GLOBAL CARBON COUNCIL

Driving Climate Actions

Methodology for Clean Cooking Transitions using DMRV Protocol

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CONTENTS

1. Introduction

1.1 Background to Baseline and Monitoring Methodologies of GCC

The Global Carbon Council (GCC) Program is the first international carbon market & sustainable development program in the Global South, which is endorsed and approved by the International Civil Aviation Organization's (ICAO) for CORSIA scheme. The GCC Program is a voluntary carbon program and an initiative of the Gulf Organisation for Research and Development (GORD). The unique feature of the GCC Program is that it provides opportunity to reduce or remove greenhouse gases and help to catalyze climate action on the ground, while ensuring that project's implementation and operations do not cause any harm to the environment and society and contribute to the United Nations Sustainable Development Goals as per host-country priorities. The GCC Program is comprised of the entire governance structure, system, and the documentation framework to achieve these objectives[1]. GCC Program will offer a single window opportunity for carbon market players to contribute to climate change mitigation and sustainability, while ensuring integrity, independence, objectivity and transparency. The details about the GCC Program are described in 'GCC Program Framework' document.

1.2 Methodology Key Elements

1. GCC methodologies facilitate the project owners of eligible greenhouse gas (GHG) reduction project activity[2] to calculate and monitor the emission reductions and facilitate the submission of the project activity in accordance with the methodologies.

2. This methodology is specifically designed for the assessment and reporting of emission reductions from cooking energy transitions. The methodology is applicable for nearly all cooking energy transitions for which the technologies[3] meet the performance applicability conditions outlined in the applicability section below.

3. The following table describes the typical project activities and mitigation actions covered under this methodology.

Table 1. Typical Project Activity and Mitigation Actions

Typical Projects	The methodology is applicable to project activities that implement technologies that reduce or displace greenhouse gas (GHG) emissions from the thermal energy consumption for cooking and/or drinking water heating in households and/or residential, institutional (schools, hospitals, community-based kitchen etc.), and/or commercial facilities. Typical examples of cooking energy transitions may include, but are not limited to the following options: Transition from three-stone/ open fire/ traditional cookstoves using non-renewable biomass [4] (viz. firewood, charcoal) and/or traditional cookstoves using solid/ liquid fossil fuel (like coal /kerosene) to

[1] GCC documents are available here: http://www.globalcarboncouncil.com/resource-centre/

[2] Throughout the methodology, the term "Project activity" should also read as "Project Activities", "Programme of Activities" and /or "Mitigation Activities" under the Programme of Activities.

[3] Throughout the methodology, the term 'technology' should be read as the single technology or multiple technologies applied in the project activity

[4] For a three-stone fire using firewood (not charcoal), or a cookstove with no improved combustion air supply or flue gas ventilation (i.e., without a grate or a chimney), the default value of efficiency is 0.15, and for other devices the default value is 0.25;

	(a) more efficient cooking device (single pot or multi pot portable or in-situ cookstoves) using non-renewable biomass (viz. firewood, charcoal); (b) more efficient cooking device using renewable energy sources including renewable biomass (such as pellets or briquettes, charcoal[5]. bioethanol, bio-gas), solar (e.g. solar cookers, parabolic solar cooker, etc.), etc.; (c) electric powered cooking devices (grid/off-grid connected cooking devices and/or stand-alone solar PV powered cooking devices) like electric induction stoves, electric pressure cookers, etc., and (d) LPG based cooking devices.
Type of GHG emissions mitigation action	The project activities, including transition from one or more cooking fuels and/or technologies to another, will result in reductions of emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), collectively referred to on a CO_2e basis. In the context of this methodology, the project activities specifically refer to the shift from polluting cooking fuels and inefficient technologies to cleaner and more efficient alternatives that results in GHG emission reductions.

4. The methodology allows the use of a software solution towards automating of data capture (direct metering / digital measurement / using proxy parameters) with provision for data validation, data management, immutability of collected data, and data storage (on an accessible device); automated estimation of emission reductions using predefined algorithms[6]; and reporting (automated project monitoring report generation) of emission reductions[7]. The methodology, in turn, will support the generation of high-quality carbon credits while ensuring accuracy and transparency of the issued credits.

5. Towards improving transparency and stakeholders' confidence, the digital monitoring, reporting, and verification (DMRV) protocol will require each of the cooking device to be uniquely identified based on the unique ID of the cooking device. In addition, the project owner should maintain a digital database which includes the user's information, like name of the user, category of user (domestic/ institutional/ commercial), date of sale and installation; GPS coordinates/address of the users, and project stove description (technical details of the cookstoves implemented under the project activity)[8]. Moreover, safeguarding measures will be institutionalized and tracked towards the avoidance of double-counting and stove-stacking.

6. The methodology allows for assessment of energy consumption and estimation of emission reductions using either continuously tracked energy consumption (CTEC) or a non-continuously tracked energy consumption (non-CTEC) approach.

Table 2. CTEC and non-CTEC projects

CTEC Projects	Non-CTEC Projects
Under the CTEC approach, fuel/energy consumption is continuously monitored on all project technologies in all	Under the non-CTEC approach fuel /energy consumptions are monitored on a

[5] Where charcoal is depicted as renewable biomass, project owner to ensure that renewable charcoal is produced by efficient charcoal production processes (e.g., retort sedentary kilns, improved sedentary kilns, Casamance kilns) i.e. Where kilns emit a minimal amount of methane during the charcoaling process (i.e., an efficient process is employed that results in high charcoal yield) and the small amount of methane that is emitted is captured and used or destroyed. Methane produced during the charcoaling process is captured and destroyed or combusted for energy purposes.
[6] Data are directly uploaded and processed by the data processing and analytics system.
[7] PMR to be reviewed and approved by GCC. VVB will be only be responsible for periodic verification of environmental and social safeguards, and projects contribution to sustainable development goals
[8] Project Owner may collect the user information like Mobile/ landline telephone number and identification details of the user in confidential mode and not to be published

CTEC Projects	Non-CTEC Projects
households/ institutions/ commercial facilities (since monitoring will be carried out on all device no sampling is required), using built-in or external data loggers (metering), or through the use of fuel purchase records (proxy indicator)[9]. Use of fuel purchase record relating exclusively to fuels used for cooking purposes under the project activity as a means of monitoring fuel/ energy consumption is only allowed for household users. Institutional and commercial facilities should use metering system for monitoring of fuel /energy consumption. Baseline energy consumption is determined using either of the options below: 1. Tracked/monitored project cookstove energy consumption data is used to back-calculate baseline energy consumption using annual usage surveys and specific fuel consumption ratios of the baseline and project cookstoves, determined via Controlled Cooking Tests (CCTs) performed on each cookstove models. 2. Baseline Kitchen Performance Test (KPT) is used to estimate the emission quotient (emission reductions produced per TJ of the continuously tracked project technology energy consumption) and then scaled by the total tracked project energy consumption to determine the total baseline emission. Project fuel/energy consumption -fuel consumption is to be continuously monitored directly through the use of built-in or external data loggers, or through fuel purchase records. As a control on potential fuel diversion, fuel consumption tracked through fuel sale records must be cross-checked against	sub-set of all project households[10] using field-based measurement protocol. Baseline energy consumption is determined using either of the options below: 1. Using a conservative global default (outlined under section 10.1.2 below) that represents the minimum level of service required for household cooking/ applying suppressed demand. 2. Conducting a baseline KPT, subject to caps and flags if outside of the expected consumption range. Project fuel/energy consumption is determined using either of the options below: 1. Conduct project Kitchen Performance Test (KPT) and cap their emission reductions (ERs) at 75% of what the project KPT-based estimate would be to adjust for the Hawthorne effect. 2. Conduct project KPT and directly monitor any effects using stove use monitors (SUMs) where cookstove uses during the KPT can be compared with stove uses to the month before or after that using SUM and making the appropriate adjustment in case of variation. For methodological consistency, this adjustment is applied directly in the project emissions calculation.

[9] Payment data needs to be uploaded via authenticated automated transport -API or secure file exchange preserving record IDs, timestamps (UTC), and currency/amount fields. CRM entries may be integrated and corelated with payment provider records to ensure customers and transaction consistency. Irreconcilable mismatches shall be rejected to held as per program policy. In addition, system server to include validation and cross check measures like (as applicable on case-to-case basis) analyzing payment pattern against expected consumption models derived from CRM, validate payment transactions against active customer accounts in CRM systems.

[10] Non-CTEC approach is only applicable for residential facilities. Institutional and commercial facilities to be covered under CTEC approach

CTEC Projects	Non-CTEC Projects
average project energy consumption values.	

7. Project activities using the CTEC approach will require tracking of energy consumption using a metered solution (using built-in or external data loggers) or using proxy parameters (device capacity e.g. bio-digester capacity, fuel purchase record) followed by transfer of monitored data to central digital data storage facility where data are directly uploaded and processed by the "data processing and analytics system". The "data processing and analytics system" includes algorithms for data conversion and analysis in compliance with the methodology, enabling a repeatable process for the generation and sharing of monitoring reports. The "data processing and analytics system" should also have an in-built quality assurance/ quality control mechanism for the detection of outliers/ missing data/sensors malfunction.

8. Project Activities using a non-CTEC approach as per the requirement of the methodology will allow for monitoring of fuel consumption based on the field-based measurement (Kitchen Performance Test) on a sample basis (with or without use of SUM) followed by data collection, recording, and processing of monitored data by the "data processing and analytics system".

2. Source of this baseline and monitoring methodology

9. For the development of GCC methodologies, the requirements of the 'GCC Program Manual' - and 'Standard for Development of Methodologies' are applied. The determination of baseline scenario and baseline emissions are consistent with the following guidance referred in the above standard: The baseline approach as stipulated in paragraph 36(iii) of *the Rules, modalities, and procedures for the mechanism established by Article 6, paragraph 4, of the Paris Agreement* (Decision 3/CMA.3).

10. This methodology is based on following baseline and monitoring methodologies:
    - A.6.4-PNM004- Comprehensive Lowered Emission Assessment and Reporting (CLEAR) Methodology for Cooking Energy Transitions, Version 1
    - Comprehensive Lowered Emission Assessment and Reporting 1 (CLEAR) Methodology for Cooking Energy Transitions – by the Clean Cooking and Climate Consortium (4C)
    - CDM Methodology AMS-II. G.-Energy efficiency measures in thermal applications of non-renewable biomass
    - CDM Methodology AMS-II. I.- Biogas/biomass thermal applications for households/ small users
    - CDM Methodology AMS-II. E.- Switch from non-renewable biomass for thermal applications by the user
    - CDM Methodology AMS-II. K.- Solar cookers for households

11. This methodology also refers to the latest approved versions of the following tools and guidelines of Article 6.4, protocols for field test, and general guidance for conducting high-quality baseline and project surveys:

    (a) A6.4-STAN-METH-006 - Addressing suppressed demand in mechanism methodologies, Version -1
    (b) A6.4-SBM016-A12 – Standard- Setting the baseline in mechanism methodologies, Version- 1
    (c) A6.4-MEP010-A01- Draft Methodological tool Emissions from electricity generation and/or consumption

(d) CCT Protocol, available at: https://cleancooking.org/protocols/
(e) IPCC Guidelines for GHG National Inventories: https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/
(f) ISO Standard 19867-1: https://www.iso.org/standard/66519.html
(g) Kitchen Performance Test Protocol, available at: https://cleancooking.org/protocols/
(h) Modelling Fuelwood Savings Scenarios (MoFuSS): https://www.mofuss.unam.mx/
(i) Mini-Grid Emissions Tool from SEforAll: https://www.seforall.org/mini-grids-emissions-tool
(j) Clean Cooking Alliance's Fuel Stacking Toolkit
(k) Designing Household Survey Samples: Practical Guidelines
(l) Guidance on survey design from the authors of Gill-Wiehl, A., Kammen, D.M. & Haya, B.K. Pervasive over-crediting from cookstove offset methodologies. Nat Sustain 7, 191–202 (2024). https://doi.org/10.1038/s41893-023-01259-6
(m) Household Sample Surveys in Developing and Transition Countries
(n) Siwatu,Gbemisola Oseni; Palacios-Lopez,Amparo; Mugera,Harriet Kasidi; Durazo,Josefine. Capturing What Matters: Essential Guidelines for Designing Household Surveys (English). LSMS Guidebook Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/381751639456530686
(o) WHO World Health Survey Manual.

3. Description of Key Terms

12. The following description of key terms applies to the projects using this methodology:

Table 3. Description of key terms

No.	Key Term	Description
1	Artisanal cookstoves	Cookstoves produced by small-scale manufacturing processes that can result in large variations in dimensions; generally made by hand by skilled workers, rather than mass-produced in factories. This methodology requires that for artisanal cookstoves, at least three randomly-selected samples of each cookstove model must be used when testing for International Organization for Standardization (ISO) thermal efficiency, and where relevant for the Controlled Cooking Test (CCT).
2	Basic human needs (BHN)	Physical and physiological needs considered essential for survival and minimum quality of life, such as access to energy services (including lighting, cooking, and thermal comforts including heating or cooling);
3	Biomass	Biomass is defined as the non-fossilized and biodegradable organic material originating from plants, animals and micro-organisms. This shall also include products, by-products, residues and waste from agriculture, forestry and related industries. Biomass also includes gases (biogas) and liquids recovered from the decomposition of non-fossilized and biodegradable organic material.

No.	Key Term	Description
	Biomass Residue	Non-fossilized and biodegradable organic material originating from plants, animals, and micro-organisms which is a by-product, residue or waste stream from agriculture, and forestry related industries
	Renewable Biomass	Renewable biomass in the context of the methodology is a by-product, residue, or waste stream from agriculture, forestry, and related industries that would not be used as a fuel or feedstock in the absence of the project activity, or biomass that originates from plantations that operate sustainably, where all project and leakage emissions associated with the biomass cultivation are accounted for.
4	Charcoal	A fuel produced by partially burning wood in a low-oxygen environment. The black substance that results is made up mostly of carbon and has a higher energy density than the wood.
5	Continuously tracked energy consumption (CTEC) project	A project that continuously measures fuel or energy consumption directly on all project technologies through built-in or external data loggers (also known as metering), or through fuel purchase records.
6	Controlled Cooking Test (CCT)	CCT is a field test used to measures cookstove performance in a controlled setting when a cook prepares a pre-determined local meal, which may include multiple dishes using local fuels, pots, and practices. CCT in general is used to compare the performance of multiple cookstove types when a cookstoves prepares a pre-determined meal. The protocols for undertaking CCT is available at https://cleancooking.org/protocols/.
7	Cooking energy transition(s)	The shift from one or more cooking fuel/ technology combination to another. In the context of this methodology, it specifically refers to the shift from polluting cooking fuels and/ or technologies to cleaner and/or more efficient alternatives that results in GHG emission reductions.
8	Cooking event(s)	An occurrence in which useful energy is delivered from a cookstove to fulfil a discrete task or set of tasks, such as cooking a meal (which may include multiple dishes), preparing tea, or heating water for drinking.
9	Data processing and analytics system	Data processing and analytics system is a customised software system under the DMRV framework responsible for processing and analysis of monitored data using programmed algorithms (that comply with this methodology) and providing a repeatable result including estimation of GHG emission reductions and generation of periodic "Project Monitoring Report". The system architecture for the "data processing and analytics system" has an inbuilt quality assurance/ quality control protocol for detection of outliers or missing data.
10	Displacement	The disuse of baseline cooking technologies and fuels due to use of the project cookstove.

