Gold Standard for the Global Goals

METHODOLOGY

METHODOLOGY FOR METERED & MEASURED ENERGY COOKING DEVICES

SDG 13

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SUMMARY

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).

This methodology shall be used in conjunction with the GHG Emissions Reduction & Sequestration Product Requirements and projects and programmes applying this methodology may be issued with GSVERs.

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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.

~~b.~~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.

~~c.~~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. ~~This~~The methodology includes the following metered cooking devices, but is not restricted to:

a. ~~metered electricity~~electric cookstove ~~where~~ [1,2],

~~a.~~b. electric pressure cooker (EPC) and other devices with characteristics where the cooking energy ~~used~~ is ~~measured for each device,~~ influenced by factors other than temperature such as cooking pressure,

~~b.~~c. ~~metered~~ LPG cookstove ~~where fuel used is measured for each device~~,

~~c.~~d. ~~Metered~~ biogas stoves,

e. bio-ethanol ~~cookstove where the~~ cookstoves.

In the case of cooking devices using fuel, the amount of ~~bio-ethanol~~fuel purchased for cooking by each customer ~~is~~shall be recorded with

[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.

arrangements to ensure the ~~bio-ethanol~~fuel is used for cooking and to prevent the alternative use of the ~~bio-ethanol~~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%.

b. The technology shall have continuous useful energy output of less than 150kW per unit, refer to the Definition~~definitionDefinition~~ "continuous useful energy output" section.

c. 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 organis~~z~~ations, etc., but do not individually act as project participants.

d. 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 ~~devices~~device(s) and describe the incentive mechanism(s) in the PDD/VPA-DD at the time of validation.

e. 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~~*3.11 | below*, avoidance of double counting or double claiming with other mitigation actions, for details on this demonstration.

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

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

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

i. 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).~~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

2.4.1 | The date of entry into force of this methodology is ~~XX August 2021~~the date of its publication i.e., 20~~07~~ October 2022.

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)~~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.

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] This methodology is a revised version of and replaces the Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC) v3.1 methodology.

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~~, applying~~ for the ~~emission factor of~~country or region based on the observed device(s) that can be replaced by the project ~~fossil fuel~~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 ~~mix~~(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

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

~~RECH V4.0.~~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 ~~(tCO_2e per TJ of useful energy)~~ 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**~~MECD 1 to MECD ~~**5**~~MECD ~~**4**~~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. Use of different cooking fuels.~~

~~d.~~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 ~~are calculated by multiplying~~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 ~~delivered by the project devices with the baseline emissions, with a cap defined in this document.~~ that is being replaced.

Case 2: Project electric cooking device involves additional characteristics that affect the cooking energy consumption, e.g. pressure, and it is not possible to determine thermal efficiency or useful energy by methods such as the Water Boiling Test (WBT). One example is the case of the Electric Pressure Cooker.

~~3.5.3 |~~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:

~~$EF_b = \sum_k \left(\sum_{i,j} P_{b,i,j} \times EF_{b,i} \times fNRB_{i,y}\right)_k \div \sum_k \left(\sum_{i,j} P_{b,i,j} \times NCV_{b,i} \times \eta_{b,i,j}\right)_k$~~ *Eq. 1*

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

Where:

~~EF_b~~ $EF_{b,useful}$	=	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)
~~$EF_{b,i}$~~ $EF_{b,i,CO2}$	=	CO_2 Emission factor of the baseline fuel *i* (tCO_2e/~~tonne~~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:

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

Where:

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

~~3.5.4~~ 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 ~~equation (1).~~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.

~~3.5.5~~ 3.5.6 | The baseline emission factor (~~EF_b~~ $EF_{b,useful}$ *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.

~~3.5.6~~ 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.

~~3.5.7~~ 3.5.9 | The overall baseline emissions for the project shall be calculated as follows:

Case 1:

$$BE_y = EG_{p,useful,y} \times \text{~~}EF_b\text{~~}EF_{b,useful} \quad \text{Eq. ~~2~~ 3}$$

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

Case 2:

The baseline emissions shall be 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:

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

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.

$$SC_b = \sum_j u_j \times SC_{b,j} \qquad \textit{Eq. 5}$$

Where,

u_j	=	Proportion of cooking of baseline device j (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).

~~3.5.8~~ | 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. ~~36~~ 36*

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*

~~3.5.9 |~~3.5.11 | 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. ~~47~~ 47*

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). ~~Using~~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:

$$PE_y = \sum_d EG_{p,d,y} \times EF_{el,y} \times \left(1 + TDL_{j,y}\right) \qquad \text{Eq. } \sout{58}\ 8$$

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:

$$PE_y = \sum_d P_{p,d,y} \times NCV_{p,i} \times EF_{p,i} \qquad \text{Eq. } \sout{69}\ 9$$

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.~~RECH V4.0.

