} = \frac{SC_{new,i,a=1}}{SC_{new,i,a}}$$

where $SC_{new,i,a}$ is the specific fuel consumption of the device '*i*' with age '*a*' determined using the CCT and $SC_{new,i,a=1}$ is the specific fuel consumption of the device at its first year of operation. $\Delta SC_{y,i,a}$ may be determined through sample surveys of project device type *i* with the same age at each year of the crediting period. Alternatively, the monitoring may determine annually the specific fuel consumption of the devices installed at the first year of the crediting period, and the efficiency loss of this population may be used to correct the initial efficiency of the population of devises installed later on. As an example, the loss rate of year 2016 for the project device of type i installed in 2015 can be considered the same as that of year 2014 for the project device of the same type installed in 2013. In this way, the monitoring at any year y will consist of the determination of the specific fuel consumption for the devices installed during the current year (the initial value $SC_{new,i,a=1}$ for the population commissioned during this year), and the values of $SC_{new,i,a}$ and of $\Delta SC_{y,i,a}$ for oldest population (i.e. the devices from the first year that have now reached the age a=y)

17. $B_{old,i}$ is determined with one of the following three options:

(a) Estimated as the average annual consumption of woody biomass per device (tonnes/year). This may be derived from historical data or a sample survey of local usage;

or

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

$$B_{old,i} = \frac{HG_{p,y}}{NCV_{biomass} \times \eta_{old}} \quad \text{Equation (8)}$$

Where:

$HG_{p,y}$ = Amount of thermal energy generated by the project devices in year *y* (TJ), if the thermal output of the devices can be directly measured

or

(c) A default value of 0.5 tonnes per capita per year may be used. The household occupancy shall be determined based on literature or sample surveys conducted for the target project area as per *"*Standard for sampling and surveys for CDM project activities and programmes of activities*".*

18. Where charcoal is used as the fuel, the quantity of woody biomass ($B_{old,i}$ or $B_{a=1,i,KPT}$ or $B_{y=1,new,i,survey}$ or $B_{y,savings,i,a}$) may be determined by using a default wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis).[7] Alternatively, credible local conversion factors determined from a field study or literature may be applied.

19. $U_{y,i}$ is the number of days of utilization of the project device during the year '*y*'. If it can be demonstrated that the pre-project device has been decommissioned and is no longer used, its value may be considered as 365 days.

20. If both the project devices and inefficient pre-project devices are used together, measurement campaigns shall be undertaken using data loggers such as stove utilization monitors (SUMs) which can log the operation of all devices (recording the situation of the device having been used or not during any day '*d*' of the measurement campaign) in order to determine the average device utilization intensity (to establish the relative share of the usage of the devices). The days when only project devices or only pre-project devices are used will be attributed accordingly. The days where both devices have been used, if the dataloggers are able to detect and record the time each device has been used (e.g. in hours), the share in the total time will be used to attribute a fraction of this day to one or to the other device. Alternatively, if the dataloggers are not able to determine the duration of the utilization, but only the situation of the device being on or off (i.e. used or not used during that day), the share of 50:50 may be used. The

[7] 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.

measurement campaign shall be conducted in at least 10 randomly selected participant households of the project activity or the component project activity (CPA) for at least 90 days during the year *y*. The average value determined through the campaign shall be annualised taking into account seasonal variation of device utilization.

4.2.1. Differentiation between non-renewable and renewable woody biomass

21. Project participants shall determine the shares of renewable and non-renewable woody biomass in $B_{old,i}$ (the quantity of woody biomass used in the absence of the project activity in tonnes per device of type *i*) ~~the total biomass consumption~~ using nationally approved methods (e.g. surveys or government data if available) and then determine $F_{NRB,y}$ as described below. The following principles shall be taken into account:

4.2.2. Demonstrably renewable woody biomass[8] (DRB)

22. Woody[9] biomass is 'renewable' if one of the following two conditions is satisfied:

    (a) The woody biomass originates from land areas that are forests[10] where:

        (i) The land area remains a forest;

        (ii) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting);

        (iii) Any national or regional forestry and nature conservation regulations are complied with;

    (b) The biomass is woody biomass and originates from non-forest areas (e.g. croplands, grasslands) where:

        (i) The land area remains as non-forest or is reverted to forest;

        (ii) Sustainable management practices are undertaken on these land areas to ensure that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting);

        (iii) Any national or regional forestry, agriculture and nature conservation regulations are complied with.

[8] This definition uses elements of annex 18, EB 23.

