MECS' recommended methodology for metered cooking for Article 6, vGS1.2a

Working Paper: proposed updates and additional guidance, based on the Gold Standard MMECD plus the latest field and lab-based research. 22nd December 2024

UKaid from the British people
MECS Modern Energy Cooking Services

Image: by Nancy Serenje, CEEEZ, Zambia, 2017

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This working paper sets out a proposed methodology for calculating carbon credits for metered and measured energy devices for cooking, intended for use in Article 6 projects for both the Mitigation Activity Idea Note (MAIN) and then the Mitigation Activity Design Document (MADD). The methodology should be used within a wider article 6 activity cycle, including the usual stages of validation and monitoring.

The methodology has at its core the published Gold Standard Methodology for Metered & Measured Energy Cooking Devices (MMECD) version 1.2, developed for the Voluntary Carbon Market. The MMECD was prompted by work commissioned by MECS through Climate Impact Partners in 2019 and MECS has worked with GS to refine and upgrade the MMECD for more accuracy, and further refinements of the VCM version can be expected over time.

The methodology proposed here brings together recent learning within MECS including elements of specific relevance to Article 6 projects. The document follows the same structure as the published MMECD: there are no proposed changes to many aspects and changes and additions are shown in bold. A revised version of the GS MMECD ER Tool is also made available showing how the recommendations should be implemented.

Context

At a time when the reliability of other methodologies used for clean cooking projects is being challenged, digital Monitoring Reporting & Verification (dMRV), including collection of real-time usage data and fuel sales data from individual Modern Energy Cooking products, has emerged as a robust way to address integrity concerns. MECS and Climate Impact Partners developed the Gold Standard's Methodology for Metered & Measured Energy Cooking Devices (MMECD) for the Voluntary Carbon Market (VCM), which is now in version 1.2. This is the methodology recommended by the University of California at Berkeley and is the basis of draft methodologies by both VERRA and the Clean Cooking and Climate Consortium (4C). A project by Ecosafi using the MMECD has achieved the first cookstove project 'A' rating by BeZero and projects are attracting premium credit prices.

MECS and CIP worked with ATEC for the first pilot implementation of the MMECD, and MECS have been discussing use of it by other project developers. Despite MMECD's immediate benefits, project developers have observed uncertainties in the interpretation of some aspects of the methodology, and the apparently lower results for credit levels led to questions. Uncertainties were fuelled by lack of familiarity with the back calculation approach used in the MMECD, as this is not the basis of the other main cookstove standards (although has been used in past Clean Development Mechanism (CDM) methodologies). MECS formed a working group of leading project developers and consultants to discuss digital approaches, and commissioned AGS Carbon Advisory to conduct a study of the workings of the MMECD.

AGS has made a comparative analysis of MMECD with other methodologies such as Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC) v4.0 and the draft Comprehensive Lowered Emissions Assessment and Reporting Methodology (CLEAR). Their key findings indicate that the current MMECD methodology provides a robust yet conservative framework that yields high quality Emission Reductions with strong environmental integrity. AGS also identifies opportunities to further improve this sector-best methodology, including clarifying how key procedures and inputs can be applied consistently by project developers and imposing requirements for a more rigorous approach to sampling.

The recommendations of the AGS report will assist in formulating recommendations to Gold Standard and other bodies regarding measures to further tighten rules and ensure developers have clarity in the requirements for published methodologies in the VCM.

However, in the meantime, project developers are also looking at opportunities in new compliance markets via the Paris Agreement Article 6 process. Article 6.2 provides immediate opportunities to develop clean cooking projects with host countries that have signed bilateral agreements with buyer governments. The overall Article 6.2 activity cycle is well established, but within that the crediting methodology to be used for a project is subject to agreement by the two governments involved. The methodology to be used is set out first in the Mitigation Activity Idea Note (MAIN) and then is used as the basis of calculations in the Mitigation Activity Design Document (MADD). MECS understands that the MMECD is being used as the starting point for numerous projects, but the process allows the parties to vary details of the methodology to suit local conditions and priorities. This provides a route for the latest thinking about the MMECD and related data and parameters to be built into article 6.2 projects immediately, ahead of further refinements of the MMECD as published by Gold Standard. In due course it could also be adopted for use in Article 6.4.

This document sets out the latest thinking from MECS on the implementation of a metered energy cooking methodology for carbon credits. It is based on the MMECD, but adds additional guidance on use of parameters, suggests some parameter values based on recent evidence and proposes some amendments to the requirements. This constitutes a revised methodology that could be adopted for Article 6.2 projects.

With the adoption of the article 6.4 standards for methodologies (v1.0), it is expected that the principles therein will be referenced by article 6.2 projects – by being part of the Paris Agreement umbrella. This shall then require considering article 6.4 rules and recommendations of setting baselines below business-as-usual to align with the NDCs/LT-LEDS and further ambitions and recognising suppressed demand, together with its contribution to the sharing of mitigation benefits..

Contents

1 Definition

1.1.1 For the purpose of this methodology, the following definitions apply:

a. **Continuous useful energy output** – Energy transferred to the contents of a cooking vessel, including the sensible heat that raises the temperature of the contents of the cooking vessel and the latent heat of evaporation of water from the cooking vessel, divided by the time of the operation of the cooking task.

b. **Cooking or heating event:** Can cover either a meal (breakfast, lunch, dinner) or another heating purpose. A single heating event record could cover multiple purposes, e.g., food could be prepared for both breakfast and lunch (two purposes). A single heating event, for a single purpose such as preparing a dinner, could include several dishes and/or heating water as part of that meal.

c. **Metered cooking devices** – metered cooking devices are cooking devices for heating and cooking food that either record fuel or energy use directly, or through a supplementary meter with the ability to record amount of energy or fuel used for cooking over a period of time. These may, amongst others, include induction cookstoves, electric pressure cookers, hot plates, rice cookers, solar electric cookers, and metered LPG and ethanol cookers when metered and sold for use in a dedicated device.

d. **Technical life**: Average time for which the project technology may continue to be operated for an extended period in a safe manner and with minimal loss of performance.

2 Scope, Applicability, and entry into force

2.1 Scope

2.1.1 This methodology is applicable to project activities that introduce technologies that reduce or avoid greenhouse gas (GHG) emissions and quantify emission reductions from cooking devices through direct measurement of energy or fuel consumed, in households, communities, and/or institutions such as schools, prisons or hospitals (hereinafter referred as end-users).

2.1.2 This methodology may be applied by project developers promoting the installation of improved cooking devices, where the actual amount of energy or fuel used in the project scenario is measured directly in real-time for every device or otherwise monitored via measurement. The methodology includes the following metered cooking devices, but is not restricted to:

a. electric cookstove[1][2],

[1] Electric cookstoves including induction cookstoves using only the grid electricity are eligible under this methodology.