No.	Key Term	Description
11	Electric Cookstoves	Cooking device powered by electricity and connected to national/regional grid, mini grids, or stand along solar PV unit.
12	Fraction of Non-Renewable Biomass (fNRB)	Geographically specific parameter that estimates the percentage of wood that is harvested beyond the landscape's rate of natural regeneration, meaning that the wood is not a carbon-neutral fuel.
13	Hawthorne Effect	The impact of the act of observation on human behaviour affects a given result or outcome.
14	Household	An individual residential unit and all the individuals living together and sharing cooking facilities and energy resources within that dwelling as their usual place of residence
15	Kitchen Performance Test (KPT)/Digital KPT	Field–based procedure to quantify fuel consumption (measuring the consumption of all cooking fuel types) under typical household and cookstove usage conditions. It involves daily measurements of the amount of fuel used across several days in the user's kitchen, and it is usually accompanied by descriptive surveys. **Digital KPT –** Include automated process of data collection, data tabulation, secure transfer of data to digital storage facility, storage of data, and ensuring immutability of collected data.
16	Level of service for meeting basic human needs	The threshold below which an individual is considered to face deprivation of Basic Human Needs.
17	Metered Device	Cooking devices 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.
18	Net Calorific Value (NCV) of fuel	The total quantity of heat released during the complete combustion of a unit quantity of fuel, excluding the heat needed to vaporize the water formed during combustion. In this methodology, it is expressed in units of energy per mass (TJ/tonne)
19	Non-continuously tracked energy consumption (non-CTEC) project	A project that measures project cookstoves' energy consumption on only a subset of sites, and/or does not measure energy consumption continuously.
20	Non-permanence	When the emission reductions achieved by a project do not persist and emissions are released back into the atmosphere.
21	Non-renewable fuels	Refer to the non-renewable fraction of fuelwood and charcoal, as well as fossil fuels such as LPG, coal, and kerosene

No.	Key Term	Description
22	Off-grid renewable energy	Renewable energy that is generated independently of the national or regional electrical grid, for example, by community- or household-level solar, micro-hydro, or wind installations.
23	Pellets	An upgraded biomass fuel made from densified dry materials such as residues from wood harvesting or processing, residues from harvesting or processing of agricultural crops, or purpose-grown plants. Pellet properties can be described according to the ISO 17225 set of standards.
24	Project technology days (PTDs)	The number of days for which project technologies are available (at the user's household, within the project boundary, and functioning) and in regular use (once or more per week on average) during a given monitoring period. This parameter is used for non-CTEC projects[11].
25	Rebound effect	Increased usage of a product or service resulting from an improvement in its efficiency, potentially negating some or all of the expected emission reductions. In cookstove carbon projects, this effect could occur if households are able to increase how much they cook with the same amount of fuel after the introduction of a project cookstove. Rebound is also often linked to suppressed demand, where the project cookstove meets previously unmet cooking needs.
26	Renewable fuels	Include the renewable fraction of fuelwood and charcoal, waste biomass like crop residues and dung, processed biomass like briquettes and pellets from fully renewable sources, bioethanol, biogas, and solar.
27	Stove stacking	"Stove stacking" is the prevalent practice where households concurrently using multiple stoves (to meet diverse cooking needs. Fuel stacking refers to the situation when a household uses multiple fuels or cooking solutions concurrently.
28	Stove Use Monitor (SUM)	Device that quantifies cookstove usage through direct measurements of physical or chemical parameters (e.g., temperature, heat flow, light, power, motion, gas concentration, etc.) of cookstoves, kitchen technologies, and cookware, among others. SUMs do not measure fuel consumption and therefore do not meet the requirements for CTEC projects.
29	Suppressed demand	Situation where the level of access to a given good or service is insufficient – due to poverty or lack of access to infrastructure – to meet Basic human needs (BHN). In the context of cookstove carbon projects, accounting for suppressed demand means that the baseline scenario is adjusted to an amount of cooking fuel necessary to provide for basic human needs rather than a potentially lower, actual amount of fuel used for cooking.

[11] For a non-CTEC project to be eligible to claim up to 90% of maximum PTDs, the entity must take the customer support actions described in the methodology and provide details of how each condition has or will be met on the Project Information Cover Sheet during the design phase of the project. Entity who does not undertake all three of these customer support actions may claim up to 75% of maximum PTDs. For CTEC projects, actual fuel consumption is measured in all project households, so usage rate isn't a parameter for emissions reductions in CTEC projects.

No.	Key Term	Description
30	Suppressed demand baseline	A crediting baseline that is established for the provision of services that address basic human needs.
31	Technical Lifetime	The technical lifetime of the cooking device is defined as the period (expressed in years) for which the technology/ equipment/ cooking device is technically designed to operate in a safe manner and with minimal loss of performance from its first commissioning. The technical lifetime of the equipment is specified by the technical specifications of/ from the original equipment manufacturer/supplier.
32	Transmission and distribution (T&D) losses	Losses incurred supplying grid electricity from point of the generation to end users.
33	Upstream emissions	In the context of this methodology, upstream emissions represent the GHG emissions associated with the production, processing, transportation, and distribution of cooking fuels. Upstream emissions apply to both baseline and project scenarios
34	Useful energy delivered	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.
35	User	An entity with a functioning cookstove that is in use on average once or more per week during a given monitoring period, confirmed through both self-reporting and visual inspection
36	Usage	The frequency or quantity of cooking with a given technology/ fuel combination. In the context of this methodology, usage is addressed in the form of annual usage surveys, which determine primary fuel type and household size, confirm whether a household meets "User household" criteria.
37	Wood-to-charcoal conversion factor	This factor expresses the amount of wood needed to produce a standard quantity of charcoal, typically expressed as a ratio of the mass of air-dry or oven-dry wood input per mass of charcoal output. This factor is relevant only for projects that use charcoal in the baseline and/or project scenarios. This methodology uses a 4:1 conversion factor, which is incorporated into upstream emission factor values, and fNRB (as noted in the fNRB parameter table).
38	Woody biomass	Any and all wood, whether or not it is harvested and used as a fuel, including live trees and shrubs, and wood harvested for any purpose.

4. Applicable Project Activities and their Eligibility Conditions

13. The methodology is applicable for nearly all cooking energy transition implemented at existing households, commercial, and/ or institutional facilities that result in reductions of emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), collectively referred to on a CO_2e basis.

14. There is no restriction on the number of households/ commercial/ institutional establishments involved or the total emission reductions achieved under a single project activity.

15. While both CTEC/non-CTEC monitoring framework are allowed for technologies implemented at residential establishment, technologies installed at commercial and institutional facilities are required to adopt CTEC approach only.

16. The methodology is only applicable for installation of new and improved technologies[12] and does not allow emission reduction claims from project activity encompassing any improved practice[13]. Furthermore, the emission reduction cannot be claimed for fuel-switch only, that means the project activity should introduce alternative technologies/ cooking devices for cooking and the technology switch should be the main source of emission reduction[14].

17. The methodology allows for continuous and gradual distribution of the technologies over the crediting period of the project activity resulting in increased adoptions. In case of phased distribution, the crediting period will start from the date of installation/ operation of first cookstoves to be considered under the project boundary, while the emission reduction for subsequent installation will be considered from the date of installation/operation of respective cookstoves as indicated in the project database.

18. The project activities are applicable under following conditions:

(a) All cookstoves under the project activity shall be identified based on unique ID of the cooking device in order to avoid double counting of emission reductions by other mitigation actions. . Each unique ID shall be linked to a specific user (household / institutional/ commercial facilities), and the project owner shall have a system in place to account for the replacement of any cookstoves within the crediting period.

(b) Furthermore, in order to avoid double counting, the project owner will require to clearly establish the ownership rights of emission reductions resulting from the project activity by complying to both the requirements (i) clearly communicating their ownership rights and intention of claiming the emission reduction resulting from the project activity with all stakeholders involved including the end user's (ii) obtaining signed agreement or written assertions from all the other parties/ stakeholders involved including technology manufacturers/ suppliers and producer/suppliers of the renewable fuel in use (e.g. pellets, bio-ethanol producer) that they cannot claim emission reduction from the clean energy interventions considered under the project activity.

(c) The project owner shall check with all the stakeholders concerned and confirm that the technologies /devices considered under the project activity is not considered under another carbon market programme (compliance/ voluntary).

(d) All biomass-burning cookstove models under the project activity must be tested for thermal efficiency using the International Organization for Standardization (ISO) Standard 19867-1:2018. For wood-burning technologies that use a griddle surface (e.g., plancha cookstoves for making tortillas) the initial thermal efficiency requirement is 20% or higher. All other biomass-burning cookstoves under the project activity must achieve initial thermal efficiency of 25% or higher. Cookstoves burning charcoal and bioethanol must achieve thermal efficiency of 30% or higher. Fuel based cookstoves other than biomass/ charcoal/ bio-ethanol should also have

[12] Throughout the methodology the term 'technology' should be read as the single or multiple technologies applied in the project activity. Improved technology for example improved cookstoves, solar cookers etc.

13 Improved practice for example storage and drying of fuels leading to better efficiency of cookstoves due to lower humidity fuels

[14] For project cooking devices that use grid electricity, emissions reductions from fuel switch and efficiency improvement are eligible

a predictable performance and durability under field conditions, and the rated thermal efficiency should be at least 40% or higher.

(e) Project owner to ensure that the technologies used in the project activity do not enhance the indoor air pollution[15] In comparison to the baseline option, using objective evidence. The level of indoor air pollution[16] during the pre-project and the project scenario (fuel and stove combination) can be demonstrated using a report of field testing for the technology's PM 2.5 and carbon monoxide (CO) emissions, report of lab testing, certification from manufacturer test, or results of modelling of the technology's operation under field conditions. In the absence of the above-mentioned reports/evidence, project owner can use the reference from published literature or a report by independent agencies, provided the independent third-party report.

(f) Project owner must identify and repair or replace malfunctioning cookstoves as and when reported by users. For replacement of malfunctioning cookstoves, the project owner should select technologies of comparable or better quality and thermal efficiency, or not claim emission reductions for households when such failures occur. Project owner must include a documented plan for this process in the project document (e.g., PSF/ PoA -SF[17]/ MA-SF).

19. For artisanal cookstoves, at least three randomly selected samples of each cookstove model must be used when testing for ISO thermal efficiency and when undertaking CCTs. The mean value from the three samples must be applied.

20. For project activity involving biogas, this methodology is only applicable to those project activities that use the CTEC approach. It includes emission reductions only from cooking fuel (biogas) consumption and not from the use of generated slurry.

21. For CTEC project activity, fuel purchase/sale records can be used to track consumption of pellets, ethanol, and LPG where LPG and Ethanol fuel delivery systems are designed exclusively for use in a specific project technology. Project activity shall implement measures to prevent fuel diversion for non-project activities (e.g., sealed canisters, tamper-evident meters, delivery log cross-verification, etc.), and cross-check[18] fuel consumption tracked through fuel sale records against average project energy consumption values. Commercial and institutional facilities should use a metered solution only.

22. Project activities shall be eligible to have implemented the following safeguards:

(a) If the expected technical lifetime of the newly installed technologies is shorter than the crediting period, the project owner shall ensure that the end users are provided with a replacement technology of comparable or better quality by the end of the technical life or retrofits its essential components to continue meeting the minimum service level requirements (i.e., thermal energy generation) or not claim emission reductions for households post the technical lifetimes.

(b) The project activity, including the use of fuel and its supply, should not undermine or conflict with any national, sub-national or local regulations or guidance. The project shall document the national, regional and local regulatory framework for the provision of thermal energy services and fuel usage within the project boundary.

(c) For all the technologies adopted under the project activity, the project owner should demonstrate that the technologies are designed, constructed, and operated to the

[15] Including PM 2.5 and carbon-monoxide emissions
[16] The project owner must provide test protocols for comparative field tests, which credibly reflect the baseline and project scenarios in respect of indoor air pollution levels including PM 2.5 and carbon-monoxide.
[17] PSF- Project Submission Form, PoA-SF- Submission Form for PoA. MA-SF- Submission Form for Mitigation
[18] Commercial and institutional facilities are to use metered solution only

requirements of safety and indoor air quality as per the relevant national or local standard.

23. This methodology is not applicable to households that use electricity as their primary baseline fuel[19], however use of electricity as supplemental baseline fuel is permitted as it is not expected to materially affect the project activities.

24. The project activity does not allow the use of improved solid and liquid-fossil fuel-based cooking devices/cookstoves (e.g., coal, kerosene, etc.) in the project scenario. The methodology, however, allows the use of LPG-based cooking.

25. Project activity using supressed demand baseline in place of a global default value is required to additionally comply with the applicability conditions referred to under "A 6.4-STAN-METH- Standard: Addressing suppressed demand in mechanism methodologies".

26. In case the project boundary overlaps with the Jurisdictional REDD+ programme, the project owner should demonstrate the avoidance of double issuance risk either by confirming that the emission reductions generated by the project activity are attributed to the project and will be deducted from the jurisdictional program[20] or demonstrate that jurisdictional programs forest reference level, forest reference emission level or accounting methodology exclude activity classes like clean cooking addressed by the project activity.

27. In case the project owner designs incentive mechanisms, to reduce the use/ eliminate the use of inefficient baseline devices that are replaced by the project cooking devices, the same should be transparently referred to in the project document, and relevant proof made available at the time of validation.

5. DMRV Framework

28. The methodology integrates DMRV solutions, which could be 1) CTEC approach, or 2) non-CTEC approach.

29. **CTEC-based approach for credit issuance** - CTEC approach includes software solution, smart sensors/meters, payment gateway, etc. to support digital data collection from device logs or verified fuel purchase records for all technologies implemented (under CTEC-based approach). Monitoring of fuel consumption needs to be carried out for all cooking devices. Monitored data are directly uploaded to the digital storage facility and processed by the data processing and analytics system. The data analytics system will provide repeatable results, including GHG emissions reductions for the selected monitoring period and project monitoring report, thereby supporting issuance of emission reduction credits. The CTEC approach to the project activity will broadly encompass the following aspects:

(a) Digital monitoring of parameters (fuel or energy consumption) based on the selected approach i.e using built-in or external data loggers (metering), or through fuel purchase records (proxy indicator).