3.8 | Emission reductions

3.8.1 | The emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$ *Eq. ~~7~~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 ~~(EF_b)~~ 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 ~~fulfill~~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 utilis~~z~~ed 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:	~~Tonne/ year-device, Tonne/trial-device, Tonne/day-device~~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 ~~and device types and~~amounts reflecting the proportions ~~and baseline~~per device ~~performance~~type may be taken from:
	- For case 1:
	  ○ Sampling campaign using Standard ~~Water Boiling~~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.~~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 ~~for a period of~~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:	~~$EF_{b,i}$~~ $EF_{b,i,CO2}$
Data unit:	~~tCO_2e/tonne~~ tCO_2/TJ
Description:	~~The~~ CO_2 emission factor arising from use of fuels in baseline ~~fuel *i*~~ scenario
Source of data:	~~IPCC~~ **Wood**: Methodology default ~~value converted by applying $NCV_{b,i}$~~, 112 tCO_2/TJ **Charcoal**: 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:	~~The parameter is used to calculate baseline emissions factor.~~

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 ~~for project region,~~ - ~~Studies~~or studies by academia, NGOs or multilateral institutions~~,~~ for project region and baseline technology, OR

	- provided by Official government publications or statistics~~, or~~ 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.~~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

[5] The CCT protocol is available at https://cleancooking.org/research-evidence-learning/standards-testing/protocols/

	paper[6]. The following default values may be applied to projects with emission reductions less than 10,000 tCO_2/year per project or VPA: Africa (MJ/person/event): Charcoal 3.92; LPG 0.96 Asia (MJ/person/event): Firewood 2.83; Charcoal 2.02; LPG 0.69 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 is an EPC. 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

[6] https://mecs.org.uk/publications/comparing-energy-consumption-and-costs-from-cooking-across-the-mecs-programme/

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 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.

The following default values may be applied to projects with emission reductions less than 10,000 tCO_2/year per project or VPA where the project device is an EPC:

Africa (MJ/person/event)		**Asia (MJ/person/event)**	
EPC	0.33	EPC	0.17

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. At renewal of the crediting period, the project developer shall carry out a survey to check if the end users utilisze 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 959**
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~~6~~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. When sampling approach is ~~used~~applied, follow Section 4.4 "General requirements for sampling" of ~~RECHV4~~Reduced Emission from Cooking and Heating (RECH) V4.0 methodology. Higher than minimum required sample size should be considered to accommodate potential device failure, measurement gaps from individual measurement devices. Changes in the sample group can be made over time as long as the minimum sample size and representativeness are ensured. 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:	~~Continuous~~Continuously, aggregated monthly.
QA/QC procedures:	~~Measurement using credible and calibrated equipment~~ ~~Data logger measuring~~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 ~~according to relevant national requirements.~~. 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 ~~equation 3.~~equations 4 or 6. Equation ~~5~~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~~7~~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)~~Determined using CDM tool TOOL05 (Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation) Alternatively, the latest harmonis~~z~~ed 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.
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

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

Data/parameter ID	MECD 12~~812~~
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~~913~~
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:	~~Applicable NRB assessment following the RECHV4.0 methodology~~Determined by following the CDM TOOL30, Calculation of the fraction of non-renewable biomass
Monitoring frequency:	~~Following~~One of two options, with the ~~requirements of~~ 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 ~~main methodology, use the latest version~~"data and parameters fixed ex ante" section of the ~~CDM TOOL30.~~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~~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 141014
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.~~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 organis~~z~~ations) 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 46. Equation ~~6~~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 151115
Data / Parameter:	LE_y

Data unit:	tCO_2e per year
Description:	Leakage in project scenario in year y
Source of data:	~~Follow requirements of Section 3.11 of RECH V4.0, i.e.,~~ 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 ~~there.~~in Option 2 of Section 3.11 of RECH V4.0.
Monitoring frequency:	~~Follow requirements of RECH V4.0~~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 ~~RECH~~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

The sampling approach shall be in line with the section 4.4 of ~~RECH~~Reduced Emission from Cooking and Heating (RECH) V4.0.

DOCUMENT HISTORY

Version	Date	Description
1.1	20~~11~~/10/2022	Provide detail guidance for EPC stove and some editorials
1.0	~~Mm~~05/10/2021	First version