[2] 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 eligible under this methodology.

b. electric pressure cooker (EPC) and other devices with characteristics where the cooking energy is influenced by factors other than temperature such as cooking pressure,

c. LPG cookstove,

d. biogas stoves,

e. bio-ethanol cookstoves,

f. **gasifier pellet stoves**

In the case of cooking devices using fuel, the amount of fuel purchased for cooking by each customer shall be recorded with arrangements to ensure the fuel is used for cooking and to prevent the alternative use of the fuel.

2.2 Applicability

2.2.1 The methodology is applicable under the following conditions:

a. Project shall choose a technology design that has predictable performance in that it is proven to be efficient and durable under field conditions; for fuel-based cookstoves, the rated thermal efficiency shall be higher than the baseline technology efficiency and at least 40%.

The technology shall have continuous useful energy output of less than 150kW per unit, refer to the:

a. Definition "continuous useful energy output" section.

b. The project activity is implemented by a project developer and can include additional project participants listed in Appendix 2 of the PDD template. The individual households and institutions may be represented collectively by community organisations, etc., but do not individually act as project participants.

c. The project developer must design incentive mechanism(s), which should be effective as fast as possible, for the elimination of any inefficient baseline stoves that are replaced entirely by the project cooking device(s) and describe the incentive mechanism(s) in the PDD/VPA-DD at the time of validation.

d. To avoid double counting or double claiming, the project developer must:

i. clearly communicate its ownership rights and intention of claiming the emission reductions resulting from the project activity to the following parties by contract or clear written assertions in the transaction paperwork: all other project participants; project technology manufacturers; and retailers of the project technology or the renewable fuel in use; and

ii. inform and notify the end users that they cannot claim emission reductions from the project or use of devices distributed as part of project activity, and

iii. exclude from the project activity, cooking devices included in any other voluntary market or CDM project activity/PoA, and strive not to displace the cooking devices of another CDM or voluntary project/PoA. See Section 3.11 below, avoidance of double counting or double claiming with other mitigation actions, for details on this demonstration.

e. Under this methodology, emission reductions cannot be claimed for fuel- switch only, so proposed project activities also need to introduce alternative technologies, i.e., technology switch is a source of emission reductions.

f. For project cooking devices that use fossil fuel, only emissions reductions from efficiency improvement are eligible.

g. For project cooking devices that use grid electricity, emissions reductions from fuel switch and efficiency improvement are eligible.

h. The measured fuel or energy is used to calculate both baseline and project emissions. The project developer must have monitoring systems in place to monitor the fuel or energy consumption by all the project devices under the project to be recorded in a database, which is maintained by the project developer.

2.3 Safeguards

2.3.1 The project shall not undermine or conflict with any national, sub-national or local regulations or guidance for thermal energy supply or fuel supply or use. The project shall document the national, regional and local regulatory framework for provision of thermal energy services of the type the project provides in the project boundary (See Section, 3.11 below).

2.3.2 If the expected technical life of project technology is shorter than the crediting period, the project developer shall describe measures to ensure that end users are provided replacement technology of comparable quality at the end of the technical life, by either replacing with comparable or better technology, or retrofitting essential parts with performance guarantee. If neither of the prior conditions can be demonstrated, no emission reductions can be claimed for the technology after its technical life has ended.

2.3.3 For project activities introducing bio-ethanol cookstoves, project participants 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.

2.4 Entry into force

2.1.2 The date of entry into force of the underpinning GS methodology is the date of its publication i.e., 13 December 2022. The date of this MECS version is the publication date.

3 Baseline Methodology

3.1 Project Boundary

3.1.1 Project developer shall provide clear definitions of project boundary, target area, and fuel production and collection area in line with section 3.1 of the methodology Reduced Emission from Cooking and Heating (RECH) V4.0[3].

3.2 Emissions sources included in the project boundary

3.2.1 Emissions from fuels can occur during fuel production, transport and combustion.

[3] This methodology is a revised version of and replaces the Technologies and Practices to Displace Decentralized Thermal Energy Consumption

a. Baseline emissions from any gases marked below may be omitted for simplification.

b. All project emissions from any of the gases marked below must be accounted for, unless demonstrably negligible or not applicable to the individual project.

3.2.2 Emissions must be well documented and based on project specific or publicly available and verifiable data. If such data is not available (for example in the case of production of a fuel) then care must be taken to ensure a conservative result, either by

a. omitting those emissions or including an incontrovertibly low estimate when they occur in the baseline; or

b. including an incontrovertibly high estimate when they occur in the project scenario

Table 1: Emissions sources included in or excluded from the project boundary

Scenario	Source	Gas	Included	Justification/Explanation
Baseline scenario	Delivery of thermal energy	CO_2	Yes	Important source of emissions
		CH_4	Yes	Important source of emissions
		N_2O	Yes	Can be significant for some fuels
	Production of fuel, transport of fuel	CO_2	Yes	Important source of emissions
		CH_4	Yes	Important source of emissions
		N_2O	Yes	Can be significant for some fuels
Project scenario	Delivery of thermal energy	CO_2	Yes	Important source of emissions
		CH_4	Yes	Important source of emissions
		N_2O	Yes	Can be significant for some fuels
	Production of fuel, electricity, transport of fuel	CO_2	Yes	Important source of emissions
		CH_4	Yes	Important source of emissions
		N_2O	Yes	Important source of emissions

3.3 Demonstration of additionality

3.3.1 The project developer must show that the project could not or would not take place without the presence of carbon finance. Possible reasons for the need for carbon finance may be that the initial investment or the on-going marketing, distribution, quality control and manufacturing costs are unaffordable for the target population.

3.3.2 To demonstrate additionality prior to achieving Design Certification, the project developer shall conform to the additionality requirements of the most recent version of one of the options below:

a. Applicable GS4GG Activity Requirements;

b. CDM Tool 01 - Tool for the Demonstration and Assessment of Additionality;

c. CDM Tool 19- Demonstration of additionality of microscale project activities; (not applicable to Gold Standard microscale projects)

d. CDM Tool 21 – Demonstration of additionality of small-scale project activities; (applicable to small-scale projects only)

e. An approved Gold Standard VER additionality tool

3.4 Baseline scenario determination

3.4.1 In the absence of the project activity, the general baseline scenario would be the use of single or multiple fuels/device combinations for meeting similar thermal energy needs by the representative end users, specifically:

a. In the case the project cooking device uses fossil fuel, the baseline scenario is the efficiency of the baseline cooking device for the country or region based on the observed device(s) that can be replaced by the project cooking device.

b. In the case the project cooking device uses grid electricity or exclusively renewable fuels (e.g., bio-ethanol) or renewable energy sources (e.g. solar energy), the baseline is the emissions of kitchens of the same end user type[4] in the project activity country or region using a baseline emission factor that is calculated for the country or region based on the observed fuel(s) and device(s) that can be replaced by the project cooking device.

