CLEAN DEVELOPMENT MECHANISM

CDM-MP83-A05

Draft Small-scale Methodology

SSC-III.XX: Switch from non–renewable biomass to electricity for cooking applications by the user

Version 01.0

Sectoral scope(s): 01

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. A request for new methodology "Switch from non–renewable biomass for electric cooking applications by the user", (hereinafter referred as SSC-NM-105) was submitted on 21 May 2020 by VNV Advisory Services Pvt. Ltd.

2. Purpose

2. The proposal submits a new methodology proposing fuel switch measures in the household and institutional cookstove sector.

3. Key issues and proposed solutions

3. The draft methodology SSC-NM-105;

   (a) Propose implementing fuel switch measures in the household and institutional cooking area introducing electric cooking appliances that are powered by national/regional grid or mini-grid. The project activity applying this methodology will replace use non-renewable woody biomass consumed during pre-project scenario;

   (b) Propose calculating 'Quantity of woody biomass that is substituted or displaced in tonnes' (B_y) that is based on the actual monitoring of average consumption of electricity by electric cooking appliance(s) in year *y* per household / institution ($EC_{AVG,y}$), instead based on average annual consumption of woody biomass per household or average annual consumption of woody biomass per person, that is fixed at the validation and where applicable at the renewal of crediting period based on survey results. The use of monitored value of $EC_{AVG,y}$ reduces uncertainty in determination B_y, and thus in determination of emission reductions claimed by the project activity;

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

4. Impacts

4. The draft methodology if approved is expected allow for development of new CDM projects in the household and institutional 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 draft version of the methodology is recommended by the Methodologies Panel (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 new 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)	Dissemination of electric cooking appliances connected to a national/regional grid or mini-grid that displace the use of non-renewable biomass. Examples of these technologies include, but are not limited to, induction cook stoves, hot plates, ceramic cooking-hob with heating coils, electric pressure cookers, slow cookers, crock pots, electric rice cookers, multi-cookers
Type of GHG emissions mitigation action	Fuel switch: Displacement of more GHG-intensive, non-renewable biomass-fuelled applications by introducing electric cooking appliances

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology comprises activities to displace the use of non-renewable biomass for cooking by introducing less GHG intensive technologies to households/ communities/ institutions[1] (hereinafter referred as end-users) connected to national/regional grid or mini-grids. Examples of these technologies include but are not limited to electric cooking appliances including induction cook stoves, hot plates, ceramic cooking-hob with heating coils, electric pressure cookers, slow cookers, crock pots, electric rice cookers, multi cookers.

2.2. Applicability

3. The methodology is applicable to end-users connected to a national/regional grid or a mini-grid. In the case of mini-grid, the electricity grid shall comprise of at least one fossil fuel based electricity generation source, mini-grids exclusively powered by renewable energy systems are eligible under the methodology, “AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user” (AMS-I.E).

4. The electric cooking appliances disseminated under the project activity or component project activity shall have a minimum of 50[2] per cent thermal efficiency.

5. Project participants shall demonstrate that the electric cooking appliances are designed, constructed and operated in accordance with applicable requirements (e.g. with regard to safety) of relevant national, regional or international standards.

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

[2] Based on peer-reviewed literature e.g. (i) Quantifying Energy Losses on Electric Cooking Stove, International Journal of Engineering Research & Technology (IJERT), Vol. 9, issue 05, May 2020 and (ii) Factors influencing the adoption and sustainable use of clean fuels and cookstoves in China - a Chinese literature review, Renewable and Sustainable Energy Reviews, page 741–750, 2015.

6. Project participants shall describe the proposed method for the distribution of project devices and how double counting of emission reductions has been addressed in the CDM-PDD/CDM-PoA-DD[3].

7. Project participants[4] 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.

8. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

2.3. Entry into force

9. The date of entry into force is the date of the publication of the EB ### meeting report on DD Month 2020.

2.4. Applicability of sectoral scopes

10. 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.