(b) Validation/certification of the digital MRV system level by third party entity to ensure that the workflow follows the GHG emissions reporting standards as per the GCC standards and applied methodology. The validation exercise will also encompass data/information triangulation techniques built into the system to flag errors or outliers and quickly detect a hardware problem, such as a faulty sensor.

(c) Analysis of the monitored data by the data processing and analytics system and generation of automatic reports on GHG emissions using predefined templates

[19] Primary baseline fuel is referred to fuel that is being used for 75% of the cooking events

[20] By submitting Attribution Agreement A formal statement, Nesting Agreement, or Letter of No Objection from the relevant jurisdictional
authority (or authorized program administrator)

based on the algorithms for data conversion and analyses as set out in the methodology for estimation of emission reductions.

30. **Non-CTEC approach for credit issuance**- Includes digitisation of monitored data from field-based test (carried out on a sample basis), followed by its uploading in the digital storage facility and processing of monitored information by "data processing and analytics system". The data analytics system will provide repeatable results, including GHG emissions reductions for the selected monitoring period and project monitoring report, thereby supporting the issuance of emission reduction credits. The key difference in the case of the non-CTEC approach with the CTEC approach is the collection of monitored data. While the CTEC solution requires the collection of monitored data from all cooking devices, under non-CTEC based approach, monitoring will be carried out at the sub-set of the devices involving the use of a field-testing protocol. Non-CTEC applicable to the project activity will broadly encompass the following aspects.

(a) Validation/certification of the digital MRV system level by third party entity to ensure that the workflow follows the GHG emissions reporting standards as per the GCC standards and applied methodology. The validation exercise will also encompass data/information triangulation techniques built into the system to flag errors or outliers and quickly detect a hardware problem, such as a faulty sensor.

(b) Analysis of the monitored data by the data processing and analytics system and generation of automatic reports on GHG emissions using predefined templates based on the algorithms for data conversion and analyses as set out in the methodology for estimation of emission reductions.

6. Sectoral Scope applicable to GCC Validation and Verification Body

31. The sectoral scopes eligible under GCC have been defined in the 'Standard for Development of Methodologies'. The sectoral scope of the methodology is "Sectoral Scope 03: "Energy Demand".

32. The Validation and Verification Bodies (VVBs) approved under GCC for the Sectoral Scope 03: "Energy Demand" can conduct validation or verification of a project that applies this methodology,

7. Project Boundary

33. The spatial extent of the project boundary corresponds to the physical, geographical sites where project technologies operate (e.g., households, commercial and institutional facilities), including the locations where baseline and project fuels are produced at or collected from:

(a) Where the baseline fuel is woody biomass/charcoal, the project boundary includes the area within which this woody biomass is grown and collected, and any associated production facilities (e.g., charcoal kilns).

(b) Where the project activity introduces the use of a new biomass feedstock into the project situation, the fuel production and collection area is inside the project boundary, wherein this new biomass is produced, collected, and supplied.

(c) Where project devices use electricity, the project boundary includes the electricity generation, and, where applicable, also the transmission and distribution (T&D) system.

(d) The boundary includes the production facilities (e.g., ethanol distilleries, LPG processing plant and biogas digesters) and associated infrastructure for transportation of baseline and project fuels.

The GHGs included in or excluded from the project boundary are listed in Table 4 below:

Table 4. Emission sources included in or excluded from the project boundary

Source		GHG	Included	Justification/explanation
Baseline	Thermal energy generation (burning of fuel)	CO_2	Included	Major source of emissions
		CH_4	Included	Can be significant for some fuels
		N_2O	Included	Can be significant for some fuels
	Fuel production and transport	CO_2	Included	Major source of emissions for some fuels
		CH_4	Included	Can be significant for some fuels
		N_2O	Included	Can be significant for some fuels
Project Activity	Thermal energy generation (burning of fuel)	CO_2	Included	Major source of emissions
		CH_4	Included	Can be significant for some fuels
		N_2O	Included	Can be significant for some fuels
	Fuel production and transport	CO_2	Included	Major source of emissions for some fuels
		CH_4	Included	Can be significant for some fuels
		N_2O	Included	Can be significant for some fuels
	Electricity generation, T&D	CO_2	Included	Major source of emissions in some cases
		CH_4	Included	Can be significant in some cases
		N_2O	Included	Can be significant in some cases

8. Crediting Baseline

34. The methodology describes the below steps for setting up the baseline including identifying the baseline scenario and determining baseline emissions and/or removals.

8.1 Business-as-usual (BAU) scenario

8.1.1 Identification of the BAU scenario

35. The methodology requires identification of a conservative business-as-usual (BAU) scenario that would occur in the absence the project activity. In accordance with the A 6.4 Standard: Setting the baseline in mechanism methodologies" the methodology considers continuation of the prevailing cooking technologies and fuel consumption patterns[21] as the BAU scenario in the absence of the project activity.

36. The BAU scenario is to be identified through a rigorous, conservative process using baseline study (Sample survey or complete enumeration[22]) and/ or literature review and contextual validation:

(a) **Baseline study and/or Literature Review**: Project owner(s) conduct a baseline study (Sample survey or complete enumeration) within the target population[23] to determine the dominant baseline cooking technologies[24] and the percentage of their use by the target population, fuel types and the percentage of their use by the target population, fuel consumption pattern for the type of service provided by project technology, stacking patterns, and household size. Baseline information can be captured through two options:

Option 1: Baseline survey carried out across a sample population within the target population. Project activity applying CTEC/ non-CTEC based approach should conduct baseline scenario survey using digital application that enables seamless survey data collection and upload of the survey results/outcome in the digital database . Project owner to ensure that the audit trail of the baseline survey is archived like verification of the unique ID of cookstoves, id of the authorised representative of the households, and geo-tagged photographs. Where feasible, the survey results may be cross-checked with appropriate national or regional datasets or published literature[25]. As an alternative to sample survey, project owner may refer to secondary literature (appropriate national or regional datasets or published literature) for determining the baseline scenario. The official publications/official statistics published by national/ sub-national Government or report published[26] by independent agencies may also be referred to, provided that the report is not more than 3 years old and represents the baseline information of the target population.

[21] Prevailing cooking practice may include use of single or multiple fuels/device combinations for meeting the similar thermal energy needs of end users.
[22] Census survey
[23] Population targeted for adopting new project technology
[24] Sample survey or census survey used for determination of the baseline cooking technologies should consider end users from different socio-economic circumstances covered under the project activity
[25] Where survey results deviate significantly from official statistics or credible literature and may lead to a non-conservative baseline, project owner to provide additional justification and rationale to explain the deviation, including specific evidence demonstrating why the official literature or statistics are not representative of the target population and use the values from the literature, official publications, or official statistics for the target population; The initial baseline survey (option1) must be carried out through a local third-party agencies.
[26] Reports that are "indexed," journal and/or published by a national or multi-national agency.

Option 2 : Baseline assessment based on complete enumeration/ census survey including capture of baseline data[27] for 100% of the beneficiary/households as a part of the digital customer onboarding process i.e., when customers receive the stove,

Assessment Against Legal and Policy Context: The identified BAU scenario is reviewed for consistency with legal requirements and relevant government policies. Scenarios that violate or constrain applicable policies are excluded unless clear justification is provided that the applicable policy is not enforced, in which case the project may apply a BAU scenario that reflects actual observed conditions.

(b) **Adjusting for changes periodically**: The methodology uses a robust, conservative approach to define baselines through direct measurement, including KPTs/Digital KPTs or back-calculation based on tracked fuel consumption and CCTs/Digital CCTs. During the first usage survey (Project activity applying CTEC/non-CTEC based approach should conduct usage survey using digital application that enables seamless survey data collection and real time data uploading in the digital database. During usage survey project households will be asked retrospective questions to assess alignment with the originally defined baseline scenario including household size and fuel usage (quantity and pattern) . If material discrepancies are found—defined as more than a 10% difference in fuel mix or household size—conservative adjustments are required, either by not claiming emissions reductions from non-conforming households or adjusting baseline estimates downward (please refer to Table 5 for specific quantitative guidance). Subsequent usage surveys identify changes over the course of the crediting period.

(c) **Alignment with Crediting Periods**: The BAU scenario must be reassessed at the start of subsequent crediting period[28], ensuring that the baseline continues to reflect the most accurate and conservative estimate of what would have occurred in the absence of the project.

37. The methodology, encourage ambition through setting crediting baselines below BAU. The methodology includes quantitative methods for downward adjustment based on clear and objective criteria that ensures selected baseline is below BAU. Adjustments are to be made to the baseline emission estimation for any changes in the target population, if necessary. However, the methodology also allows for the use of global defaults values of firewood and charcoal consumption as the baseline scenario (section 10.1.2). For project activity where global default values are used as baseline scenario , the BAU and baseline scenarios are different and the baseline emissions are presumed to be lower than the BAU emissions and therefore no difference needs to be reported . The process for determining the BAU scenario follows the same steps as for establishing the baseline scenario.

8.1.2 Calculation of the BAU emissions or removals

38. BAU emissions are calculated using the same methodological approach and parameters as the baseline emissions. The equations, assumptions, and justifications applied are identical and are detailed in section 10.1.1 (Calculation of the baseline emissions or removals). For project activity using default value of firewood and charcoal consumption as baseline option, the baseline emission is lower than the BAU emission and therefore BAU emission is not required to be calculated separately.

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[27] Baseline cooking technologies and the percentage of their use by the target population, fuel types and the percentage of their use by the target population, fuel consumption pattern for the type of service provided by project technology, stacking patterns, and household size

[28] Project owner may refer to secondary literature (appropriate national or regional datasets or published literature) for reassessment of the BAU scenario at the start of the crediting period. The official publications/official statistics published by national/ sub-national Government or report published by independent agencies may also be referred to, provided that the report represents the baseline information of the target population.

39. For projects with KPT/digital KPT baselines, project owner(s) must also identify any mismatch between values documented during the baseline scenario and those reported by actual project households, as described in Section 8.2.2 (Identification of the baseline scenario).

40. For CTEC projects that back-calculate their baseline, the proportion of cooking on baseline technologies is assessed periodically (at least every other year) during the crediting period. As such, the monitoring directly accounts for changes in the baseline associated with "business-as-usual" trends.

8.2 Baseline Scenario

8.2.1 Baseline approach

40. The methodology considers approach (c) from paragraph 36 of the RMPs - An approach based on existing actual or historical emissions, adjusted downwards to ensure alignment with paragraph 33 of the RMP.

41. The selection of the baseline approach is justified as this methodology

(a) supports the use of existing baseline technologies and actual baseline fuel consumption, derived from direct measurements of fuel consumption, including KPTs, and continuously tracked energy consumption approaches. These requirements make the methodology well-aligned with the approach of using existing actual and historical emissions adjusted conservatively to ensure environmental integrity, as required under paragraph 33 of the RMP.

(b) The methodology requires project owner(s) to estimate baseline fuel consumption using real-world data, ensuring alignment with environmental integrity principles under paragraph 33 of the RMP.

(c) The methodology allows for the application of downward adjustment to encourage ambition over time.

(d) Applying statistical conservativeness (95/10 rule) to account for measurement

8.2.2 Identification of the baseline scenario

42. The baseline scenario(s) refers to the technologies and fuel that would be used by the target population in the absence of the project activity, including the existing baseline technologies (including the stove stacking) and fuel consumption patterns that are being replaced/displaced by the project technology. The baseline scenario survey shall define fuel types, fuel mix proportions, household size (in case of residential establishment) and service delivered in case of institutional (e.g. number of patients served in the health care facility) and commercial establishment. It may also be used to support common practice analysis.

43. The description of the baseline scenario should clearly outline the technologies that are likely to be replaced by the project technology considered, such as the presence and usage of multiple baseline technologies by the target population (stove stacking) as it is not conservative to compare the project to only the most inefficient technology being used by the target population.

44. Multiple baseline scenarios may be generated as appropriate (e.g., for multiple geographic areas with differing demographics, or multiple kinds of user groups with different baseline fuel mixes), and each compared against the project scenario.

45. Project owners must consider distinct baseline scenarios when the project activity targets end users that consume significantly different fuels. For example, end users cooking

predominantly with wood are significantly different from end users cooking predominantly with charcoal and would thus warrant a different baseline scenario.

46. Conversely, if a project is promoting multiple project technologies/fuels, a single baseline scenario can be assessed against multiple project scenarios[29] across same user category, i.e. residential/ institutional/ commercial. Project technologies with similar design and performance characteristics (defined as having the same combustion technology and within 10% thermal efficiency per ISO 19867-1) may be included under a single project scenario. Project technologies with significantly different performance characteristics are treated as independent project scenarios and are monitored and calculated separately.

47. For independent project scenarios (identified above) project owner to analyse whether multiple baseline scenarios are applicable in relation to the different project technologies, depending on fuel type and baseline technology use patterns in target beneficiary. For example, the use of inefficient wood stoves and use of inefficient charcoal stoves are treated as different baseline scenarios.

48. For project activity with entire installation at the project start or gradual technology adoption the baseline is considered fixed during the crediting period and does not require continuous monitoring except for identification of material discrepancies during first usage survey which requires conservative adjustments i.e. either by not claiming emissions reductions from non-conforming households or adjusting baseline estimates downward.

49. For non-CTEC projects opting to measure the baseline using the KPT rather than using a default value, and for CTEC projects opting to use the KPT/digital KPT to measure baseline fuel consumption, the baseline scenario(s) shall be identified and defined through the application of a baseline survey to the target population (option 1) or capturing of baseline information for the target population (option 2 – Capturing information from every individual/household) i.e. as a part of the digital customer onboarding process i.e., when customers receive the stove. The baseline scenario survey can also be used to meet the customer support action of demonstrating that the project has selected technologies and fuels that meet the cooking needs of the target population.

50. For CTEC projects choosing to back-calculate the baseline, as well as non-CTEC projects opting to use a default value, the baseline scenario survey is recommended but not mandatory. These project types may use other data[30] to establish baseline scenarios at the project design stage, as they will collect all the data necessary to substantiate emissions reductions from actual project households during the usage survey. Where possible, all scenarios should be cross-checked with recent, appropriate (geographically and demographically comparable) information from nationally- or regionally representative surveys or reputable literature[31].