3.4.2 The specific baseline of fuel/device combination(s) for representative end user groups shall be identified with justifications following section 3.4 & 3.5 of RECH V4.0. and taking into account the restrictions of the two general baselines defined in paragraph 3.4.1 above.

3.5 Baseline emissions

3.5.1 A baseline emission factor for baseline cooking devices and fuels used in a country or region for representative end user groups is determined using parameters sourced from credible published literature, project-relevant measurement reports, methodology default values, or project specific field tests (see parameters MECD 1 to MECD 5).

3.5.2 To determine the baseline emission factor, the following shall be determined:

a. Types of cooking devices and fuels used by target population in the baseline scenario and proportional use of those cooking devices (for example, 50% use of three-stone fire, 10% use of improved biomass cookstove and 40% use of inefficient LPG stove) that can be replaced by the project cooking device. When multiple devices/fuels are used by the end user in same premises, the proportional use shall be established based on delivered useful energy by different baseline device/fuels combination or following an approach which leads to conservative baseline emissions estimation.

b. Efficiencies of the identified baseline device/fuel combinations.

c. Where project devices use fossil fuel, determine and apply the emission factor of the project fuel, to account only emission reductions from efficiency improvement.

3.5.3 The baseline emissions shall be determined depending on the characteristics of the technology to be implemented.

Case 1: It is possible to determine the thermal efficiency of the project device and to know the useful energy that is being replaced.

[4] Same user type refers to the end users with similar socio-economic

MECS developed the arguments for adding a Case 2, based on evidence that a simple thermal efficiency, derived from the WBT procedure which measures how much water is evaporated when simmering for a set period, could not adequately represent the efficiency advantages of modern cooking devices when cooking real dishes: ie the project device efficiency compared to the traditional stove efficiency does not capture the actual energy use reduction seen in real cooking. The MMECD cites pressure and an EPC as examples, but other device types which have appropriate characteristics should also be eligible to use Case 2.

MECS' [own peer-reviewed statistical analysis] of a wide range of field studies has shown that induction cookstoves offer similar reductions in energy use to those for EPCs. [The AGS study] used a detailed dataset of Controlled Cooking Tests and Kitchen Performance Tests from Ghana, and found very similar results. The characteristics of an induction stove that explain the discrepancy between real cooking performance and the WBT efficiency values are that an induction stove provides heat input directly to the base of the pot and thus avoids losses as the pot is moved about eg for stirring; and the induction stove is highly controllable, so power input can be moderated up and down accurately to match cooking needs; and it switches off itself when the pot is taken away.

As such, MECS propose a slightly different criterion to the MMECD for use of Case 2.

Case 2: Where appropriate evidence (eg from CCTs) demonstrates that the project cooking device has characteristics that affect the cooking energy consumption, such that the energy performance of the device is significantly better than that shown by thermal efficiencies. For example, pressurised devices, or those with high levels of controllability.

3.5.4 **Case 1:** The baseline emissions factor is determined applying the equation below. In case of multiple devices/fuels, the amount of baseline fuel(s) ($P_{b,i,j}$) and the efficiency of baseline device(s) ($\eta_{b,i,j}$) must reflect paragraph 3.5.2 | a, above:

$$EF_{b,useful} = \sum_k \left(\sum_{i,j} P_{b,i,j} \times Percentage\ of\ fuel\_i \times (EF_{b,i,CO2} \times fNRB_{i,y} + EF_{b,i,non-CO2}) \times NCV_{b,i} \right)_k \div \sum_k \left(\sum_{i,j} P_{b,i,j} \times Percentage\ of\ fuel\_i \times NCV_{b,i} \times \eta_{b,i,j} \right)_k \quad \text{Eq. 1}$$

Where:

$EF_{b,useful}$	=	Baseline emissions factor (tCO_2e per TJ of useful energy)
$P_{b,i,j}$	=	Amount of baseline fuel *i* used in device *j* in the baseline (tonnes)
$EF_{b,i,CO2}$	=	CO_2 Emission factor of the baseline fuel *i* (tCO_2e/TJ)
$EF_{b,i,non-CO2}$	=	Non-CO_2 Emission factor of the baseline fuel *i* (tCO_2e/TJ)
$fNRB_{i,y}$	=	Non-renewability status of woody biomass fuel i during year y
$NCV_{b,i}$	=	The net calorific value of the baseline fuel type *i* (TJ/tonne)

$\eta_{b,i,j}$	=	Efficiency of baseline device *j* with fuel i (fraction)
$Percentage\ of\ fuel_i$	=	Percentage of fuel type i in the baseline situation (%).
k	=	Household *k* from the target population, where applicable
j	=	Baseline devices *j*
i	=	Baseline fuel *i*

Case 2: The baseline emission factor shall be determined applying the equation below. In this case, the amount of baseline fuel(s) ($P_{b,i,j}$) is sourced from the Controlled Cooking Test (CCT) described in paragraph 3.5.9 | below:

$$EF_{b,input} = \sum_k \left(\sum_{i,j} P_{b,i,j} \times (EF_{b,i,CO2} \times fNRB_{i,y} + EF_{b,i,non-CO2}) \times NCV_{b,i} \right)_k \div \sum_k \left(\sum_{i,j} P_{b,i,j} \times NCV_{b,i} \right)_k \quad \textit{Eq. 2}$$

Where:

$EF_{b,input}$	=	Baseline emissions factor (tCO_2e per TJ of energy input)

3.5.5 When the observed baseline fuel is non-renewable biomass, the amount of fuel is multiplied by the fraction of non-renewable biomass ($fNRB_{i,y}$), as demonstrated in the numerator of equations 1 and 2. This is the case also when applying the emission factor of the project fossil fuel in the baseline calculation. The parameter $fNRB_{i,y}$ is excluded from equation 1 and equation 2 when the observed baseline fuel is fossil fuel.

3.5.6 The baseline emission factor ($EF_{b,useful}$ or $EF_{b,input}$) value determined as above shall be fixed for the project for the crediting period for the project cooking device type and end user type in the region or country. It shall be reassessed at each crediting period renewal.

3.5.7 In the case of programmes, once determined, the baseline emission factor can be used by other activities within the programme of the same cooking device and end user types in the same country or region over the crediting period for a period of three years after first activity inclusion, after which it must be updated for new activity inclusion.

3.5.8 For all project devices under case 1, the baseline emissions are calculated by multiplying the useful energy delivered by the project devices with the baseline emissions factor, with a cap defined in this document.