[9] In the case of charcoal produced from woody biomass, the demonstration of renewability shall be done for the areas where the woody biomass is sourced.

[10] The forest definitions as established by the country in accordance with the decisions 11/CP.7 and 19/CP.9 shall apply.

4.2.3. Non-renewable biomass

23. *NRB* is the quantity of woody biomass used in the absence of the project activity in tonnes per device of type *i* ($B_{old,i}$) minus the *DRB* component, as long as at least two of the following supporting indicators are shown to exist:

    (a) A trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area;

    (b) Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area;

    (c) Increasing trends in fuel wood prices indicating a scarcity of fuel-wood;

    (d) Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass.

24. Thus the fraction of woody biomass saved by the project activity in year *y* that can be established as non-renewable is:

$$f_{NRB,y} = \frac{NRB}{NRB + DRB} \qquad \text{Equation (9)}$$

25. Project participants shall also provide evidence that the identified trends are not occurring due to the enforcement of local/national regulations.

4.3. Leakage

26. Leakage 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 potential source of leakage due to the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources shall be considered. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass by the non-project households/users, that is attributable to the project activity, then $B_{old,i}$ is adjusted to account for the quantified leakage. Alternatively, $B_{y,savings,i,a}$ is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

27. If devices currently being utilised outside the project boundary are transferred to the project activity, then leakage is to be considered.

5. Monitoring methodology

28. The installation date and recipient/location of each device shall be tracked individually, and emissions reductions shall be considered from the date of commissioning of each device. Monitoring shall consist of checking all devices or a representative sample thereof, at least once every two years (biennially) to determine if they are still operating;

those devices that have been replaced prior to and independently from the monitoring survey by an equivalent in-service device can be counted as operating.

29. Monitoring shall also consist of checking the efficiency of all devices or a representative sample thereof annually as below:

    (a) For project activities using the KPT protocol to determine the quantity of fuel saved (i.e. paragraph 14, Option 1), monitoring shall determine the fuel consumption per operating device ($B_{a=1,i,KPT}$) of all operating devices or a representative sample thereof, annually and $\Delta B_{y,i,a}$ as per paragraph 14;

    (b) For project activities using the WBT protocol (i.e. paragraph 15, Option 2), monitoring shall consist of determining the efficiency of all operating devices or a representative sample thereof, annually and $\Delta \eta_{y,i,a}$ as per paragraph 15. For the purpose of calculating emissions reductions, the ex post monitored value of the efficiency of the operating devices ($\eta_{new,i,a=1}$) shall be used;

    (c) For project activities using the CCT protocol (i.e. paragraph 16, Option 3), monitoring shall consist of determining the specific fuel consumption or the fuel consumption rate ($SC_{new,i,a=1}$) of all operating devices or a representative sample thereof, annually and $\Delta SC_{y,i,a}$ as per paragraph 16.

30. If Option (b) in paragraph 17 is chosen for determining $B_{old,i}$ monitoring shall also determine the amount of thermal energy generated by the project device *i* in year *y*.

31. In order to assess the leakage described in section 4.3 above, 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.

32. Monitoring shall ensure that either:

    (a) The replaced low efficiency devices are disposed of and not used within the boundary or within the region; or

    (b) If pre-project stoves continue to be used, monitoring shall ensure that the fuel-wood consumption of those stoves is excluded from $B_{old,i}$.

33. Relevant parameters shall be monitored and recorded during the crediting period as indicated in section 5.1 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.

5.1. Data and parameters monitored

Data / Parameter table 1.

Data / Parameter:	$\mathbf{N_{y,i,a}}$
Data unit:	-
Description:	Number of project devices of type *i* and age *a* that are operating in year *y*
Source of data:	-
Measurement procedures (if any):	As per paragraph 12 and 28
Monitoring frequency:	At least once every two years (biennial)
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$\mathbf{B_{a,i,KPT}}$
Data unit:	t/year
Description:	Annual quantity of woody biomass used during the project activity in tonnes per device of type *i* with the age *a*
Source of data:	-
Measurement procedures (if any):	As per paragraph 14 and 29(a)
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$\mathbf{B_{y=1,new,i,survey}}$
Data unit:	t/year
Description:	Annual quantity of woody biomass used during the project activity in tonnes per device of type *i,* determined through a sample survey
Source of data:	-
Measurement procedures (if any):	As per paragraph 15
Monitoring frequency:	Once in the first year
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	$\mathbf{HG_{p,y}}$
Data unit:	TJ