51. All baseline scenarios shall be assessed for consistency with government policies and legal requirements. Any baseline scenario that does not fulfil legal requirements shall be excluded. Any baseline scenario that is not aligned with government policies but instead constrains their outcomes shall be excluded. In the case that observed conditions demonstrate that relevant legal requirements are not enforced, then the project may make an exception, document the inconsistency in the PSF/ / PoA -SF / MA-SF [32], and apply a baseline scenario that is inconsistent with government policies and legal requirements. For example, if charcoal production or sales are restricted by law but charcoal is widely used as a baseline fuel, as is the case in some countries, then charcoal may be included in the baseline scenario. In additional, baseline scenarios surveys should assess the

[29] Project scenario is defined by the fuel consumption of end users within a target population that adopt a project technology

[30] Secondary literature (appropriate national or regional datasets or published literature) such as official publications/official statistics published by national/ sub-national Government or report published by independent agencies may also be referred to

[31] Examples of reputable literature include sources that are "indexed," journal and/or published by a national or multi-national agency

[32] PSF- Project Submission Form, PoA-SF- Submission Form for PoA. MA-SF- Submission Form for Mitigation,

percent of households in the target population with a functional technology that is equivalent to the project technology as a common practice additionality check; if greater than 30%, the project is not additional. An equivalent technology is one that meets all three of the following criteria: 1) accomplishes the same cooking tasks; 2) has similar thermal efficiency; and 3) uses the same fuel(s).

52. The baseline scenario shall remain valid for the duration of the reasonably expected remaining lifetime of the baseline cookstoves. In practice, this provision does not, by itself, require any change in the baseline scenario during the crediting period. If a baseline cookstove reaches the end of its lifetime during the crediting period, the project owner may assume that the household/institution/ commercial establishment, in the absence of the project, would naturally replace it with a cookstove of the same type and performance. This assumption reflects that cookstove project crediting periods are relatively short, and without targeted support, households/ institution/ commercial establishments are unlikely to transition to improved or cleaner cooking options during this period due to persistent affordability and access barriers, as identified in the additionality analysis.

8.2.3 Additional requirements for non-CTEC and CTEC projects conducting baseline KPTs:

53. Project owner(s) of non-CTEC or CTEC projects using the KPT to measure the baseline must also use the baseline scenario survey to collect data on the relative fuel use at different times of the year to address potential seasonal variation. The following question (or an appropriate variation) must be asked, “Relative to the amount of fuel you used this week, are there other times of the year when you use more fuel? If so, when? And/or less fuel? If so, when?” For additional information on addressing seasonal variation in fuel consumption, see Monitoring Requirements in Section 13.

54. For projects with KPT baselines, project owner(s) must also identify any mismatch between values documented during the baseline scenario and those reported by actual project households during the first project usage survey for primary fuel type and household size, primary fuel type and service delivered in case of institutional and commercial establishments. This assessment should be carried out using retrospective questions of project households, institutional, and commercial establishments during the first usage survey.

55. Where a material discrepancy between the baseline scenario households and project households occurs, project owner(s) must either not claim emission reductions for households that do not conform to the baseline scenario profile or follow requirements on adjusting the baseline (toward lower baseline emissions).

56. A material discrepancy is defined as more than a 10% absolute difference[33] between the baseline and project scenarios for the primary fuel type used[34], and/or any household size estimate (service delivered in case of institutional and commercial establishment) measured during a project usage scenario (Hs) that is greater than the baseline scenario estimate. When calculating the difference, the absolute difference should be relative to the project estimate. For example, if the proportion of use events with wood is 85% in the baseline and 80% in the project, the difference is estimated as (0.85-0.80)/0.80 = 6.2% (within the 10% threshold). Specific requirements for baseline and project scenario comparisons are provided below.

[33] Methodology uses a greater than 10% variation as the definition of a material discrepancy throughout the methodology as this is appropriate given the distributed nature of the cooking technology intervention, the natural variation in human cooking behaviors, and the challenges of collecting real-word field data, especially in many low resource environments.
[34] Parameters PC_{bi} and PC_{pj} are used to calculate this material difference and are used in Appendix 10 providing sampling requirements for these proportions of cooking events

Table 5. Specific requirements for baseline and project scenarios[35]

Discrepancy between values documented during the baseline scenario and those reported by actual project households during the first project usage survey	Adjustment requirement in the baseline scenario
1. The number of people per household in the project is greater than in the baseline scenario.	The number of people per household (Hs) estimated from project usage surveys must be lowered to the baseline.
2. The number of people per household in the project is less than or equal to the baseline scenario.	No change
3. The primary fuel used for cooking events identified through the baseline scenario survey is more than 10% different from that determined retrospectively through the first project usage survey, and the difference results in baseline emissions that are lower than they would be if the proportion of primary fuel from the baseline and project scenarios matched. For example, if the baseline (from before the project technology was introduced) scenario indicates 85% wood use, and 15% charcoal use; and the first project usage survey indicates a baseline of 75% wood use and 25% charcoal use, then the emissions in the baseline scenario would be considered conservative, as charcoal has higher CO_{2e} emissions than wood per unit of useful energy delivered. If more than two fuels are used, the same process must be applied for all.	No change
4. The primary fuel used for cooking events identified through the baseline scenario survey is more than 10% different from that determined retrospectively through the first project usage survey and the difference results in baseline emissions that are higher than they would be if the proportion of primary fuel in baseline and project scenarios matched. For example, if the baseline scenario indicates 75% primary wood use, and 25% charcoal use; and the first project usage survey indicates a baseline of 85% wood use and 15% charcoal use (from before the project technology was introduced), then the emissions in the baseline scenario would be considered non-conservative, as charcoal has higher CO_{2e} emissions than wood per TJ of useful energy delivered. If more than two fuels are used, the same process must be applied for all.	The project must exclude the baseline energy consumption from supplemental fuels in the estimation of baseline emissions or proportionately reduce the energy consumption of the primary fuel by the percent difference in primary fuel use between the baseline scenario and project-estimated baseline from the first project usage survey, whichever results in a lower baseline CO_2e emissions estimate.

[35] Sample size requirements for baseline scenario parameters are provided in Appendix 10 of the methodology.

8.2.4 Suppressed Demand consideration in the Baseline Scenario

57. The methodology allows for a baseline scenario to take into account suppressed demand[36]. Suppressed demand conditions are applicable where neither the existing conditions, nor those in the BAU scenario can realistically provide the level of service for meeting the basic human needs of a population and such conditions are likely to persists throughout the crediting period due to barriers such as low income, lack of capital, or inadequate infrastructure.

58. For project activity/ programme of activities applying supressed demand the project owner shall demonstrate using objective evidence[37] that the intended project activity beneficiaries are in suppressed demand conditions with respect to the identified basic human need(s) in comparison to their peers at the start of each crediting period. Moreover, these conditions are likely to persist every year throughout the crediting period. For this purpose, guidance stipulated in the latest approved version of the Article 6.4 Mechanism Standard “Addressing Suppressed Demand in Mechanism Methodologies” shall be used.

59. When the suppressed demand baseline is applied, the level of thermal energy consumption in the baseline scenario will not correspond to the pre-project situation but to a satisfied demand level, which will be equal to or lower than the project level of satisfied demand.

60. For suppressed demand in residential energy consumption, the specific BHN values shall be derived, and appropriately justified, consistent with the following threshold values: For total fuel consumption for cooking and heating up to 2.1 Gigajoules (50 kg oil equivalent of modern fuel) per person per year (thresholds for the level of service for meeting basic human needs are defined in the Article 6.4 Mechanism Standard “Addressing Suppressed Demand in Mechanism Methodologies”).

61. For establishing the level of service for meeting a specific BHN, the following data sources may be used:

(a) National or international peer-reviewed research (indexed journal);

(b) Relevant studies and reports from multilateral organizations[38];

(c) Official Government data

(d) Project relevant reports by qualified entities

(e) Established benchmarks related to international and/or national development goals[39].

62. Further for establishing the level of service for meeting a specific BHN, the following conditions may be taken into account:

(a) Climatic zones;

(b) Policy and regulations;

[36] When a group of people are deprived of a reasonable level of human development in comparison to their peers, the group of people is considered to experience suppressed demand i.e. it is assumed their use of energy would be high enough to achieve a satisfactory level of service- if only they had sufficient resources. Project activities with cumulative emission reductions above 60K or technology measures implemented in commercial and/or institutional premises, is not allowed to claim suppressed demand baseline

[37] In the form of project-specific field studies, project-relevant reports by qualified entities, official government data, or credible published literature for the project area.

[38] For example, The World Health Organization recommendations on per capita safe drinking water volumes.

[39] For example, the DLS framework, IPCC AR6 Chapter 5 Demand, Services and Social Aspects of Mitigation, pages 505, 506, 513- 522: https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter05.pdf

(c) Scale and proportionality to the metric for the total level of service for meeting BHN for the relevant context , as defined under A6.4 Standard: Addressing suppressed demand in mechanism methodologies

63. If the project activity applying non-CTEC approach and selecting conservative global default (outlined under section 10.1.4.1 below) for establishing the baseline emission can demonstrates that the identified beneficiaries are in supressed demand conditions the project owner can select supressed demand baseline emission value as articulated under Article 6.4 Mechanism Standard "Addressing Suppressed Demand in Mechanism Methodologies".in place of global default for estimation of baseline emission.

64. Project activity applying suppressed demand baseline are not required to apply downward adjustment, however will require to establish the supressed demand conditions using monitoring protocol defined in the Article 6.4 Mechanism Standard "Addressing Suppressed Demand in Mechanism Methodologies".

9. Additionality

65. Additionality of the project activity/ programme of activities is to be demonstrated using the following steps in accordance with the A6.4- Standard: Demonstration of additionality in mechanism methodologies.

9.1 STEP 1. Demonstration of prior consideration

66. Project owner to demonstrate prior consideration of the benefits of the mechanism for the project activities or for the component project (CP) based on the requirements of GCC 2.0 Program Process and GCC 2.0 Project Standard.

9.2 STEP 2. Regulatory Analysis

67. Project owner must demonstrate that the emission reductions resulting from the project activity would not occur as a result of any legal instruments (including laws, statutes, regulations, court orders, decrees, consent agreements, executive orders, permitting conditions or any other legally binding mandates) i.e. the project activity are neither directly mandated by existing legal instruments or indirectly mandated by requiring a certain technological, performance, or management action, or by preventing alternative scenarios.

68. Where an applicable legal instrument restricts or prohibits a cooking fuel or technology (e.g., informal charcoal), the project owner shall provide credible evidence that households are not switching away from the restricted fuel or technology because of the legal restrictions and that the project activity is the only reason that fuel consumption is changing.

69. Project owners shall conduct the regulatory analysis at the time of submission of the project for Global Stakeholders Consultation (GSC) and update it at each crediting period renewal, or more frequently if required by the host country or GCC.

70. The analysis should be based on credible and current evidence and clearly justified. Acceptable supporting evidence includes official regulatory texts and government websites, expert legal opinion (if appropriate), peer-reviewed or grey literature, and documentation from interviews with relevant regulatory agencies or implementation bodies.

71. The analysis must apply the assumption that all legal requirements are enforced, unless there is documented, credible evidence that non-enforcement is widespread.

72. If a relevant legal mandate comes into effect during the crediting period, the project may only continue claiming credits up to the date that mandate becomes legally effective.

9.3 STEP 3. Avoidance of locking-in the level of emissions

73. Where the technologies applicable under the project activity have a technical or operational lifetime of no more than 10 years based on manufacturer reporting, no lock-in risks are assumed.

74. Renewable energy technology (e.g solar cooker, biogas, etc.) are exempted from lock-in-risk assessment, irrespective of the lifespan.

75. Decentralised technology options with technical or operational lifetime of more than 10 years and those assessed after 31 December 2030 needs to undergo lock in risk assessment outlined below.

76. If the technology deployed under the project activity/ programme of activities, have a technical or operational lifetime of more than 10 years (e.g LPG stove), a project owner

needs to conduct a lock in risk assessment in accordance to the A6.4-STAN-METH-003 Standard: Demonstration of additionality in mechanism methodologies (latest version). The project owner shall demonstrate:

(a) Project activity is consistent with the host country's long-term low-emission development strategy (LT-LEDS), as referred to in Article 4.19 of the Paris Agreement (where the host country has submitted one);

(b) For project activity involving technologies with a long lifetime, project owner to demonstrate that technology is among those within the lowest greenhouse gas intensity in the relevant region taking into account the lifetime of the technology in line with national circumstances, approaches and pathways; and

(c) Project activity does not involve a technology that constitutes an inefficient use of a resource that is important for mitigating climate change or achieving other policy objectives and restrict the transition to low emission alternatives.

77. Project activity must follow any relevant requirements/clarification issued by GCC for avoiding long-term lock-in of fossil fuels for cooking.

9.4 STEP 4. Approaches to demonstrate additionality

78. The investment analysis is proposed as the most preferred option for demonstrating the additionality. However, for interventions under the project activity/programme of activities involving adoption of improved cookstoves/ cooking devices at individual household's barrier analysis may be applied for demonstrating additionality instead of investment analysis[40]. Project owner may proceed to Step 4.1 (investment analysis) or Step 4.2 (barrier analysis) post regulatory analysis for demonstration of additionality.

79. Where investment analysis or barrier analysis are used, this shall be complemented by a common practice analysis.

9.4.1 Sub-step 4.1. Investment Analysis

80. The methodology applied to programme of activities, with mitigation actions encompassing implementation of improved cookstoves in residential household, an investment analysis (i.e., simple cost analysis, benchmark analysis, or investment comparison analysis) is not required . For mitigation activities (MA) implemented at the household level, a barrier analysis (paragraph 54 of the A6.4 Standard: Demonstration of Additionality in Mechanism Methodologies - Version 01), may be applied as an alternative to investment analysis.

81. While the methodology excludes a formal investment analysis for mitigation actions involving implementation of improved cookstoves in residential household , it still follows the UNFCCC requirements outlined under the additionality standard (A6.4-STAN-METH-003). The methodology requires project owner(s) to include financial viability information, specifically:

(a) The increase in financial viability through carbon credit revenues (e.g., being able to reduce cookstove costs, being able to conduct awareness campaigns to convince the population to adopt the cookstove, secure financing, etc.); and

(b) The financial viability with and without carbon credit revenues, to show that the activity depends on carbon finance to happen.

82. The methodology applied to programme of activities, with mitigation actions encompassing implementation of improved cookstoves in institutional and/ or commercial

[40] Investment analysis is however recommended for distribution of improved cookstoves/ cooking device across institutional and commercial establishment.

establishment an investment analysis (i.e., simple cost analysis, benchmark analysis, or investment comparison analysis) is required for demonstration of additionality.

83. The following types of investment analyses may be used:

(a) Simple cost analysis: Demonstration that the implementation of Programme of Activity is associated with costs and does not generate any cost savings or revenues other than from the programme of activities;
(b) Benchmark analysis: Comparison of the financial attractiveness of the Programme of Activity with a financial benchmark; or
(c) Investment comparison analysis: Comparison of the financial attractiveness of the Programme of Activity with alternative options

84. Project Owner to refer to "Standard: Demonstration of Additionality in mechanism methodologies" and associated tools for conducting the investment analysis.