3.5.9 The overall baseline emissions for the project shall be calculated as follows:

Case 1:

$$BE_y = EG_{p,useful,y} \times EF_{b,useful} \quad \textit{Eq. 3}$$

Where:

BE_y	=	Baseline emissions (tCO_2e) in the year y
$EG_{p,useful,y}$	=	The amount of useful energy applied in the project in year y (TJ)
$EF_{b,useful}$	=	Baseline emissions factor (tCO_2e per TJ of useful energy)

Case 2:

The baseline emissions shall be **back** calculated from the total electric energy input used in the project scenario in year *y*, the energy ratio of the specific energy consumption of baseline device(s) and the project device, and the baseline emissions factor:

$$BE_y = \sum_d EG_{p,d,y} \times \frac{SC_b}{SC_p} \times 0.0036 \times EF_{b,input}$$ *Eq. 4*

Where:

BE_y	=	Baseline emissions (tCO_2e) in the year y
$EG_{p,d,y}$	=	The amount of electricity used in the project scenario by device *d* in year *y* (MWh)
0.0036	=	Factor to convert MWh to TJ
$EF_{b,input}$	=	Baseline emissions factor (tCO_2e per TJ of energy input)
SC_b	=	Specific energy consumption used in the baseline scenario (TJ/test per person)
SC_p	=	Specific energy consumption used in the project scenario (TJ/test per person)

The specific energy consumption for baseline and project devices shall be determined through a mixed methods approach, combining a Controlled Cooking Test (CCT) with qualitative data of the dishes and cooking practices of the project region that can be prepared both by the baseline device and by the project device. This assumes that the project device such as EPC will replace one type of baseline cooking device. If the project device replaces more than one type of baseline cooking devices, then the SC_b shall be defined as the weighted average of the specific energy consumption of the replaced baseline cooking devices, weighted by the proportion of cooking by the baseline cooking device types in the target population and applying assumptions which lead to conservative estimations of specific energy consumption in the baseline.

$$SC_b = \sum_j ui_j \times SC_{b,j}$$ *Eq. 5*

Where,

u_{ij}	=	Proportion of cooking of baseline device j **using fuel i** (Fraction)
$SC_{b,j}$	=	Specific energy consumption for device j used in the baseline scenario (TJ/test per person)

The project developer shall ensure that the cooking task(s) evaluated in the baseline scenario can be replaced by the project device such as EPC, considering that the EPC or other project device may not be capable of carrying out all the cooking activities of the baseline devices (e.g. frying, grilling).

Values for Parameters P_b, Perc and U

Project developers have shared their uncertainty about the intended use of some of the key parameters for calculation of baseline emissions. Based on review of numerous project calculations and close review of the calculation procedure, MECS offers the following guidelines and examples. These are repeated in the version of the MMECD ER Tool associated with this methodology.

Pb_{ij} the amount of baseline fuel i used in device j in the baseline:

> **Values for P_{bij} should be used to reflect the mass of fuel used in each device and fuel combination in the baseline for the project's target population.**

The absolute values don't matter; it is the ratios between them which are important, which should reflect how much of each fuel is needed for cooking and the proportion of households using each fuel in the target population. Metrics used could be total tonnes per year of each for the whole region, or could be average kg per day per household. In any case, adding up all the values across fuel and devices should give the total mass of all fuels used for the relevant time period and set of users (eg total mass of fuels per year for all users in the region, or per day for the average household).

The example approach in the associated ER Tool uses typical values for use of each fuel type per household/day (eg 5 kg wood/day), multiplied by the percentages of each type in the baseline (ie $Perc_i$ or U_i), giving the relative use of each fuel in tonnes/household/year. For a real project, the metrics used must be based on credible evidence, as described in Section 3.11 MECD1.

$Perc_i$ (case 1) Percentage of fuel type i in the baseline situation and U_j (case 2) Proportion of cooking of baseline device j:

> **Parameters $Perc_i$ and U_j should be used to reflect the proportions of cooking done using each fuel or each device type. This may be proportions of dishes cooked, proportions of households using each, etc.**

The values for $Perc_i$ or U_j must be consistent with those for Pb_{ij}. In broad terms, Pb_{ij} is used to calculate an average emission factor for the baseline, combining the individual emission factors of the fuels by weighting them in proportion to how much of each is used. The average emission factor must reflect the mix of fuels expected to be displaced by the project device, and thus the weighting must be consistent with the parameters used for Percentage of each.

For example, at its most extreme, if Perc of charcoal use is 100% (and thus Perc of all other fuels is zero), then Pb_{ij} must have zero values for fuels other than charcoal. For baselines with multiple fuels in use, if $Perc_i$ has 30% wood, 50% charcoal and 20% LPG, the Pb_{ij} values should reflect similar ratios, except that Pb_{ij} is also influenced by the efficiency of each stove type j, so expect the Pb_{ij} value for LPG to be less than 20%/30% of that for wood (as efficiency of LPG is higher than that of wood stoves). Similarly, if the baseline has more than one type of stove using wood, for equal percentages of households using a 3 stone fire and an ICS, expect slightly higher Pb_{ij} values for the 3 stone fire than for the ICS, as the 3 stone efficiency is lower and hence fuel use per household is higher.

For a real project, the metrics used must be based on credible evidence, as described in Section 3.11 MECD6 (for $Perc_i$; there is no parameter definition section for U_j but similar requirements should be assumed).

3.5.10 Where the project device uses electricity and corresponds to case 1, the total electricity use in the project scenario is monitored and recorded, and the useful project energy in year *y* shall be calculated as follows:

$$EG_{p,useful,y} = \sum_{d} EG_{p,d,y} \times 0.0036 \times \eta_{p,d,y}$$ *Eq. 6*

Where:

$EG_{p,d,y}$	=	The amount of electricity used in the project scenario by device *d* in year *y* (MWh)
0.0036	=	Factor to convert MWh to TJ
$\eta_{p,d,y}$	=	Energy efficiency of the project device, *d* in year *y* (fraction)
d	=	Project device *d*

Where the project device uses fuel (e.g., bio-ethanol, LPG), the total fuel use in the project scenario is monitored and recorded, and the useful project energy is calculated as follows:

$$EG_{p,useful,y} = \sum_{d} P_{p,d,y} \times NCV_{p,i} \times \eta_{p,d,y}$$ *Eq. 7*

Where:

$P_{p,d,y}$	=	The amount of fuel used in the project in by device *d* in year *y*, considering cap (mass or volume unit)
$NCV_{p,i}$	=	The net calorific value of the fuel *i* used in the project scenario in year *y*
$\eta_{p,d,y}$	=	Energy efficiency of the project device, *d* in year *y* (fraction)
d	=	Project device *d*

3.6 Project emissions

3.6.1 The project device is assumed to provide the same or similar useful energy service that would have been delivered by the baseline fuel(s) and device(s). Under Case 1, using the project device, the units of useful energy delivered to end-user displace the same amount of useful energy in the baseline. In Case 2 it is necessary to consider the improvement in energy consumption due to the other factors influencing cooking energy such as cooking pressure. The total quantity of baseline fuel displaced is higher than the monitored amount used in the project, as the baseline devices are less efficient.