Description:	Amount of thermal energy generated by the project devices in year *y*
Source of data:	-
Measurement procedures (if any):	As per paragraph 17(b) and 30
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	$\eta_{\mathbf{new,i,a}}$
Data unit:	Fraction
Description:	Efficiency of the device of type *i* being deployed as part of the project activity, with the age *a*
Source of data:	-
Measurement procedures (if any):	As per paragraph 15 and 29(b)
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	$\mathbf{SC_{new,i,a}}$
Data unit:	t fuel/unit output or t fuel/hour
Description:	Specific fuel consumption or fuel consumption rate in year *y* of the device(s) of type *i* deployed as part of the project that is fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour respectively with the age *a*
Source of data:	-
Measurement procedures (if any):	As per paragraph 16 and 29(c)
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	$\mathbf{f_{NRB,y}}$
Data unit:	-
Description:	Fraction of woody biomass saved by the project activity in year *y* that can be established as non-renewable biomass
Source of data:	-
Measurement procedures (if any):	As per paragraph 12

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:	-

Data / Parameter table 8.

Data / Parameter:	$\Delta \mathbf{B}_{\mathbf{y,i,a}}$ or $\Delta \eta_{\mathbf{y,i,a}}$ or $\Delta \mathbf{SC}_{\mathbf{y,i,a}}$
Data unit:	-
Description:	Factor to consider the efficiency loss of the project device type *i* due to its aging at the year *y*
Source of data:	-
Measurement procedures (if any):	As per paragraph 14, 15, 16
Monitoring frequency:	yearly
QA/QC procedures:	-
Any comment:	-

5.2. Representative sampling methods

34. A statistically valid sample of the locations where the devices are deployed, with consideration, in the sampling design, of occupancy and demographic differences can be used to determine parameter values used to calculate emission reductions, as per the relevant requirements for sampling in the *"*Standard for sampling and surveys for CDM project activities and programmes of activities*".* When biennial inspection is chosen a 95 per cent confidence interval and a 10 per cent margin of error 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 shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/10 precision are not achieved, the lower bound of the 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.

5.3. Project activity under a programme of activities

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

(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 $B_{old,i}$ 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 $B_{old,i}$ is adjusted to account for the quantified leakage;

(c) As an alternative to subparagraphs (a) and (b) $B_{old,i}$ can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

36. To determine the value of the fraction of non-renewable biomass (fNRB) to be applied in a Component Project Activity (CPA) of a POA, use one of the two options as follows: (a) Conduct local studies to determine the local fNRB value (sub national values); or (b) Use default national values approved by the Board (see footnote 3). The choice of which option to use shall be made ex ante. However, a switch from a national value of fNRB (i.e. option (b)) to sub-national values (i.e. option (a)) is permitted, under the condition that the selected approach is consistently applied to all CPAs.

37. Monitoring approaches for $B_{y,savings,i,a}$ (Option 1, 2 or 3 in paragraph 14–16),[11] and values for parameters fNRB (when Option (a) in paragraph 36 is chosen) and the quantity of woody biomass $B_{old,i}$ may be determined either at the CPA level before the inclusion of the CPA or at the PoA level before the registration of the PoA-DD.

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Document information

Version	*Date*	*Description*
Draft 06.0	21 October 2013	SSCWG 42, Annex 4 A call for public input will be issued on this draft revised methodology. Revision to introduce simplified approaches to determine the thermal efficiency of project devices and other changes based on previous clarifications: Due to the overall modification of the document, no highlights of the changes are provided.
05.0	23 November 2012	EB 70, Annex 30 Includes clarification on monitoring requirements under different options; and provides a provision of wood to charcoal conversion factor.

[11] Any one of the three options in paragraph 14, 15 and 16 may be used for a particular CPA, but there should be no change in the chosen option during the crediting period.

Version	*Date*	*Description*
04.0	20 July 2012	EB 68, Annex 23 Includes a reference to the available country specific default values for fNRB and specifies requirements of using national or local fNRB values for CPAs under a PoA.
03	15 April 2011	EB 60, Annex 21 KPT for stove testing included, 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.
02	04 December 2009	EB 51, Annex 18 To include: (a) Default efficiency factors for baseline cook stoves; (b) Procedures for sampling, (c) Revised procedures for determination of quantity of woody biomass that can be considered as non-renewable; and (d) Clarifications as to which leakage requirements are appropriate for projects versus PoAs.
01	01 February 2008	EB 37, Annex 7 Initial adoption.

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