9.4.2 Sub-step 4.2. Barrier Analysis

85. Under the methodology, the project owner shall identify and describe relevant barriers faced by the project activity/ mitigation actions under the *programme of activity*, and provide supporting evidence such as independent studies, publicly available surveys, or interviews with relevant stakeholders.

86. The following barriers may be considered:

(a) The activity is first-of-its kind (e.g. no other similar activities have been implemented in the relevant geographical area).

(b) Information/ Knowledge barriers, such as a lack of awareness of the health risks associated with using traditional cookstoves and fuels for cooking;

(c) Financial barriers, specifically, the inability of households to afford transitioning to clean cooking solutions without the use of carbon revenue to reduce the upfront cost of cookstove acquisition and/or ongoing fuel costs, lack of access to loans by rural households etc.

(d) Infrastructural barriers, namely gaps in the supply of efficient technologies, access to operation and maintenance support and repairs, and fuel supply chains that may depend on carbon projects to arrange and facilitate access; and

(e) Institutional barriers, such as the inability of project owner(s) to service last-mile customers without additional funding.

87. The barrier analysis shall include the following components:

(a) Identify and describe relevant barriers faced by the proposed project activity/ programme of activities;

(b) Demonstrate that the barriers prevent project activity/ programme of activities from being implemented without carbon finance revenues;

(c) Demonstrate that there are no other programs or incentives, such as subsidies, that would incentivize this project activity/ programme of activities;

(d) Demonstrate that the incentives from carbon finance, such as free or reduced-price cooking technologies and/or fuels, are the determining element in overcoming the identified barriers;

88. The barrier analysis shall take into account

(a) All relevant national and sub-national policies, including legislation;

(b) Current practices within the sector and geographic area;

(c) Indigenous Traditional Knowledge and customary laws, where applicable, and

(d) Relevant national circumstances, approaches, and pathways

89. The barrier analysis shall be supported by credible evidence. Such evidence may include independent studies, publicly available surveys, relevant verifiable market data, household survey data, or data from national or international statistics, but shall not include anecdotal evidence. The evidence shall be interpreted in a conservative manner (i.e., that it is unlikely that the effect of the barrier is overestimated).

9.5 Step 5. Common practice analysis

90. Project owner shall conduct a common practice analysis using the Market Penetration Method (corresponding to Approach B[41] of Article 6.4 Common Practice Analysis Tool Version 1.0), using the following steps.

91. Define the applicable geographical area for the common practice analysis- The applicable geographical area shall by default be the host country of the project activity, with results disaggregated by urban and rural beneficiary (residential /institutional / commercial). For projects implemented in urban settings, only the national-level urban market penetration rate shall be used; for projects implemented in rural settings, only the national-level rural market penetration rate shall be used. Where credible, recent and representative data are available at a more detailed sub-national level, the analysis may be conducted using that sub-regional geographical area. Project owner may also disaggregate results by wealth quintiles or other nationally recognized income/wealth indices (such as those available in DHS surveys[42]), where such data are available and credible, in order to better reflect affordability barriers to adoption for the target population.

92. Calculate the indicator of common practice. The indicator is count-based and calculated as the number of households/ commercial establishment/ institutions in the target population with a functional technology that is equivalent to the project technology within the applicable geographical area (as defined above), not including those provided through carbon finance. An equivalent technology is one that meets all of the following criteria:

(a) Accomplishes the same cooking tasks as the project technology;

(b) Has a thermal efficiency within ±10% of the project technology's thermal efficiency[43]; and

(c) Uses the same fuel(s).

93. Assess the market penetration rate[44] by dividing the count-based indicator by the total number of households / institutions/ commercial establishment in the target market. If the market penetration rate is below a threshold (F(max)) of 30%, the technology shall be considered not common practice and shall pass this step of the additionality assessment. If the market penetration rate is 30% or greater, the technology shall be considered common practice. The quantification of the market penetration rate should exclude technologies distributed through support of carbon finance.

The threshold of 30% reflects a reasonable bound for when a self-sustaining market for clean cooking technologies is likely to exist in low- and middle-income countries. While a rule of thumb often identifies a 20% penetration rate as a tipping point for a self-sustaining

[41] This approach involves determining the size of the target market and quantifying the market penetration of the proposed technology, measure, or practice. The analysis assesses whether the uptake within the relevant market exceeds the threshold for being considered common practice.

[42] Demographic and Health Surveys (DHS)

[43] Based on manufacturer specification of the cookstove efficiency or third-party test report

[44] Baseline scenarios surveys should assess the percent of households in the target population with a functional technology that is equivalent to the project technology as a common practice additionality check; if greater than 30%, the project is not additional. An equivalent technology is one that meets all three of the following criteria: 1) accomplishes the same cooking tasks; 2) has similar thermal efficiency; and 3) uses the same fuel(s)

market. The threshold is set higher for clean cooking due to weak distribution and knowledge networks connecting urban and rural areas and the relatively small middle-class consumer segment with disposable income in low- and middle-income countries. Nonetheless, the option to provide further additionality justification is offered for specific circumstances where the universal 30% threshold is not applicable, as the need for clean cooking in almost all least developed nations and many developing countries is so pervasive.

94. Data requirements - All calculated variables shall:

(a) Exclude technologies installed as a result of voluntary carbon finance activities;

(b) Be based on recent (no more than three years old) and credible data sources; and

(c) Include documentation of data sources, reference years, and all calculations.

95. Acceptable data sources may include national household energy surveys, census data, or other representative market studies. Where no such sources are available, baseline surveys (Option 1/ Option 2) may be used as a last resort, provided that they follow statistically robust sampling and are documented transparently. Where the available dataset reports only fuel type and not cookstove technology, and the fuel type alone does not clearly indicate whether the cookstove meets the equivalence definition (e.g. fuels such as charcoal or wood, which may be used in a variety of cookstove types), the project owner shall use credible supplementary data sources to determine the proportion of users of that fuel who own and regularly use a functional equivalent technology. Where no such supplementary data are available, the proportion may be obtained from the baseline survey (Option 1/ Option 2). For fuels that correspond to a specific technology (e.g., LPG, electricity, ethanol), the reported fuel shall be assumed to correspond directly to one functional cookstove.

96. Where functional status or thermal efficiency data are not directly available, project owner shall apply conservative assumptions to classify equivalent technologies, with justification provided. Where only the primary cooking fuel or device is reported, this shall be interpreted as representing the main technology in regular use. Secondary cookstove ownership shall only be included where credible evidence demonstrates that the cookstove is functional and regularly used. Where data less than three years old are not available, the most recent credible dataset may be used, provided that a conservative adjustment is applied to reflect likely changes in penetration since the data were collected.

10. Quantification of GHG emission reduction

10.1 Baseline emissions

10.1.1 Calculation of baseline emissions or removals

97. This methodology determines both baseline and project emissions by calculating GHG emissions from electricity, renewable, and non-renewable fuels.

98. Electricity can include both grid and off-grid sources. Emissions from grid electricity are country-specific and calculated based on either of the following options (a) 6.4-MEP010-A01 -Draft Methodological tool -Emissions from electricity generation and/or consumption[45] (final version as applicable) (b) grid emission factors from the International Financial Institutions Technical Working Group on GHG Accounting (provided in Appendix 2: Grid Emission Factors) (c) grid emission factors provided by the relevant national authority.

99. Emissions from off-grid electricity sources are technology-specific (provided in Appendix 3: Off-Grid Emission Factors for Select Technologies). The off-grid component includes both individual household/ institutional/ commercial systems and mini-grids using either single or multiple sources of power.

100. Renewable fuels include the renewable fraction of fuelwood and charcoal, waste biomass like crop residues and dung, processed biomass like briquettes and pellets from fully renewable sources, bioethanol, biogas, and solar.

101. Non-renewable fuels refer to the non-renewable fraction of fuelwood and charcoal, as well as fossil fuels such as LPG, coal, and kerosene.

102. To account for renewable and non-renewable woody biomass, the methodology utilizes fNRB.

103. Methodology parameters are calculated differently for CTEC and non-CTEC projects, and therefore are presented separately in this methodology.

104. Emissions are calculated on an energy basis, for which the conversions from mass to energy are conducted as follows:

$$ECx = FCx \times NCVx \quad (1)$$

Where:

Parameter	Description	Unit
ECx	Energy consumption for the respective fuel and scenario x	TJ
FCx	Fuel consumption for the respective fuel and scenario x	tonnes
$NCVx$	Net calorific value for fuel *x* (see Appendix 5)	TJ/tonnes

10.1.2 Baseline Energy Consumption Default, Caps, and Flags:

Global Default

105. Non-CTEC projects may determine energy consumption in the baseline scenario by using a global default for fuelwood or charcoal consumption. This default can only be applied for projects where the baseline is predominantly wood or charcoal (more than 75% of cooking events with wood or charcoal, respectively, as determined via baseline scenario surveys).

[45] Till A6.4 tool for estimation of grid emission is not available, latest version of Tool 7 may be used

The Global default is as follows:

(a) The Global Default for baseline fuelwood consumption is 0.0012 TJ useful energy delivered/(person*year)[46] which is assumed to be equivalent to 0.5 tonnes/ (person*year) of air-dried wood, or 0.0078 TJ/(person*year);

(b) The Global Default for baseline charcoal consumption is 0.00074 TJ useful energy delivered/(person*year)[47] which is assumed to be equivalent to 0.1 tonnes/ person*year) of charcoal or 0.00295 TJ/(person*year);

(c) When fuels other than wood or charcoal are in the respective baselines, their energy use must be accounted for in the 0.0012 and 0.00074 TJ useful energy delivered/(person*year), respectively[48]. These values reflect the minimum level of energy service required for cooking.

(d) As an alternative of using a static baseline (global default baseline energy consumption value), representing the minimum level of energy service required for cooking, project owners may use the suppressed demand approach outlined in "Addressing Suppressed Demand in Mechanism Methodologies".

Baseline Caps and Flags

106. Baseline energy consumption values (estimated with the KPT or back calculated) for primary fuelwood users (75% of cooking events is carried out using fuelwood) are capped at 0.0047 TJ useful energy delivered/(person*year) equivalent to 2.0 tonnes/ (person *year)), or 0.031 TJ/ (person *year)) of air-dried wood or a combination of wood and any other additional baseline fuels. Values above 0.0023 TJ useful energy delivered/ (person*year) equivalent to 1.0 tonnes/(person* year)) or 0.0156 TJ/ (person * year)) of air-dried wood and additional baseline fuels are flagged for additional justification.

107. For baselines with charcoal as the primary fuel use, the cap is set at 0.00295 TJ useful energy delivered/(person*year) equivalent to 0.40 tonnes/(person*year)), or 0.012 TJ/(person*year) of charcoal and any additional baseline fuels. Values above 0.0015 TJ useful energy delivered/(person*year) equivalent to 0.20 tonnes/(person*year)), or 0.0059 TJ/(person*year) are flagged for further justification.

108. For mixed baseline scenarios (no primary fuel is used for more than 75% of cooking events) or those with other primary baseline fuels, the flags and caps are the same as those for primary charcoal baselines[49].

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[46] 0.5 tonnes of air-dried fuel wood with 0.0156 TJ/tonnes NCV, and thermal efficiency of 15%.

[47] 0.1 tonnes of charcoal with 0.0295 TJ/tonnes NCV, and thermal efficiency of 25%.

[48] The energy for each fuel is estimated by applying the thermal efficiencies in Appendix 5 (e.g., 15% thermal efficiency for unimproved baseline wood cookstoves, 25% thermal efficiency for unimproved charcoal cookstoves, and 50% for gas and liquid fueled cookstoves) to the useful energy delivered and relative amount of cooking on each fuel type. For example, if surveys indicate in the baseline that 80% of cooking events are done on wood cookstoves and 20% on LPG cookstoves, then the baseline energy consumption would be as follows: Wood consumption: (0.80*0.0012 TJ useful energy delivered/(person*year)) / 15% thermal efficiency = 0.0064 TJ useful energy delivered/(person*year of wood energy; LPG 0.20*0.0012 TJ useful energy delivered/(person*year) / 50% = 0.00048 TJ useful energy delivered/(person*year) of LPG energy

[49] If baseline energy consumption is measured at 0.050 TJ/(person*year) of wood and 0.0335 TJ/(person*year) of charcoal, the useful energy delivered would be calculated using efficiency factors of 15% for wood and 25% for charcoal. This results in 0.0075 TJ/(person*year) of useful energy from wood and 0.008375 TJ/(person*year) from charcoal, for a total of 0.015875 TJ/(person*year) of useful energy delivered. Since this results in a mixed baseline of 47.3% energy delivered from wood and 52.7% delivered from charcoal, the mixed baseline cap of 0.00295 TJ useful energy delivered/(person*year) must be applied, and the useful energy must be reduced proportionally to stay within the allowable limit. The adjustment factor needed is 0.00295 / 0.015875 = 0.186. Applying this factor, the useful wood energy becomes 0.001395 TJ/(person*year), and the useful charcoal energy becomes 0.00156 TJ/(person*year).

109. An overview of the baseline caps and flags is presented in the table below.

User group	Cap	Flag	Unit
Primary fuelwood users	0.0047	> 0.0023	TJ useful energy delivered/(person*year)
	0.031	0.0156	TJ/(person*year)
	2	>1.0	tonnes/(person*year)
Primary charcoal users	0.00295	> 0.0015	TJ useful energy delivered/(person*year)
	0.012	0.0059	TJ/(person*year)
	0.4	>0.2	tonnes/(person*year)
Mixed/other primary baseline	0.00295	> 0.0015	TJ useful energy delivered/(person*year)
	0.012	0.0059	TJ/(person*year)
	0.4	>0.2	tonnes/(person*year)

110. When the flagged threshold is surpassed, projects must provide justification in the Project Submission Form for why a higher baseline is realistic in that project area. For example, such justifications could include the case of households using plancha cookstoves or areas where wood is relatively abundant.

10.1.3 CTEC Projects

111. Energy consumption for CTEC projects (total energy use for all project technology cookstoves in all project households, institutional, and commercial facilities[50]) is determined by continuously measuring fuel or energy consumption directly through the use of built-in or external data loggers, or by tracking all fuel purchases. Two options are provided for determining baseline emissions for CTEC projects.

(a) Under the first option (refer to section 10.1.3.1), baseline energy consumption is back calculated from project cookstove energy consumption using specific energy consumption ratios of the baseline and project cookstoves, determined via CCTs performed on each cookstove model.