3.6.2 Where project devices use renewable energy, such as solar energy, there are no project emissions. In the case of bio-ethanol or other biomass-derived fuels, the project emissions associated with production and transport of fuel must be evaluated.

3.6.3 Furthermore, for other energy or fuel sources, project emissions associated with fuel or energy consumption must be calculated. The following sources of project emissions shall be considered, as applicable:

a. Project emissions associated with electricity use in the project scenario: CO_2 emission factor from electricity consumption by the project activity shall be determined using the latest version of CDM tool "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".

b. Project emissions associated with the use of fossil fuel in the project scenario: CO_2 emissions factor from fossil fuel consumption by the project activity shall be determined using the latest version of CDM tool "TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".

c. Project emissions from transportation of fuel/biomass shall be accounted if the transportation distance (including both long-distance and home delivery transport) is more than 200 km; otherwise they can be neglected.

3.6.4 Project emissions (PE_y) shall be calculated as follows:

a. Where the project device uses electric energy, the project emissions in year y are then calculated using the following equation:

$$PE_y = \sum_d EG_{p,d,y} \times EF_{el,y} \times \left(1 + TDL_{j,y}\right) \qquad \textit{Eq. 8}$$

Where:

PE_y	=	Project emissions in year *y* (tCO_2)
$EG_{p,d,y}$	=	The amount of energy used in the project scenario by device *d* in year *y* (MWh)
$EF_{el,y}$	=	The emissions factor of the electricity system (tCO_2e/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*.

b. Where the project device uses fossil fuels, the project emissions in year y are then calculated using the following equation:

$$PE_y = \sum_d P_{p,d,y} \times NCV_{p,i} \times EF_{p,i} \qquad \textit{Eq. 9}$$

Where:

PE_y	=	Project emissions in year *y* (tCO_2)
$P_{p,d,y}$	=	The amount of fuel used in the project in by device *d* in year *y* (mass or volume unit)
$NCV_{p,i}$	=	The net calorific value of the fuel *i* used in the project scenario in year *y*
$EF_{p,i}$	=	The emissions factor of the project fuel *i* (tCO_2e per TJ)

3.7 Leakage emissions

3.7.1 Leakage emissions, LE_y, shall be determined as per Section 3.11 of RECH V4.0.

3.8 Emission reductions

3.8.1 The emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Eq. 10}$$

Where:

ER_y	=	Emission reductions in year y (t CO2e/yr)
BE_y	=	Baseline emissions in year y (t CO2e/yr)
PE_y	=	Project emissions in year y (t CO2/yr)
LE_y	=	Leakage emissions in year y (t CO2/yr)

3.9 Changes required for methodology implementation in 2nd and 3rd crediting periods

3.9.1 When the project developers apply for crediting period renewal, the baseline emission factor must be reassessed, in addition to other relevant methodological parameters as per the latest version of the methodology available at the time submission of renewal of crediting period and GS4GG crediting period renewal requirements.

3.10 General requirements for data and information sources

3.10.1 In the following tables of data and parameters monitored and not monitored, there are cases where a variety of source documents or studies may be applied to determine a parameter, or to cross-check a parameter.

3.10.2 When multiple sources are available and fulfil the requirements for defining or cross-checking a parameter, the most relevant source should be chosen. Criteria for relevance include geographical (e.g., more specific to the project boundary location), temporal (e.g., more recent), and others. The VVB shall assess the relevance of the source applied compared to the other sources available. While conservativeness is a guiding principle for selecting data, the source applied to define or cross-check the parameter may not be the most conservative, if it can be shown to be the most relevant. Two hypothetical examples follow to illustrate these requirements.

a. A national study from last year shows that average household size is 4, whereas a municipal study from the year before shows that the average household size in the rural areas where the project is implemented is 5. In this case, it is more relevant to apply the household size of 5 in the calculations.

b. The annual report of the Ministry of Education shows that the average number of students per rural elementary school is 60, whereas the records of the rural elementary school that participates in the project show that the average attendance was 40 students. In this case, it is more relevant to apply the number of students as 40 for the school in the calculations.

3.10.3 When sampling or surveys are utilised to define parameters, the sampling and surveys must be undertaken with reference values from other relevant data sources in mind, and project-specific survey and sampling results are expected to correlate with results from other relevant data sources. Where project specific results differ from relevant data sources in a way that is statistically significant, and the difference leads to less conservative results in the emission reduction calculations, then the project must provide justification for the differences. Further, the project may be required to substitute more conservative results from other data sources if the justification is not accepted by the VVB or certifier.

3.11 Data and parameters not monitored

Data/parameter ID	MECD 1
Data / Parameter:	$P_{b,i,j}$
Data unit:	Tonnes Note that the unit of tonnes may be on different bases (e.g. per household-year, per device-trial, per person-day) as long as the units are consistent across fuels and devices.
Description:	Amount of baseline fuel i used in device j in the baseline

Source of data:	The baseline fuel amounts reflecting the proportions per device type may be taken from:
	
	- For case 1:
	    ○ Sampling campaign using Standard Kitchen Performance Test,
	    ○ Credible published literature for project region,
	    ○ Studies by academia, NGOs or multilateral institutions, or
	    ○ Official government publications or statistics.
	- For case 2: Sampling campaign using Baseline Controlled Cooking Test (see MECD 7)
	
	Source applied must not be more than 3 years old.
	
	When sampling is used, follow Section 4.4 "General requirements for sampling" of RECH V4.0 methodology.
	
	Where multiple fuels and devices are used, the amount of baseline fuel must capture the proportion of each one.
	
	Where the baseline is a suppressed demand scenario, and a single fuel and device is demonstrated to constitute the baseline practice, then the following default values may be applied to determine $P_{b,i,j}$:
	
	Wood, three-stone fire: 0.5 tonnes per capita per year ($\eta_{b,i,j}$ = 10%)
	
	Charcoal, conventional cookstove: 0.13 tonnes per capita per year ($\eta_{b,i,j}$ = 20%)

Any comment:	The parameter is used to calculate baseline emissions factor. In the case of a **project activity**, the baseline fuel use value for the project cooking device type and end user type in the region or country is fixed for the project for the crediting period. It shall be reassessed at each crediting period renewal. In the case of **programmes**, the baseline fuel use value for the project cooking device type and end user type in the region or country may be applied to new VPAs included in the PoA within three years after its approval, after which it must be updated.