3. Normative references

11. Project participants shall apply the “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.

12. This methodology refers to the latest approved versions of the following methodologies, standard and tools:

    (a) “AMS-I.E.: Small-scale Methodology: Switch from non-renewable biomass for thermal applications by the user”;

    (b) “TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”;

    (c) “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”;

    (d) “TOOL30: Calculation of the fraction of non-renewable biomass”;

    (e) “Standard: Sampling and surveys for CDM project activities and programme of activities”.

[3] 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).

[4] In context of this methodology the term project participant also includes coordinating and managing entities for a PoA.

4. Definitions

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

14. For the purpose of this methodology, the following definitions shall 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[5];

    (b) **Electric cooking appliance** - is an electrically powered cooking device that uses either a direct current heating element or an alternate current heating element, used for heating and cooking of food.

5. Baseline methodology

5.1. Project boundary

15. The project boundary is the physical, geographical site of the use of electric cooking appliances.

16. For project activities involving national or regional grids, the spatial extent of the project boundary includes all power plants within the host country physically connected through transmission and distribution lines to the national or regional grid.

17. For project activities involving mini-grids, the spatial extent of the project boundary includes all power plants connected through transmission and/or distribution lines to the mini-grid which is being built or extended through the project activity.

18. For all project activities, the spatial extent of the project boundary also includes the physical sites of the end-use consumers served by the project activity.

5.2. Baseline

19. In the absence of the project activity, the end-users would have used non-renewable biomass for meeting similar thermal energy needs as in the project case. This shall be substantiated with evidence of the existing practices of the end-users that will participate in the project activity.

20. The project participants shall determine the proportions of woody biomass and other fuels used for cooking before the start of the project activity and at the renewal of each crediting period shall be determined through a sample-based survey as per "Standard: Sampling and surveys for CDM project activities and programme of activities". In doing so at the renewal of the crediting period,

[5] Project participants may also refer to non-binding best practice example related to definition of 'batch' in AMS-I.E.

(a) If there is no change in the proportions of various fuels, no adjustment is necessary in the parameter 'Quantity of thermal energy generated by the electric cooking appliances during year *y*' ($HG_{p,y}$);

(b) If there is decrease in the proportion of woody biomass, per centage decrease in the share of woody biomass is used to adjust the parameter $HG_{p,y}$.

Box. Non-binding best practice example 1

The 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 where applicable at the renewal of each crediting period. Appendix 2 of this document provides an example of survey questionnaire. In case of the renewal of the crediting period, the end-users in the sample should not include the project end-users.

The 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 first crediting period**	Average amount of consumption **at the renewal of first/second crediting period**
1. Inefficient woody biomass stove	'2.5' tonnes/household/year	'2.0'/'1.5' tonnes/household/year
2. LPG stove	'a' kg or cylinders/household/year	'a1'/'a2' kg or cylinders/household/year
3. Kerosene stove	'b' Liters/household/year	'b1'/'b2' Liters/household/year
4. Electric stove	ZZ kWh/household/year	'ZZ1'/'ZZ2' kWh/household/year
5. Others		

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

Direct measurement of the usage of each fuel in the field (e.g. weighing the amount of woody biomass, metering LPG) is more accurate and preferred. where direct measurement cannot 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 is demonstrated that direct measurement is not feasible.

Sampling approach to estimate the proportion of baseline fuels shall be implemented to meet the reliability requirements (i.e. confidence/precision) of "Standard: Sampling and surveys for CDM project activities and programme of activities"

5.3. Additionality

21. Additionality shall be demonstrated using one of the three options below.

5.3.1. Option 1 (Positive list)

22. To consider project technology/measure as automatically additional, demonstrate ex ante that the penetration[6] of electric cooking appliances is equal to or less than 5 per cent of

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

the technologies/measures providing similar services in the region[7].

23. The penetration of electric cooking appliances 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.

24. 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.