(b) Under the second option KPT (refer to section 10.1.3.2) is used to estimate the emission reductions produced per TJ of the continuously tracked project technology energy consumption and then scaled by the total tracked project energy consumption for the given monitoring period to determine the total emission reductions.

10.1.3.1 Baseline Emission Back Calculation Using Specific Fuel Consumption Ratios

112. Baseline emission for CTEC projects using the back-calculation option is calculated using Equation (2)[51]

$$BEy = \sum_i (ECd - base,i,y \times (fNRBi \times EFbase,i,CO2 + EFbase,i,nonCO2)) + \sum_i UEbase,i,y \quad (2)$$

Where:

Parameter	Description	Unit
BEy	Baseline emissions during year y	tCO_2e

Converting these adjusted useful energy values back into total fuel consumption, the wood component would be 0.0093 TJ/(person*year), and the charcoal would be 0.00624 TJ/(person*year).

[50] Institutional and commercial facilities can only use monitored energy consumption data based on built-in or external data loggers

[51] In this methodology, the subscript i is used to represent either a fuel alone or a fuel–cookstove combination, depending on the parameter being referenced. For parameters that are fuel-specific (e.g., fNRB), i refers to the fuel only (e.g., fuelwood, charcoal, LPG). For parameters that are specific to the combination of fuel and cookstove technology (e.g., thermal efficiency, emissions factors), i refers to the unique fuel–cookstove combination (e.g., fuelwood with three-stone fire, fuelwood with a high efficiency wood cookstove).

$EC_{d-base,i,y}$	Displaced energy consumption of fuel *i* in baseline scenario in year *y*. Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel[52]. This parameter is determined following Equation (3).	TJ
$fNRBi$	Fraction of non-renewable woody biomass fuel *i* consumed. This parameter varies between zero and 100% for fuelwood, charcoal, and other solid biomass fuels that are not fully renewable. When renewable biomass fuels are used (defined above), this parameter is equal to zero. When fossil fuels are used, it is equal to 100%.	%
$EF_{base,\ i,\ CO_2}$	CO_2 emission factor for baseline fuel i	tCO_2e/TJ
$EF_{base,\ i,\ nonCO_2}$	Non-CO_2 emission factor for baseline fuel *i*	tCO_2e/TJ
$UE_{base,i,y}$	Upstream emissions for baseline fuel *i* in year *y*, determined following section "*Upstream Emissions for the Baseline Scenario"*	tCO_2e

113. The above approach calculates baseline energy consumption for each technology that is displaced by determining the amount of equivalent energy required for the baseline technology(ies) to provide the same level of service as the project technology according to its continuously tracked energy consumption. This estimation is done using specific fuel consumption ratios, derived from CCTs performed on each of the baseline and project technology types.

114. When multiple fuel-stove combinations are used in the baseline by the end user in the same premises, the proportional use shall be established from surveys or SUMs (See Appendix 9 for SUMs guidance). For example, if baseline cookstove use is estimated as 50% of cooking events performed on a three-stone fire, 10% on a charcoal cookstove, and 40% on an LPG cookstove, then the baseline energy consumption that the project technologies displace shall be apportioned proportionately[53] in accordance with Equation (3):

$$ECd - base,i,y = tECproj,j,y \times tPCb,i \times (\frac{SCb,i}{SCp,j}) \quad (3)$$

Where:

Parameter	Description	Unit
$EC_{d-base,i,y}$	Displaced energy consumption of fuel *i* in baseline scenario in year *y*	TJ
$tEC_{proj,j,y}$	Total tracked energy consumption of project fuel *j* for CTEC projects in year *y*	TJ
$tPC_{b,i}$	Proportion of cooking events conducted using baseline fuel-stove combination *i*	%
$SC_{b,i}$	Specific energy consumption of a baseline fuel-stove combination *i* to cook a given amount of food	MJ/kg food

[52] For example: If a pellet fuel consists of 60% wood and 40% sugarcane bagasse (on a TJ basis), and the energy consumption for these pellets is 0.05 TJ/(person*year), then there would be two constituent fuels to sum over; ECd-base,pellet-wood = 0.03 TJ/(person*year), and ECd-base,pellet-bagasse = 0.02 TJ/(person-year), each with its own respective fNRB, EF, and UE.

[53] When multiple fuel/ cooking devices are use in the baseline for single end user the proportional use shall be shall be established based on delivered useful energy by different baseline device/fuels combination by factoring into efficiencies of the identified baseline devices/ fuel combination or following an approach which leads to conservative baseline emissions estimation.

$SC_{p,j}$	Specific energy consumption of a project fuel-stove combination *j* to cook a given amount of food[54]	MJ/kg food

115. Baseline fuel consumption caps and flags described above apply.

116. Tracked energy consumption for project fuel is estimated using Equation (4):

$$tEC_{proj,j,y} = \sum_h tEC_{proj,j,h,y} \tag{4}$$

Where:

Parameter	Description	Unit
$tEC_{proj,j,y}$	Total tracked energy consumption of project fuel *j* for CTEC projects across all commissioned devices that are in operation in the year *y*	TJ
$tEC_{proj,j,h,y}$	Tracked energy consumption of project fuel *j* in project Household /institutional/ commercial facility *h* in year *y*	TJ
h	Project households	Number

117. For **project energy sources other than electricity**, Equation (1) shall be used to convert fuel masses to fuel energy.

118. **Downward Adjustment in the calendar year of the start date of the crediting period for CTEC projects back-calculating the baseline** - For CTEC projects deriving baseline energy consumption from back-calculating the displaced baseline energy consumption based on relative specific consumptions between baseline and project technologies, an initial downward adjustment is applied to ensure that baseline emissions remain below a conservatively determined BAU level and that credited emission reductions are not overstated. The specific consumptions for each baseline fuel-stove combination ($SC_{b,i}$) shall be determined using the lower bounds of the 95 percent confidence intervals when estimating $EC_{d\text{-}base,i,y}$. using Equation (3).

119. The unadjusted baseline emissions during the calendar year of the start date of the first crediting period ($BE_{unadj,y1}$), are calculated using Equations (2), (3) and (13), based on the mean values obtained for the specific energy consumption of each baseline fuel-stove combination $SC_{b,i}$.

120. The downward adjusted baseline emissions during the calendar year of the start date of the first crediting period, $BE_{adj,y1}$ are calculated using Equations (2), (3) and (13), based on the lower bounds of the one-sided[55] 95 percent confidence intervals of the specific energy consumption for each baseline fuel-stove combination $SC_{b,i}$.

121. The downward adjusted baseline emissions must be less than or equal to the minimum downward adjustment, as specified in the Article 6.4 Standard: Setting the baseline in mechanism methodologies. The minimum downward adjusted baseline emissions for the first calendar year of the crediting period shall be calculated using Equation (5):

$$BE_{adj,min,y1} = BE_{unadj,y1} - \left(BE_{unadj,y1} - PE_{y1}\right) * 0.05 \tag{5}$$

Where:

Parameter	Description	Unit
$BE_{adj,min,y1}$	Minimum downward adjusted baseline emissions during year y_1	tCO_2e

[54] Factor of 0.0036 to used for conversion of MWh to TJ

[55] One-sided 95% confidence intervals place all uncertainty in one direction to give a bound the true mean exceeds with 95% confidence, supporting conservative downward adjustments in baseline estimates.

$BE_{unadj,y1}$	Unadjusted baseline emissions during year y_1	tCO_2e
PE_{y1}	Project emissions during year y_1	tCO_2e
y_1	Calendar year of the start date of the first crediting period	

122. The final downward adjusted baseline emissions for the calendar year of the start date of the first crediting period is then calculated using Equation (6):

$$BE_{final,y1} = \min(BE_{adj,min,y1}, BE_{adj,y1}) \quad (6)$$

Where:

Parameter	Description	Unit
$BE_{final,y1}$	Final downward adjusted baseline emissions during year y_1	tCO_2e
$BE_{adj,min,y1}$	Minimum downward adjusted baseline emissions during year y_1	tCO_2e
$BE_{adj,y1}$	Downward adjusted baseline emissions during year y_1	tCO_2e
y_1	Calendar year of the start date of the first crediting period	

123. **Downward adjustment in subsequent years:** For each calendar year after the first crediting year, a downward adjustment to the baseline emissions shall be calculated by applying an annual reduction of 1% relative to the final adjusted baseline of year 1 using Equation (7):

$$BE_{final,y2+} = BE_{final,y1} * (1 - 0.01) * (y_{2+} - y_1) \quad (7)$$

Where:

Parameter	Description	Unit
$BE_{final,y2+}$	Final downward adjusted baseline emissions during year y_{2+}	tCO_2e
$BE_{final,y1}$	Final downward adjusted baseline emissions during year y_1	tCO_2e
y_{2+}	Calendar year after the first crediting year	
y_1	Calendar year of the start date of the first crediting period	

124. The 1% annual rate is intended to ensure that baselines remain ambitious over time, while acknowledging the economic realities of clean cooking projects, which often face significant affordability barriers.

10.1.3.2 Baseline back calculation using tracked energy consumption and KPTs

125. This option estimates emission in baseline scenario using metered data for CTEC projects and KPTs. For the option the average baseline emission is estimated using KPT. Baseline emissions are calculated using Equation (8).

$$BEy = EQbase \times tECproj,j,y + \sum_i UEbase,i,y \quad (8)$$

Where:

Parameter	Description	Unit
BE_y	Baseline emissions during year y	tCO_2e
$EQbase$	Emissions quotient for the consumption of energy for cooking in baseline scenario	tCO_2e/TJ or tCO_2e/kWh
$tECproj,j,y$	Total tracked energy consumption of project fuel *j* for CTEC projects across all commissioned device that are in operation in year *y* (see Equation (4) above)	TJ or kWh

$UE_{base,i,y}$	Upstream emissions for baseline fuel *i* in year *y*, determined following section *"Upstream Emissions for the Baseline Scenario"*	tCO_2e

126. This approach involves determining a baseline emission quotient per unit project fuel by using the energy consumption through its measurement by an ex-ante KPT of the baseline scenario and an ex-post KPT of the project scenario using Equation 9.

$$EQbase = \frac{\sum_i [ECbase,KPT,i \times (fNRBi \times EFbase,i,CO2 + EFbase,i,nonCO2)]}{tECproj,KPT,j-project} \quad (9)$$

Where:

Parameter	Description	Unit
EQ_{base}	Emissions quotient for the consumption of energy for cooking in baseline scenario	tCO_2e/TJ or tCO_2e/kWh
$EC_{base,KPT,i}$	Energy consumption of baseline fuel *i* for CTEC projects based on baseline KPT. Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel. (See example following Equation (2))	TJ/(person*year)
$fNRB_i$	Fraction of non-renewable woody biomass fuel *i* consumed. This parameter varies between zero and 100% for fuelwood, charcoal, and other solid biomass fuels that are not fully renewable. When renewable biomass fuels are used (defined above), this parameter is equal to zero. When fossil fuels are used, it is equal to 100%.	%
$EF_{base,i,CO2}$	CO2 emission factor for baseline fuel i	tCO_2e/TJ
$EF_{base,i,nonCO2}$	Non-CO_2 emission factor for baseline fuel *i*	tCO_2e/TJ
$tEC_{proj,KPT,j-project}$	Tracked energy consumption of the project fuel *j* for project cookstove(s) only from project KPT	TJ/(person*year) or kWh/(person* year)

127. For baseline energy sources $EC_{base,\,KPT,i}$ other than electricity, use Equation (1) to convert fuel masses to fuel energy.

128. If project cookstove energy use is in the form of electricity, then the equation will result in a quotient in terms of tCO_2e/kWh.

129. Baseline fuel consumption caps and flags described above apply.

130. **Downward Adjustment in the calendar year of the start date of the crediting period for CTEC projects using KPT** - For CTEC projects deriving baseline energy consumption from KPT, an initial downward adjustment is applied to ensure that baseline emissions remain below a conservatively determined BAU level and that credited emission reductions are not overstated. To account for sampling uncertainty, the baseline energy consumption $EC_{base,KPT,y}$ shall be determined using the lower bounds of the 95 percent confidence intervals for each respective fuel (i) in the baseline.

131. The unadjusted baseline emissions during the calendar year of the start date of the first crediting period ($BE_{unadj,y1}$), are calculated using Equations (8), (9) and (13), based on the mean values of baseline energy consumption $EC_{base,KPT,y}$.

132. The downward adjusted baseline emissions during the calendar year of the start date of the first crediting period, $BE_{adj,y1}$ are calculated using Equations (8), (9) and (13), based on the lower bounds of the one-sided 95 percent confidence intervals of baseline energy consumption $EC_{base,KPT,y}$.

133. The downward adjusted baseline emissions must be less than or equal to the minimum downward adjustment, as specified in the Article 6.4 Standard: Setting the baseline in mechanism methodologies. The minimum downward adjusted baseline emissions for the first calendar year of the crediting period shall be calculated using Equation (5). The final downward adjusted baseline emissions for the calendar year of the start date of the first crediting period is then calculated using Equation (6).

134. **Downward adjustment in subsequent years:** For each calendar year after the first crediting year, a downward adjustment to the baseline emissions shall be calculated by applying an annual reduction of 1% relative to the final adjusted baseline of year 1 using Equation (7).

10.1.4 Non-CTEC Projects

10.1.4.1 Baseline emissions for non-CTEC projects

135. Baseline emissions for non-CTEC projects are calculated using Equation (10)

$$BEy = \sum_i (ECbase,i,y \times (fNRBi \times EFbase,i,CO2 + EFbase,i,nonCO2)) + \sum_i UEbase,i,y \quad (10)$$

Where:

Parameter	Description	Unit
BE_y	Baseline Emission during the year y	tCO_2e
$EC_{base,i,y}$	Consumption of fuel *i* in baseline scenario in year *y*. Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel. (See example following Equation (2))	TJ
$fNRBi$	Fraction of non-renewable woody biomass fuel *i* consumed. This parameter varies between zero and 100% for fuelwood, charcoal, and other solid biomass fuels that are not fully renewable. When renewable biomass fuels are used (defined above), this parameter is equal to zero. When fossil fuels are used, it is equal to 100%.	%
$EF_{base,i,CO2}$	CO_2 emission factor for baseline fuel i	tCO_2e/TJ
$EF_{base,i,nonCO2}$	Non-CO_2 emission factor for baseline fuel *i*	tCO_2e/TJ
$UE_{base,i,y}$	Upstream emissions for baseline fuel *i* in year *y*, determined following section "*Upstream Emissions for the Baseline Scenario*"	tCO_2e

136. **Non-CTEC projects** may choose from two different approaches to determine energy consumption in the baseline scenario:

(a) Using a global default for fuelwood or charcoal consumption (included under section 10.1.2) suppressed demand

(b) Measuring fuel consumption using a baseline KPT

137. In case non-CTEC projects measure fuel consumption using a baseline KPT, projects may determine non-continuously tracked energy consumption by conducting an ex-ante KPT of the baseline scenario using Equations (11) and (12). The resulting baseline fuel consumption calculations are subject to the caps and flags described above apply.

$$ECbase,i,y = Hs \times ntECbase,i \times \frac{PTDh,\Psi,y}{CD} \quad (11)$$

$$PTD_{h,\Psi,y} = \Psi_{Survey,y} \times \sum_h Days_{y,h} \quad (12)$$

Where:

Parameter	Description	Unit
$EC_{base,i,y}$	Consumption of fuel *i* in baseline scenario in year *y*	TJ
Hs	Average household size (persons per household, segregated by age or gender)	Number
$ntEC_{base,i}$	Energy consumption of baseline fuel *i* for non-CTEC projects taken from global default baseline energy consumption value, or results from baseline KPT	TJ/(person*year)
$PTD_{h,\Psi,y}$	PTDs of the monitoring period during year y	Number
$\Psi_{Survey,y}$	Percent of project households with cookstoves present, where project cookstove is used at least once per week, determined via survey and visual observation in year *y* or estimated with SUMs. Capped at 90% for projects that undertake customer support actions as described below and 75% for those that do not.	%
$Days_{y,h}$	Number of total possible project-technology days during the year y in household *h*	Number
CD	Days in a calendar year *y*. Use 366 for leap years, 365 for other years.	Number

Note: For baseline energy sources other than electricity, Equation (1) shall be used to convert fuel masses to fuel energy.