Data/parameter ID	MECD 2
Data / Parameter:	$NCV_{b,i}$
Data unit:	Terrajoules (TJ)/tonne of fuel
Description:	The net calorific value of the baseline fuel type i
Source of data:	- IPCC default data, **-** project-relevant measurement reports, or project specific field tests. If either project-specific or project-relevant results are used, these must be cross-checked with IPCC defaults and differences shall be justified using evidence.
Any comment:	The parameter is used to calculate baseline emissions factor.

Data/parameter ID	MECD 3
Data / Parameter:	$EF_{b,i,CO2}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor arising from use of fuels in baseline scenario

Source of data:	**Wood**: Methodology default, 112 tCO_2/TJ **Charcoal**: **The AGS review of the MMECD noted that the default values were sourced from 2006 IPCC Guidelines for National Greenhouse Gas Inventories and they pointed out that these values may not be fully reflective of more recent research. The draft CLEAR methodology uses a dataset provided by Floess et al., 2023 which has drawn data from latest peer-reviewed literature, and applied the GREET model. The CLEAR default values correspond to the cap values in MMECD, and AGS recommended that GS revise upwards its default values for charcoal to reflect the most recent available datasets.** **Values for EF_{bi} must be chosen based on appropriate evidence for the target region. However recent research suggests previous default values may be overly conservative. As such, MECS encourages project developers to use the cap value below where shown to be appropriate.** Methodology default, 112 tCO_2/TJ (combustion only) Methodology default, 165.22 tCO_2/TJ (includes charcoal production emissions) Methodology cap, 197.15 tCO_2/TJ (includes charcoal production emissions) **Other fuels**: IPCC defaults When emissions from fuel production, transport, and similar are included to determine a project-specific emission factor, then the following shall apply as well: - The project boundary must include these processes - Avoidance of double counting considerations (see two parameter tables) must cover all steps in the project boundary - The determination of the specific emissions from these sources is fully documented and evidenced in the PDD These provisions may be applied to include the actual GHG emissions happening upstream in charcoal production in the charcoal emission factor; however, emission factors higher than the methodology cap are not permitted.
Any comment:	-

Data/parameter ID	MECD 4
Data / Parameter:	$EF_{b,i,non-CO2}$
Data unit:	tCO_2/TJ
Description:	Non-CO2 emission factor arising from use of fuels in baseline scenario

Source of data:	**Wood**: Methodology default: - 9.46 tCO2e/TJ (AR5 GWP) or - 8.692 tCO2e/TJ (AR4 GWP) **Charcoal**: Methodology defaults: - 5.865 tCO2e/TJ (AR5 GWP) (combustion only) - 44.83 tCO2e/TJ (AR5 GWP) (includes charcoal production emissions), - Methodology cap: 92.29 tCO2e/TJ (AR5 GWP) (includes charcoal production emissions) or - 5.298 tCO2e/TJ (AR4 GWP) (combustion only) - 40.26 tCO2e/TJ (AR4 GWP) (includes charcoal production emissions) - Methodology cap: 82.90 tCO2e/TJ (AR4 GWP) (includes charcoal production emissions) Other fuels: Any of the following, in order of preference: - IPCC defaults - project-specific field tests prior to first verification by a qualified entity that is certified or accredited by National Standards body - project-relevant measurement reports by qualified entities - national defaults - credible published literature for the project area If either project-specific or project-relevant results are used, these must be cross-checked with IPCC defaults and differences shall be justified using evidence. When emissions from fuel production, transport, and similar are included to determine a project-specific emission factor, then the following shall apply as well: - The project boundary must include these processes - Avoidance of double counting considerations (see two parameter tables) must cover all steps in the project boundary - The determination of the specific emissions from these sources is fully documented and evidenced in the PDD These provisions may be applied to include the actual GHG emissions happening upstream in charcoal production in the charcoal emission factor; however, emission factors higher than the methodology cap are not permitted.
Any comment:	-

Data/parameter ID	MECD 5
Data / Parameter:	$\eta b,i,j$
Data unit:	Fraction

Description:	Energy efficiency of baseline device *j* with fuel *i*

Source of data:	Determined from
	- Standard Water Boiling Tests, OR
	- Credible published literature or studies by academia, NGOs or multilateral institutions for project region and baseline technology, OR
	- provided by Official government publications or statistics for project region and baseline technology,
	
	OR
	
	- The following default values may be applied:
	  - Three-stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system, that is without either a grate or a chimney: default efficiency 10%.
	  - Other conventional systems using woody biomass: default efficiency 20%
	  - Improved cookstoves: manufacturer specification, or if not available, default efficiency 30%
	  - Fossil fuel combusting system: manufacturer specification, if available.
	
	When sampling is used, follow Section 4.4 "General requirements for sampling" of RECH V4.0 methodology.

Any comment:	The parameter is used to determine the baseline emission factor.

Data/parameter ID	MECD 6
Data / Parameter:	$Percentage\ of\ fuel\_i$
Data unit:	%
Description:	Percentage of fuel type i in the baseline situation.
Source of data:	Provide evidence that this is coherent with the information on target population characteristics, baseline technology use & fuel consumption using evidence from at least one of the following sources: - baseline survey, - Credible published literature for project region, - Studies by academia, NGOs or multilateral institutions, or - Official government publications or statistics Source applied must not be more than 3 years old; further, cross-check with older sources may be used provided they give conservative results
Any comment:	-

Data/parameter ID	MECD 7
Data / Parameter:	SC_b
Data unit:	TJ/test per person
Description:	Specific energy consumption used in the baseline scenario
Source of data:	Determined from a mixed methods approach, combining a Controlled Cooking Test (CCT)[5] with qualitative data of the cooking characteristics of the target population where the cooking device is used. The CCT performed in the baseline scenario shall consider only cooking task(s) that can be replaced by the project device (such as Electric Pressure Cooker), so that the results are comparable with the CCT of the project device. The test shall be designed so that it captures a cooking pattern representative of a whole year using a reasonable number of dishes expected to be most commonly cooked in the project device (such as EPC) over the course of the year. For example, this may involve carrying out multiple tests for different dishes, or prescribing a representative cooking pattern during a single test. Sampling shall follow Section 4.4 "General requirements for sampling" of RECH V4.0 methodology. The following study may be used as a point of reference to compare the results of the CCT: Scott, N. & Leach, M. (2022). Comparing energy consumption and costs – from cooking across the MECS programme. MECS working paper[6]. **AGS compared the default values with SC values from the CCTs undertaken by BURN in Ghana. They concluded that the defaults are conservative, and recommended the defaults to be allowed for larger scale projects.** **The source used for the MMECD defaults is now out of date: this was a MECS working paper which has since been updated and peer reviewed, and is now published in the journal Energies. The revised version uses an enlarged database of studies and the SC values for EPCs, LPG, charcoal and wood stoves are very slightly changed from those reported in the MMECD. The revised SC values are below. Note that there are still too few data point to determine an SC value for cooking with wood in Africa.** The following default values may be applied to projects with emission reductions less than 10,000 tCO_2/year per project or VPA **and can be used**

[5] The CCT protocol is available at https://cleancooking.org/research-evidence-learning/standards-testing/protocols/
[6] https://mecs.org.uk/publications/comparing-energy-consumption-and-costs-from-cooking-across-the-mecs-programme/

for larger scale projects where project developers can demonstrate suitability:

Africa (MJ/person/event)		Asia (MJ/person/event)	
		Firewood	2.48
Charcoal	3.83	Charcoal	2.02
LPG	0.94	LPG	0.73

Note: Other values published by third-parties may be used as long as they are validated.