5.3.2. Option 2

25. Demonstrate additionality applying the "TOOL21: Demonstration of additionality of small-scale project activities".

5.3.3. Option 3

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

5.4. Baseline emissions

27. Baseline emissions shall be calculated as:

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

Where:

BE_y	=	Baseline emissions during the year *y* (tCO_2e)
B_y	=	Quantity of woody biomass that is substituted or displaced (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)
$NCV_{biomass}$	=	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 of fossil fuels projected to substitute the use of non-renewable woody biomass by similar consumers (tCO2e/TJ)

[7] 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.

28. The region-wise default values of the emission factor of fossil fuels projected to substitute the use of non-renewable woody biomass by similar consumers, are provided in Table 2 below may be used.

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

	Fossil fuel emission factor (t CO_2e/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

29. Alternatively, the emission factor of fossil fuels projected to substitute the use of non-renewable woody biomass by similar consumers[9] for their project or PoA may be estimated applying equation (2) below:

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

[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 should 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.

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

30. The fNRB value shall be determined using one of the following options:

(a) **Ex ante:** fNRB value is determined at the validation stage and it is fixed for the crediting period;

(b) **Ex post:** fNRB,y value is determined for year "y" in the crediting period and updated annually.

31. B_y is calculated using the quantity of thermal energy generated in the electric cooking appliances as follows:

$$B_y = \sum_i^n HG_{p,y} \div \left(NCV_{biomass} \times \eta_{old,i}\right) \quad \text{Equation (3)}$$

Where:

$HG_{p,y}$ = Quantity of thermal energy generated by the electric cooking appliances during year *y* (TJ)

$\eta_{old,i}$ = Efficiency of pre - project devices

32. The quantity of thermal energy generated $HG_{p,y}$ shall be calculated as follows:

$$HG_{p,y} = EC_{AVG,y} \times N_{o,i,j} \times n_{y,i,j} \times 3.6 \times 10^{-3} \times \eta_{new,i,j} \quad \text{Equation (4)}$$

Where:

$EC_{AVG,y}$ = Average consumption of electricity by electric cooking appliance(s) in year *y* per household / institution (MWh/y)

$N_{0,i,j}$ = Number[11] 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^{-3} = Factor to convert MWh to TJ

[11] Project devices may be commissioned in batches. See paragraph 13 (b).

$\eta_{new,i,j}$ = Efficiency of the electric cooking appliance *i* and batch *j*

33. The drop in efficiency due to aging of the project devices *i* in batch *j* shall be accounted during the monitoring period using one of the options below. The option should be identified and fixed ex ante in the CDM-PDD/CDM-PoA-DD at the time of registration.

    (a) Determine[12] the rate of efficiency drop for a representative sample of the first batch of project device *i* in year *y* and assume that same rate of drop in efficiency applies to all other batches. In other words, it may be assumed that the degradation of efficiency measured in a representative sample of the first batch of project devices *i* apply 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 drop in efficiency[13] may be applied correspondingly to all batches;

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

34. The project cookstoves whose lifetime has ended may be replaced 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 eligible. 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. 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.

5.5. Project emissions

35. The project emission from electricity consumption ($PE_{EC,y}$) by the project activity shall be calculated using the latest version of "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" as follows.

$$PE_{EC,y} = EC_{AVG,y} \times N_{o,i,j} \times n_{y,i,j} \times EF_{grid,y} \times (1 + TDL_{j,y}) \quad \text{Equation (5)}$$

Where:

$EF_{grid,y}$ = CO_2 emission factor for grid electricity in year *y* (t CO_2/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source *j* in year *y*.

36. Further, where applicable, CO_2 emissions from on-site consumption of fossil fuels including any back-up fuels (e.g. diesel) due to the project activity, shall be calculated using the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

[12] Example: For the representative sample of Batch 1, if the efficiency of a new project device is 90% and at the end of Year 1, the efficiency is monitored to be 84%; the loss rate is (90%-84%)/1=6%. Then this 6% loss rate is to be assumed to be applicable for all the devices in the first batch and subsequent batches for first year of operation.