138. **Customer support action for maximum PTDs**: To be eligible to claim up to 90% of maximum PTDs, project owners not estimating PTDs with SUMs must take the following customer support actions and provide details of how each condition has or will be met on the PSF during the design phase of the project.

(a) Demonstrate that the project has selected technologies and fuels that meet the cooking needs of the target population, either by citing robust research or conducting an investigation of cooking practices and attitudes during the project design phase.

(b) Provide evidence of the project owners support activities. These may include such things as providing materials (print, in-person, or video) on how to operate the cookstove to prepare common local foods, how to troubleshoot common operational issues, and how to make minor repairs (including how to access any necessary parts). All project owners' communications and materials shall be provided in the local language(s) commonly used in the project area.

(c) Project owner must be able to contact the beneficiary to access support (e.g., maintenance and repair services) through a commonly used, toll-free communications channel.

139. A beneficiary who does not undertake all three of these customer support actions may claim up to 75% of the maximum PTDs. These caps are waived where PTDs are estimated with SUM.

140. **Downward adjustment in the calendar year of the start date of the crediting period for non-CTEC projects** - For non-CTEC projects deriving baseline energy consumption from KPTs, an initial downward adjustment is applied to ensure that baseline emissions remain below a conservatively determined BAU level and that credited emission

reductions are not overstated. The baseline energy consumption $ntEC_{base,i,y}$ shall be determined using the lower bounds of the 95 percent confidence intervals for each respective fuel (i) in the baseline $ntEC_{base,i,y}$.

141. In addition, for the parameter representing the percent of project households with cookstoves present, where the project cookstove is used at least once per week, a cap of 90% (if project owner takes up customer support actions) or 75%(if project owner does not take up customer support actions) shall be applied, even if monitoring results indicate a higher usage rate, unless PTDs are estimated using SUMs. The applicable cap depends on whether the project undertakes customer support actions as described above. These measures collectively address baseline uncertainty and potential overestimation of project usage and constitute the initial downward adjustment required under Section 7 of the Article 6.4 Standard: Setting the baseline in mechanism methodologies.

142. The unadjusted baseline emissions during the calendar year of the start date of the first crediting period, $BE_{unadj,y1}$ are therefore calculated using equations (10), (11), (12) and (13), based on the mean values of the baseline energy consumption for each fuel $ntEC_{base,i,y}$ and without the application of a cap on Ψ_{y1}

143. The downward adjusted baseline emissions during the calendar year of the start date of the first crediting period, $BE_{adj,y1}$ are therefore calculated using equations (10), (11), (12) and (13), based on the lower bounds of the 95 percent confidence intervals of the baseline energy consumption $ntEC_{base,i,y}$ and with the application of the appropriate cap on Ψ_{y1}

144. The downward adjusted baseline emissions must be less than or equal to the minimum downward adjustment, as specified in the Article 6.4 Standard: Setting the baseline in mechanism methodologies. The minimum downward adjusted baseline emissions for the first calendar year of the crediting period shall be calculated using Equation (5). The final downward adjusted baseline emissions for the calendar year of the start date of the first crediting period is then calculated using Equation (6).

145. For projects using the global default for baseline energy consumption, no additional downward adjustment for baseline uncertainty is required in the calendar year of the first crediting period. For these projects, the baseline emissions (BE_{y1}) in the calendar year of the first crediting period are equal to the final downward adjusted baseline emissions during this year ($BE_{final,y1}$).

146. **Downward adjustment in subsequent years**: For each calendar year after the first crediting year, a downward adjustment to the baseline emissions shall be calculated by applying an annual reduction of 1% relative to the final adjusted baseline of year 1, using Equation (7).

147. The 1% annual rate is intended to ensure that baselines remain ambitious over time, while acknowledging the economic realities of clean cooking projects, which often face significant affordability barriers. This downward adjustment for subsequent years applies to all projects, except those using the global default for baseline energy consumption, for which an exemption has been requested.

10.1.5 Upstream Emissions for the Baseline Scenario

148. Upstream emissions for fuels in year y in the baseline scenario ($UE_{base,i,y}$) for all fuels except electricity are calculated as follows:

$$UE_{base,i,y} = EC_{base,i,y} \times EF_{i,upstream} \quad (13)$$

149. For CTEC projects using the back-calculation approach, $EC_{base,i,y}$ shall be taken as equal to $EC_{d\text{-}base,i,y}$

150. For CTEC projects using the KPT approach, $EC_{base,i,y}$ is calculated by scaling the amount of energy consumption for each fuel during the KPT per TJ of project fuel during the KPT by the total tracked project fuel consumption per year:

$$EC_{base,i,y} = \frac{EC_{base,KPT,i}}{tEC_{proj,KPT,j-project}} \times tEC_{proj,j,y} \quad (14)$$

Where:

Parameter	Description	Unit
$UE_{base,i,y}$	Upstream emissions for baseline fuel *i* in year *y*	tCO_2e
$EC_{i,y}$	Energy consumption for a fuel *i* in the baseline scenario in year *y*	TJ
$EF_{i,upstream}$	Upstream emission factor for fuel i	tCO_2/TJ
$EC_{base,KPT,i}$	Energy consumption of baseline fuel *i* for CTEC projects based on baseline KPT. Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel. (See example following Equation (2))	TJ/(person*year)
$tEC_{proj,KPT,j-project}$	Tracked energy consumption of project fuel j for project cookstove only based on project KPT	TJ/(person*year)
$tEC_{proj,j,y}$	Total tracked energy consumption of project fuel j for CTEC projects in year y	TJ

Note: Upstream emissions from electricity generation are included in the grid/off-grid emission factors, which are presented in Appendix 2 and Appendix 3. In case T&D losses for providing electricity are not included in the assessment of grid emission factors, T&D losses are accounted for separately.

10.2 Project Emissions

151. The project emissions shall be calculated with three approaches: CTEC projects using the tracked energy consumption of project technology option, CTEC projects using the tracked energy consumption of project technology option and KPT, and non-CTEC projects using the KPT.

10.2.1 CTEC Projects

10.2.1.1 Project emissions using tracked energy consumption

152. Project emissions for CTEC projects using the tracked energy consumption of project technology option are calculated using Equation (15). This approach is applicable for project activity estimating baseline emission using specific fuel consumption.

$$PE_y = \sum_j (tEC_{proj,j,y} \times (fNRB_i \times EF_{proj,j,CO2} + EF_{proj,j,nonCO2})) + \sum_j UE_{proj,j,y} + PE_{elec,y} \quad (15)$$

Where:

Parameter	Description	Unit
PE_y	Project emissions during year y	tCO_2e

$tEC_{proj,j,y}$	Total tracked energy consumption of project fuel *j* for CTEC projects in year *y.* Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel. (See example following Equation (2)) For any given beneficiary or technology, if more than half of the possible CTEC data for a monitoring period is missing, only available CTEC data may be included in emission reduction calculations. If missing CTEC data for a given beneficiary or technology consists of less than half of the possible data, then the project owner(s) may use the 25th percentile of the available tracked project energy consumption for that project participant or technology as a conservative replacement of the missing data.	TJ
$fNRB_i$	Fraction of non-renewable woody biomass fuel *i* consumed. This parameter varies between zero and 100% for fuelwood, charcoal, and other solid biomass fuels that are not fully renewable. When renewable biomass fuels are used (defined above), this parameter is equal to zero. When fossil fuels are used, it is equal to 100%.	%
$EF_{proj,j,CO2}$	CO_2 emission factor for project fuel j	tCO_2e/TJ
$EF_{proj,j,nonCO2}$	Non-CO_2 emission factor for project fuel *j*	tCO_2e/TJ
$UE_{proj,j,y}$	Upstream emissions for project fuel *j in year y*, determined following section "*Upstream Emissions for the Project Scenario"*	tCO_2e
$PE_{elec,y}$	Emissions from electric energy consumption in year y	tCO_2e

153. The continuously tracked energy consumption in the project scenario is determined by continuously tracking fuel or electricity for the project technology, or from fuel purchase.

154. Other, non-project cookstoves that may be in use in the project scenario are ignored, and the baseline fuel consumption calculation only includes that which is displaced by the project cookstove.

155. For CTEC project cookstoves:

$$tEC_{proj,j,y} = \sum_h tEC_{proj,j,h,y} \quad (16)$$

Where:

Parameter	Description	Unit
$tEC_{proj,j,y}$	Total tracked energy consumption of project fuel *j* for CTEC projects in year *y*	TJ
$tEC_{proj,j,h,y}$	Tracked energy consumption of project fuel *j* in project household *h* in year *y*	TJ
h	Project households	Number

156. For **project energy sources other than electricity**, use Equation (1) to convert fuel masses to fuel energy.

157. If the **project cookstove uses electricity**, coming from either the national grid or an off-grid system(s) using renewable or non-renewable energy sources, its project emissions and electricity consumption must be calculated using Equation (17) and Equation (18), and/or Equation (19).

$$PEelec,y \; = 10^{-6} \times [\frac{tECproj,grid,y \times EFproj,grid,y}{1-TDLy} + (tECproj,offgrid,y \times \sum_k fk,y \times EFproj,offgrid,k)] \quad (17)$$

Where:

Parameter	Description	Unit
$PE_{elec,y}$	Emissions from electric energy consumption in year y	tCO_2e
$tEC_{proj,grid,y}$	Tracked grid electricity consumption for cooking	kWh
$EF_{proj,grid,y}$	Country-specific grid emission factor. See Appendix 2: *Grid Emission Factors* in year *y*	gCO_2e/kWh
$tEC_{proj,offgrid,y}$	Tracked off-grid electricity consumption for cooking in year y	kWh
$f_{k,y}$	Fraction of off-grid electricity provided by source *k* in year *y*	%
$EF_{proj,offgrid,k}$	Off-grid emission factor for source *k*. This is a technology-specific value provided in Appendix 3: *Off-Grid Emission Factors for Select Technologies*	gCO_{2e}/kWh
TDL_y	Average technical T&D losses for providing electricity in year *y*	%
10^{-6}	Unit conversion for grams CO_{2e} to tonnes CO_{2e}	

158. Electricity consumption shall be measured using calibrated equipment[56] such as a built-in or external power meter, from all project electric cookstoves (Equation (18) and/or Equation (19)).

$$tECproj,grid,y \; = \sum_h tECproj,grid,h,y \quad (18)$$

$$tECproj,offgrid,y \; = \sum_h tECproj,offgrid,h,y \quad (19)$$

Where:

Parameter	Description	Unit
$tEC_{proj,grid,y}$	Tracked grid electricity consumption for cooking in households connected to the grid year y	kWh
$tEC_{proj,grid,h,y}$	Tracked grid electricity consumed for cooking in household *h* connected to the grid in year *y*	kWh
$tEC_{proj,offgrid,y}$	Tracked off-grid electricity consumption for cooking in households connected to the off-grid year *y*	kWh
$tEC_{proj,offgrid,h,y}$	Tracked off-grid electricity consumed for cooking in household *h* connected to the off- grid in year *y*	kWh
h	Project households	Number

10.2.1.2 Project emissions for CTEC projects using tracked energy consumption and KPTs

159. For this option the average project emissions are estimated using a KPT. Project emissions for CTEC projects using tracked energy consumption and KPTs are calculated using Equation (20).

$$PEy \; = EQproj \times tECproj,j,y \; + \sum_j UEproj,j,y + PEelec,y \quad (20)$$

Where:

Parameter	Description	Unit
PE_y	Project emissions during year y	tCO_2e

[56] Calibrated according to manufacturer recommendations and/or relevant national requirements as applicable.

EQ_{proj}	Emissions quotient for the consumption of energy for cooking in project scenario in year *y*	tCO_2e/TJ or tCO_2e/kWh
$tEC_{proj,j,y}$	Total tracked energy consumption of project fuel *j* for CTEC projects in year *y*	TJ or kWh
$UE_{proj,j,y}$	Upstream emissions for project fuel *j* in year *y*, determined following section: *Upstream Emissions for the Project Scenario*	tCO_2e
$PE_{elec,y}$	Emissions from electric energy consumption in year *y* (See Equation 17)	tCO_2e

160. This approach for determining energy consumption in the project scenario requires quantifying the energy consumption of all technologies used in the project scenario (including any baseline technologies still in use) based on a project KPT, using metered energy consumption data for the project cookstove specific to the KPT period where available.

161. Where metered energy consumption is not available specific to the KPT period, the traditional fuel-weighing KPT approach must be used. Fuel-weighing must always be used for fuel consumption based on purchase data. To link total emission reductions with the amount of tracked project fuel consumption, the emission reductions as measured during the KPTs are normalized by project fuel consumption and scaled by the amount of tracked project fuel consumption, as shown in Equation (21).

$$EQproj = \frac{\sum_j [tEC_{proj,KPT,j} \times (fNRB_i \times EF_{proj,j,CO2} + EF_{proj,j,nonCO2})]}{tEC_{proj,KPT,j-project}} \quad (21)$$

Where:

Parameter	Description	Unit
EQ_{proj}	Emissions quotient for the consumption of energy for cooking in project scenario in year *y*	tCO_2e/TJ or tCO_2e/kWh
$tEC_{proj,KPT,j}$	Energy consumption of each fuel j used in project households from project KPT for CTEC projects. Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel. (See example following Equation (2))	TJ/(person*year)
$fNRB_i$	Fraction of non-renewable woody biomass fuel *i* consumed. This parameter varies between zero and 100% for fuelwood, charcoal, and other solid biomass fuels that are not fully renewable. When renewable biomass fuels are used (defined above), this parameter is equal to zero. When fossil fuels are used, it is equal to 100%.	%
$EF_{proj,j,CO2}$	CO2 emission factor for project fuel j	tCO_2e/TJ
$EF_{proj,j,nonCO2}$	Non-CO_2 emission factor for project fuel *j*	tCO_2e/TJ
$tEC_{proj,KPT,j-project}$	Energy consumption of tracked project fuel *j* for project cookstove(s) only from project KPT	TJ/(person*year) or kWh/(person*year)

162. For continuously tracked project energy sources $tEC_{proj,i}$ other than electricity, apply Equation (1) to convert fuel masses to fuel energy. This equation excludes any consumption of electricity in the numerator.