Any comment:	**In the original MMECD ER Tool, the example calculation of the amount of electricity used in the project scenario EG_{pdy} is incorrect. It seems to assume that SC_p represents the energy needed to cook one meal for one person and multiplies by 3, to represent three meals per day. But SC_p must only be used in combination with SC_b, to get the ratio of project to baseline energy use.** **The SC default values are 'per cooking event', which could be just one dish and can't be interpreted as energy per meal. So the MMECD is correct but on this point the example values given in the calculation tool are misleading. This has been corrected in the revised tool accompanying this methodology**. At renewal of the crediting period, the project developer shall carry out a survey to check if the end users utilise the project device (such as EPC) for preparation of the expected dishes. If not, then the CCT design shall be updated to reflect the observed cooking characteristics of the end users of the project device.

Data/parameter ID	MECD 8
Data / Parameter:	SC_p
Data unit:	TJ/test per person
Description:	Specific energy consumption used in the project scenario

Source of data:	Determined from a mixed methods approach, combining a Controlled Cooking Test (CCT)[3] with qualitative data that takes account the cooking characteristics of the target population where the cooking device will be used. The test shall be designed so that it captures a cooking pattern representative of a whole year using a reasonable number of dishes expected to be most commonly cooked in the project device (such as EPC) over the course of the year. For example, this may involve carrying out multiple tests for different dishes, or prescribing a representative cooking pattern during a single test. Data logger measuring the electricity consumption of the project device (such as EPC) shall be in conformity with industry standards and manufacturer calibrated. Sampling shall follow Section 4.4 "General requirements for sampling" of RECH V4.0 methodology. **The source used for the MMECD defaults is now out of date: this was a MECS working paper which has since been updated and peer reviewed, and is now published in the journal Energies. The new studies have allowed the analysis to be extended to SC values for a wider range of electric stoves, now covering EPCs, hotplates, Induction and Infrared, for cooking in Africa and Asia. The revised SC values are below.** The following default values may be applied to projects with emission reductions less than 10,000 tCO_2/year per project or VPA **and can be used for larger scale projects where project developers can demonstrate suitability:**

Africa (MJ/person/event)		Asia (MJ/person/event)	
EPC	0.264	EPC	0.180
Hotplate	0.35	Hotplate	0.34
Induction	0.27	Induction	0.28
Infrared	0.38	Infrared	0.37

Note: Other values published by third-parties may be used as long as they are validated.

Any comment:	The parameter is used to determine the energy ratio when the project device corresponds to Case 2. **In the original MMECD ER Tool, the example calculation of the amount of electricity used in the project scenario EG_{pdy} is incorrect. It seems to assume that SC_p represents the energy needed to cook one meal for one person and multiplies by 3, to represent three meals per day. But SC_p must only be used in combination with SC_b, to get the ratio of project to baseline energy use.** **The SC default values are 'per cooking event', which could be just one dish and can't be interpreted as energy per meal. So the MMECD is correct but on this point the example values given in the calculation tool are misleading. This has been corrected in the revised tool accompanying this methodology**. At renewal of the crediting period, the project developer shall carry out a survey to check if the end users utilise the project device (such as EPC) for preparation of the expected dishes. If not, then the CCT design shall be updated to reflect the observed cooking characteristics of the end users of the project device.

4 Monitoring methodology

4.1 Monitoring data and information requirements

4.1.1 The project developers shall keep a record of all the fuel or energy that is consumed by the devices under the project.

4.1.2 During project implementation, the exact number of project devices and their corresponding fuel or energy consumption will be monitored as part of the monitoring plan.

4.2 Data and parameters monitored

Data/parameter ID	MECD 9
Data / Parameter:	$\eta p,d,y$
Data unit:	Fraction
Description:	Thermal efficiency of the project device
Source of data:	Any of the following sources shall be used: - Standard water boiling test - Manufacturer specifications - Third-party certification by a qualified entity - Commercial guarantee - Technical reports from the installer For electric cooking devices, the efficiency may be determined following the method to determine efficiency of electric cooking appliances as per method 1 of Appendix 3 of AMS-I.E version 12.0 or the most recent version.

Monitoring frequency:	Annual, or a default schedule of linear decrease in efficiency down to the terminal efficiency (efficiency at end of technical life), which must be demonstrated to be 40% or higher, may be applied through the technical life span of the project device For modern electric cooking devices, thermal efficiency is expected to be consistent over the technical life span of the product. In this case, an annual decrease of 0% is assumed for the determination of useful energy across the product life span
QA/QC procedures:	-
Any comment:	This parameter is used in the determination of useful energy

Data/parameter ID	MECD 10
Data / Parameter:	$EG_{p,d,y}$
Data unit:	MWh
Description:	The amount of energy used in the project scenario by device *d* in year *y* (MWh)
Source of data:	Direct, continuous measurement. Remote monitoring methods may be applied. **All devices should be measured or metered.** For project devices that experienced intermittent or continuous loss of network connection to monitor energy consumption during project implementation, for each day of non-connectivity the average energy consumption of all connected project devices may be applied as that day's energy consumption, as long as the number of connected devices that day is at least or higher than the minimum required sample size.
Monitoring frequency:	Continuously, aggregated monthly.