[13] If the efficiency of the project devices falls below 50%, it is no longer eligible to be considered a project device.

5.6. Leakage emissions

37. Leakage emissions (LE_y) 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.

38. The following potential source of leakage shall be considered:

    (a) The use/diversion of non-renewable woody biomass saved under the project activity by non-project end-users that previously used renewable energy sources;

    (b) If this leakage assessment quantifies an increase in the use of non-renewable woody biomass used by the non-project end-users that is attributable to the project activity, then B_y is adjusted to account for the quantified leakage.

39. Alternatively, B_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakage, in which case surveys are not required. In the case of a project activities opting to apply a net to gross adjustment factor of 0.95 in lieu of conducting a survey to account for leakage emissions, the adjustment factor should be applied once.

5.7. Emission reduction

40. The emission reductions of the project in year *y* (ER_y) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (6)}$$

Where:

ER_y	=	The emission reductions of the project in year *y* (t CO_2e/yr)
BE_y	=	Baselines emissions of the project in year *y* (t CO_2e/yr)
PE_y	=	The project emission ($PE_{EC,y}$) of the project in year *y* (t CO_2e/yr)
LE_y	=	Leakage emissions for the project in year *y* (t CO_2e/yr)

5.8. Data and parameters not monitored

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}
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:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/tonne
Description:	Net calorific value of the non-renewable woody biomass, briquettes or charcoal used in baseline 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
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	$EF_{grid,y}$
Data unit:	tCO2/MWh
Description:	CO2 Emission factor for grid electricity in year *y*
Source of data:	-
Measurement procedures (if any):	As per the requirements in "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
Monitoring frequency:	Fixed at the time of validation
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	$TDL_{j,y}$
Data unit:	-
Description:	Average technical transmission and distribution losses for providing electricity to source *j* in year y

Source of data:	As per the requirements in "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
Measurement procedures (if any):	As per the requirements in "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
Monitoring frequency:	Fixed at the time of validation
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	$\eta_{old,i}$
Data unit:	Fraction
Description:	Efficiency of pre-project device using woody biomass
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
Monitoring frequency:	This parameter may be established prior to implementation of a project activity
QA/QC procedures:	-
Any comment:	-

6. Monitoring methodology

41. 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.

42. In addition, during project activity implementation, 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 9 and 10);

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

43. 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.

44. Monitoring should confirm the displacement or substitution of the non-renewable woody biomass at each location.

6.1. Data and parameters monitored

Data / Parameter table 7.

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

Data / Parameter table 8.

Data / Parameter:	$n_{y,i,j}$
Data unit:	-
Description:	Proportion of commissioned project devices of type *i* and batch *j* ($N_{0,i,j}$) that remain operating in year *y* (fraction)
Source of data:	Monitoring
Measurement procedures (if any):	Measured directly or based on a representative sample. "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. 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 9.

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 10.

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 11.

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:	Annual
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 12.

Data / Parameter:	$EC_{AVG,y}$
Data unit:	MWh/yr
Description:	Average consumption of electricity by electric cooking appliance(s) in year *y* per household/institution (MWh/yr)

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. Separate samples shall be taken for each batch
Monitoring frequency:	Annual
QA/QC procedures:	Data logger measuring the 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 13.

Data / Parameter:	$\eta_{\mathbf{new,i,j}}$
Data unit:	Fraction
Description:	Efficiency of the device of each type *i and* batch *j* implemented as part of the project activity
Source of data:	-
Measurement procedures (if any):	Efficiency shall be measured/estimated based on: (i) Certification by a national standards body or an appropriate certifying agency recognized by that body; or (ii) Manufacturer specifications on efficiency based on water boiling test (WBT) adapted for electrical cooking appliances/electric pressure cookers may be used. The efficiency of electric cooking appliance shall be determined in accordance with national standards (if available) or international standards or guidelines; (iii) The sampling test of stoves by such certification bodies/agency or manufacturers 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"; (iv) Procedure as detailed under Appendix 3 of this document; (v) The following simplified approach, when the efficient electric 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): o 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; o 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 33 above
QA/QC procedures:	-
Any comment:	-

6.2. Project activity under a programme of activities

45. The application of this methodology to a component project activity under a programme of activities (PoA) is legitimate if the following leakages are estimated and accounted for, where applicable, 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.