QA/QC procedures:	Data logger, analog or digital meters that are either in-built or attached separately to the electric cooking appliances to measure the electricity consumption of the electric cooking appliance(s) shall be in conformity with industry standard and manufacturer calibrated. It is the responsibility from manufacturer to provided calibrated equipment and evidence of the calibration. In case of damage or measurement errors, the equipment shall be replaced. Compare result to the reference value of 1 kWh per capita per day. - If the project energy use is more per capita than the reference value, then the project energy use shall be further substantiated by independent third-party studies about cooking technologies and fuel/energy use that are specific to the project region, including but not limited to government publications, peer-reviewed literature, third party assessments (for example – UN and similar organizations) and/or official data or statistics. In case of multifamily settings or other applications such as restaurants, the higher consumption per device is expected. In such scenario, the higher consumption per device shall be substantiated and justified with monitoring data of number of users on sample basis. - If the results cannot be further substantiated, then apply 1 kWh per capita as a cap on the electricity consumption per capita as applied in equations 4 or 6. Equation 8 should continue to use the real monitored value.
Any comment:	This parameter is monitored during project implementation when the project device uses electricity

Data/parameter ID	MECD 11
Data / Parameter:	$EF_{el,y}$
Data unit:	tCO_2e/MWh
Description:	The emissions factor of the project electricity system in year y
Source of data:	Determined using CDM tool TOOL05 (Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation) Alternatively, the latest harmonised grid emission factor dataset provided by UNFCCC may be applied[7].
Monitoring frequency:	Annually, or fixed ex-ante for devices connected to a national interconnected system.

[7] https://unfccc.int/climate-action/sectoral-engagement/ifis- harmonization-of-standards-for-ghg-accounting/ifi-twg-list-of-

QA/QC procedures:	Using credible data for the electricity system In case the electricity system is a mini-grid introduced by the project, mini-grids powered by fossil-fuel engines are not eligible, with the exception of renewable mini-grids with back-up engines that are used for no more than 10% of operating hours in the year. Where back-up fossil-fuel engine(s) are used, use the monitored fuel amount to estimate the number of operating hours during the monitoring period, and compare this to the total number of operating hours of the mini-grid for the same period. If the use of the engine surpasses 10% of operating hours, then determine the number of days in which the backup technology was used to operate the mini-grid for more than 10% of total operating hours during the day. The project devices are ineligible for crediting on the days when the use of back-up technology was more than the 10% threshold.
Any comment:	This parameter is monitored where the energy consumed by the project devices is electrical and directly measured during project implementation.

Data/parameter ID	MECD 12
Data / Parameter:	$TDL_{j,y}$
Data unit:	Fraction
Description:	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data:	Determined as per the CDM tool TOOL05, paragraph 7.2 (Data/parameters monitored, table 3),
Monitoring frequency:	Once per monitoring period
QA/QC procedures:	Using credible data for the electricity system or default value
Any comment:	This parameter is monitored where the energy consumed by the project devices is electrical and is directly measured during project implementation.

Data/parameter ID	MECD 13
Data / Parameter:	$fNRB_{i,y}$
Data unit:	Fraction non-renewability
Description:	Non-renewability status of woody biomass fuel i during year y

Source of data:	Determined by following the CDM TOOL30, Calculation of the fraction of non-renewable biomass
Monitoring frequency:	One of two options, with the option defined and fixed at project design certification stage: 1. Determined ex-ante and fixed for a given crediting period (if it is fixed ex-ante, then include fNRB,b,y in the "data and parameters fixed ex ante" section of the PDD), or 2. Updated biennially or at each monitoring and verification
QA/QC procedures:	Use of latest version of the CDM TOOL30: Calculation of the fraction of non-renewable biomass
Any comment:	As applicable, NRB assessment may be used for multiple scenarios where woody biomass is used. Project developers applying for a renewal of the crediting period must reassess the NRB based on most recent information available.

Data/parameter ID	MECD 14
Data / Parameter:	$P_{p,d,y}$
Data unit:	mass or volume unit
Description:	The amount of fuel used in the project in by device d in year y
Source of data:	Direct measurement by metering or at sales, either on a device basis or cluster-of-devices basis. Remote monitoring methods may be applied. When sampling is used, follow Section 4.4 "General requirements for sampling" of RECH V4.0 methodology.
Monitoring frequency:	Continuously, aggregated monthly

QA/QC procedures:	Measurement using credible and calibrated equipment with mechanisms that ensure alternative use of the measured fuel is not possible. Measuring device shall be in conformity with industry standard and calibrated according to relevant national requirements. Compare result to the reference value of 0.0045 GJ per capita per day. If the project energy use is more than the reference value, then the project energy use shall be further substantiated by independent third-party studies about cooking technologies and fuel/energy use that are specific to the project region, including but not limited to government publications, peer-reviewed literature, third party assessments (for example – UN and similar organisations) and/or official data or statistics. If the results cannot be further substantiated, then apply the reference value as a cap on the fuel consumption (on equivalent terms) as applied in equation 6. Equation 8 should continue to use the real monitored value.
Any comment:	In case direct metering is not applied, then the fuel purchases, which are summarised on a monthly basis, are automatically captured on a continuous basis. Measurement may occur cluster-wise where project-specific retailers can clearly be assigned to customers and alternative uses are obviously excluded (if, for example, a new fuel is introduced specifically for project devices).

Data/parameter ID	MECD 15
Data / Parameter:	LE_y
Data unit:	tCO_2e per year
Description:	Leakage in project scenario in year y
Source of data:	Option 1: Apply a discount value of 0.95 to the emission reductions to approximate leakage emissions, or Option 2: Evaluate leakage following the procedure described in Option 2 of Section 3.11 of RECH V4.0.
Monitoring frequency:	Every two years
QA/QC procedures:	Transparent data analysis and reporting
Any comment:	-

4.3 Baseline scenario survey

The baseline scenario shall be conducted following the section 4.3 of Reduced Emission from Cooking and Heating (RECH) V4.0, and it may be based either on external sources or the baseline scenario survey, which provides critical information on target population characteristics, baseline technology use, fuel consumption, leakage, and sustainable development indicators.

4.4 General requirements for sampling approach

Section 2.1.2 of the MMECD encourages metering or measuring stove usage and/or fuel sales for all stoves and/or customers but does allows use of sampling approaches.

As stated in MECD 10, this methodology requires all project devices to be metered or subject to measurement of fuel use. Some allowance can be made for occasional loss of data due to IT connection failures, in which case sensible and conservative assumptions should be made, for example applying average consumption data for that device.

AGS reviewed the sector and recommended potential best practices.

a. **To ensure data accuracy and reliability, the methodology should either mandate complete metering/measuring of project devices and/or customers, or encourage complete metering, while allowing sampling with best practices**

b. **To incentivise high levels of metering, a methodology could consider:**
   - **Applying a discount factor on overall ERs where sampling is used**
   - **Providing a cap value on amount of energy/fuel per device and/or per customer which is below the current reference value for projects opting for sampling**

c. **If sampling used, from the literature review of best practices, guidance includes:**
   - **Use a 95% confidence level with 10% margin of error**
   - **Projects should monitor at least 5% of their cookstoves**
   - **Ensure the sample population is representative of the entire target population; this might require larger sample size.**

Where sampling is used it shall be in line with section 4.4 of Reduced Emission from Cooking and Heating (RECH) V4.0.