46. Alternatively, B_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakage, in which case surveys are not required. In the case of a component project activity (CPA) opting to apply a net to gross adjustment factor of 0.95 in lieu of conducting a survey to account for leakage emissions, the adjustment factor should be applied once.

47. The fNRB value used in a CPA of a PoA shall be determined using one of the following options;

    (a) Conduct own studies to determine the fNRB value[14] as per "TOOL30: Calculation of the fraction of non-renewable biomass" (TOOL30); or

    (b) Use default value approved by the Board as per footnote 1 of the TOOL30[15,16].

[14] 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.

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

[16] After registration of a PoA that applies the default fNRB 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.

48. A switch from option (b) to option (a) from above paragraph is permitted, under the condition that the selected approach is consistently applied to all CPAs[17].

49. If the generic CPA consists solely of units that qualify as “microscale CDM units” 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] The determination of fNRB value of all CPAs under the PoA should 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 TOOL30 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.

Appendix 1. Definition of regions

1. The table below lists the Non-Annex-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 4. 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[18]

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)[19]

"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[20]

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

[18] Selection of end-users should be based on a sampling plan.

[19] 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.

[20] In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms measurement units. 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).

	Yes/No	Quantity of usage	Unit
LPG			kg or Cylinders/month or year
Kerosene			Litres/month or year
Coal			kg/month or year
Electricity			kWh/month or year
Other fuels (explain)			

2. Survey format B: Project survey

2.1. General information[21]

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)[22]	Yes/No
- If yes, have you used the stove regularly since you installed it?[23]	Yes/No
- If yes, is your stove in good condition?[24]	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

[21] Selection of end-users should be based on a sampling plan.

[22] 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.

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

[24] 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?[25]	Meals/week or month
Do you use any other stove? (ICS etc.)[26]	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[27]

	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)				

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

[26] 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.

[27] In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms measurement units mentioned in the table. 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. Electrical 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 given electric cooking appliance is operated at maximum power rating. After some time, the water will start boiling. Record the final temperature (t_2) of the water together with the input electrical energy (total kilowatt hours), voltage, and current using power analyser.

2. The total heat energy absorbed (output) is calculated as follows:

$$Q = (m \times Cp \times \Delta t)/\ 3.6\ \times 10^6 \qquad \text{Equation (1)}$$

Where:

Q	=	Total heat energy absorbed (kWh)
m	=	mass of water (kg)
Cp	=	specific heat capacity of water (4.186 J/kg^{o}C)
Δt	=	change in temperature ($t_2 - t_1$) in ^{o}C
$3.6\ \times 10^6 =$	=	Conversion factor from Joule to kWh

3. The efficiency is calculated as follows:

$$Efficiency\left(\eta\right) = \frac{Q}{Input\ electrical\ energy}\ x100\% \qquad \text{Equation (2)}$$

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 (ti). Reset the power meter reading to 'zero'. When the EPC reaches maximum pressure and temperature, record the final temperature (tf), and the power meter reading (R1). Then operate the EPC till the water starts boiling and the final power meter reading (R2) is recorded.

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

$$Q_u\ =\ m \times (H_m\ - H_i) \qquad \text{Equation (3)}$$

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 as follows:

$$Q_t = R_2 x\, 3600 \qquad \text{Equation (4)}$$

The efficiency is calculated as follows:

$$efficiency\ (\eta) = \frac{Heat\ energy\ effectively\ utilized}{Total\ energy\ input} = \frac{Q_u}{Q_t} x100\%$$

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