163. If the project cookstove uses electricity, then the equation will result in a quotient in terms of tCO_2e/kWh. For determining emissions from energy consumption from electric technologies $PE_{elec,y}$ apply Equation (17), Equation (18), and Equation (19).

10.2.2 Non-CTEC

10.2.2.1 Project emission for non-CTEC projects using KPT

164. Project emissions for the non-CTEC project emissions before any Hawthorne effect adjustment are calculated using Equation (22)

$$PE_y = \sum_j (ntEC_{proj,j,y} \times (fNRB_i \times EF_{proj,j,CO2} + EF_{proj,j,nonCO2})) + \sum_j UE_{proj,j,y} + PE_{elec,y} \quad (22)$$

Where:

Parameter	Description	Unit
PEy	Project emissions during year y, before applying any Hawthorne effect adjustment	tCO_2e
$ntEC_{proj,j,y}$	Consumption of fuel *j* in project scenario in year *y.* Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel. (See example following Equation (2))	TJ
$fNRB_i$	Fraction of non-renewable woody biomass fuel *i* consumed. This parameter varies between zero and 100% for fuelwood, charcoal, and other solid biomass fuels that are not fully renewable. When renewable biomass fuels are used (defined above), this parameter is equal to zero. When fossil fuels are used, it is equal to 100%.	%
$EF_{proj,j,CO2}$	CO_2 emission factor for project fuel j	tCO_2e/TJ
$EF_{proj,j,nonCO2}$	Non-CO_2 emission factor for project fuel *j*	tCO_2e/TJ
$UE_{proj,j,y}$	Upstream emissions for project fuel *j* in year *y*, determined following section *"Upstream Emissions for the Project Scenario"*	tCO_2e
$PE_{elec,y}$	Emissions from electric energy consumption in year *y* (See Equation (24))	tCO_2e

165. Non-CTEC projects may choose from two approaches to determine energy consumption in the project scenario, differentiated by application (or non-application) of SUMs. Adjustments to account for the Hawthorne Effect for each approach are included below.

166. Both approaches involve determining non-CTEC project fuel consumption through a representative sample with direct measurements of fuel using KPT following the following equations (23)

$$EC_{proj,j,y} = H_s \times ntEC_{proj,j} \times \frac{PTD_{h,\Psi,y}}{CD} \quad (23)$$

Where:

Parameter	Description	Unit
$EC_{proj,j,y}$	Consumption of fuel *j* in project scenario in year *y*	TJ
H_s	Average household size (persons per household, segregated by age or gender)	Number
$ntEC_{proj,j,y}$	Energy consumption of project fuel *j* for non-CTEC projects as measured by the project KPT during year *y*	TJ/(person*year)
$PTD_{h,\Psi,y}$	PTDs of the monitoring period during year *y* (See Equation (12); as in the baseline scenario, PTDs are capped at either 90% or 75% depending on customer	Number

	support actions taken. These caps are waived when PTDs are estimated using SUMs.	
CD	Days in a calendar year y. Use 366 for leap years.	Number

167. For **energy sources other than electricity**, use Equation (1) to convert fuel masses to fuel energy.

168. In the case of **non-CTEC electricity use in the project scenario**, project emissions must be calculated taking into account the average electricity consumption measured by the project KPT including the use of a plug-in power meter and its corresponding emission factor. Emissions from electric energy consumption from grid and/or off-grid sources are calculated using Equation (24).

$$\mathrm{PEelec,y} = 10^{-6} \times [\frac{\mathrm{ECproj,grid,y} \times \mathrm{EFproj,grid,y}}{1-\mathrm{TDLy}} + (\mathrm{ECproj,offgrid,y} \times \sum_k \mathrm{fk,y} \times \mathrm{EFproj,offgrid,k})] \quad (24)$$

Where:

Parameter	Description	Unit
$PE_{elec,y}$	Emissions from electric energy consumption in year y	tCO_2e
$EC_{proj,grid,y}$	Grid electricity consumption for cooking for non-CTEC project in year *y. See Equation (25)*	kWh
$EF_{proj,grid,y}$	Country-specific grid emission factor. See Appendix 2: *Grid Emission Factors* in year *y*	gCO_2e/kWh
$EC_{proj,offgrid,y}$	Off-grid electricity consumption for cooking in year *y. See Equation (26)*	kWh
$f_{k,y}$	Fraction of off-grid electricity provided by source *k* in year *y*	%
$EF_{proj,offgrid,k}$	Off-grid emission factor for source *k*. This is a technology-specific value provided in Appendix 3: *Off-Grid Emission Factors for Select Technologies*	gCO_2e/kWh
TDL_y	Average technical T&D losses for providing electricity in year *y*	%
10^{-6}	Unit conversion for grams CO_{2e} to tonnes CO_{2e}	

169. Electricity consumption shall be determined using plug-in power meters during the KPT and calculated using Equation (25) for grid electricity, and/or Equation (26) for off-grid electricity:

$$ECproj,grid,y = Hs \times \frac{PTD\ h,\Psi,y}{CD} \times ECproj,grid,KPT\ y \quad (25)$$

$$ECproj,offgrid,y = Hs \times \frac{PTD\ h,\Psi,y}{CD} \times ECproj,offgrid,KPT\ y \quad (26)$$

Where:

Parameter	Description	Unit
$EC_{proj,grid,y}$	Grid electricity consumption for cooking in households connected to the grid for non-CTEC project in year *y*	kWh
$EC_{proj,offgrid,y}$	Grid electricity consumption for cooking in households connected to the off-grid for non-CTEC project in year *y*	kWh
H_s	Average household size (persons per household, regardless of age or gender)	Number
$PTD_{h,\Psi,y}$	PTDs of the monitoring period during year y	Number
$EC_{proj,grid,KPT,y}$	Grid electricity consumption in households connected to the grid for project KPT in year *y*	kWh/(person*year)
$EC_{proj,offgrid,KPT,y}$	Off-grid electricity consumption in households connected to the off-grid for project KPT in year *y*	kWh/(person*year)

10.2.2.2 Adjustment for the potential impact of the Hawthorne effect for non-CTEC projects

170. To account for the potential impacts of the Hawthorne Effect on project KPTs for non-CTEC projects, the methodology applies a Hawthorne Effect adjustment factor (HE_{ind}). This factor adjusts the calculated emissions reductions. For methodological consistency, the adjustment is incorporated directly in the project emissions calculation.

171. The final project emissions (PE_y) are calculated using Equation (27).

$$PE_y = PE_{unadj,y} + \left(BE_{final,y} - PE_{unadj,y}\right) \times (1 - HE_{ind}) \quad (27)$$

Where:

Parameter	Description	Unit
PE_y	Final project emissions during year *y*	tCO_2e
$PE_{unadj,y}$	Project emissions during year *y*, before applying any Hawthorne effect adjustment	tCO_2e
$BE_{final,y}$	Final downward adjusted baseline emissions during year *y*	tCO_2e
HE_{ind}	Hawthorne Effect adjustment factor, either: 75% when KPTs and usage surveys are used without SUMs, Or Result of Equation (28) where KPTs and usage surveys are complemented by SUMs measurements	%

172. When projects complement KPTs and surveys with SUMs measurements, the ratio of project technology usage (cooking events/day) measured during the KPT to that measured during the month prior to or following the KPT is used to adjust the emission reduction estimate, such that in Equation (27), HE_{ind} equals the result of this ratio (see Equation (28)). This option requires that SUMs be applied to all project cookstoves in households where the KPT is performed. Refer to Appendix 9 for general SUMs guidance.

173. When projects measure fuel consumption through KPTs and usage surveys only, maximum emission reductions are capped at 75% of the KPT-based estimate to account for the Hawthorne Effect, such that in Equation (27), HE_{ind} equals 75%.

$$HE_{ind} = \min(1, \frac{PTC_m}{PTC_{KPT}}) \quad (28)$$

Where:

Parameter	Description	Unit
HE_{ind}	Adjustment to calculated emission reductions for the Hawthorne Effect	%
PTC_m	Average project technology cooking events per day over 1 month from SUMs measurements	Number
PTC_{KPT}	Average project technology cooking events per day over the project KPT from SUMs measurements	Number

10.2.3 Upstream Emissions for the Project Scenario

174. Upstream emissions for fuels in year y in the project scenario ($UE_{proj,j,y}$) for all fuels except electricity are calculated as follows:

$$UEproj,j,y = ECproj,j,y \times EFj,upstream \quad (29)$$

175. For CTEC projects using the back-calculation approach, $EC_{proj,j,y}$ shall be taken as equal to $tEC_{proj,j,y}$

176. For CTEC projects using the KPT approach, $EC_{proj,j,y}$ is calculated by scaling the amount of energy consumption for each fuel during the KPT per TJ of project fuel during the KPT by the total tracked project fuel consumption per year:

$$ECproj,j,y = \frac{tECproj,KPT,j}{tECproj,KPT,j-project} \times tECproj,j,y \quad (30)$$

Where:

Parameter	Description	Unit
$UE_{proj,j,y}$	Upstream emissions for project fuel *j* in year *y*	tCO_2e
ECproj,j,y	Energy consumption for a fuel *j* in the project scenario in year *y*	TJ
$EF_{j,upstream}$	Upstream emission factor for fuel j	tCO_2/TJ
$tEC_{proj,KPT,j}$	Tracked energy consumption of project fuel *j* from project KPT for CTEC projects. Where fuels such as pellets and briquettes are made from a mix of renewable and non-renewable sources (e.g., renewable agricultural waste and non-renewable wood), each source should be considered its own fuel. (See example following Equation (2))	TJ/(person*year)
$tEC_{proj,KPT,j-project}$	Tracked energy consumption of project fuel *j* for project cookstove only based on project KPT	TJ/(person*year)
$tEC_{proj,j,y}$	Total tracked energy consumption of project fuel *j* for project cookstove only under CTEC projects in year *y*	TJ

177. Upstream emissions from non-electric sources include transport emissions. Other upstream emissions from electricity generation are included in the grid/off-grid emission factors, which are presented in Appendix 2 and Appendix 3. In case T&D losses for providing electricity is not included in the assessment of grid emission factors, T&D losses are accounted for separately.

10.3 Emission reductions/removals

10.3.1 Emission Reductions for CTEC Projects

178. Emission reductions for CTEC projects are calculated using Equation (13).

$$ERy = (BEfinal,y - PEy) \times (1 - LEy) \tag{31}$$

Where:

Parameter	Description	Unit
ERy	Emission reductions for the project during year y	tCO_2e
$BE\text{final},y$	Final downward adjusted baseline emissions during year y	tCO_2e
PEy	Project emissions during year y	tCO_2e
LEy	Percentage deduction to account for leakage emissions during year *y*	%

Leakage

179. All projects shall either apply a default adjustment factor of 2% to the emission reductions (Option 1) to approximate leakage emissions, or evaluate the relevant potential sources of leakage (Option 2) and provide an evidence-based description and estimated quantification of each potential source and its relevance for the project.

180. If utilizing option 2, for each source for which the leakage assessment expects an increase in fuel consumption by non-project households attributable to the project activity, then calculations must be undertaken to account for the leakage from this source. Leakage is either calculated as a quantitative emissions volume (tCO_2e) or as a percentage of total emission reductions. The project documentation shall include a projection of leakage emissions based on available data and information. The monitoring plan must include monitoring parameters to be registered during the leakage investigation every two years to populate the leakage calculation.

181. When using option 2, the project proponent must conduct a leakage investigation every two years using relevant methods. For example, surveys to determine parameters for the leakage calculation may be combined with project monitoring surveys, as is applicable. Monitoring plans should include field-based measurement methods, especially for the quantification of fuel, as data on fuel use estimated via surveys are often insufficiently accurate.

10.3.2 Emission Reductions for Non-CTEC Projects

182. Emission reductions for both CTEC and non-CTEC projects are calculated using Equation (31).

11. Monitoring Requirement

11.1 Monitoring activity schedule for CTEC Projects

Table 6. Monitoring Activity Schedule for CTEC Projects

Activity	Prior to registration under DMRV	Prior to first Issuance request under DMRV	Annual	Every Monitoring period (two years max)
Emission reduction estimation	×			
Baseline Studies				
Baseline scenario survey	×			
Baseline energy consumption measurement for CTEC projects using KPT approach		×		
Specific energy consumption of baseline cookstove and fuel combination (from CCTs) for CTEC projects back-calculating the baseline	×			
Project Studies				
Usage survey			×	
Project energy consumption measurement (from KPTs or tracked energy consumption) *Continuous if tracked, and reported every monitoring period		×		×*
Specific energy consumption of project cookstove and fuel combination (from CCTs) before validation and every two years thereafter for CTEC projects that use CCTs to back-calculate the baseline.	×			×
Ongoing monitoring tasks				
Maintenance of total purchase and service records, and project databases	Continuous			

11.2 Monitoring Activity Schedule for Non-CTEC Projects

Activity	Prior to registration under DMRV	Prior to the first Issuance request under DMRV	Annual	Every Monitoring period (two years max)
Emission reduction estimation	×			
Baseline Studies				
Baseline scenario survey	×			
Baseline energy consumption measurement (from KPTs) (required for all projects not using global default value)		×		
Project Studies				
Usage survey			×	
Project energy consumption measurement (from KPTs)		×		×
Ongoing monitoring tasks				
Maintenance of total purchase and service records, and project databases	Continuous			

11.3 Other Monitoring Requirements

183. KPTs must be undertaken every two years, at the end of the monitoring period for which credits are being validated and issued, rather than at the beginning of a monitoring period[57]. For a five-year crediting period, project proponents are expected to conduct KPTs at the end of Year 2 and Year 4. They may either conduct an additional KPT in Year 5 or if the project is renewed, apply the results from KPTs conducted in Year 6.

11.3.1 Evolving baselines

184. For projects with KPT baselines, project owner(s) must identify any mismatch between values documented during the baseline scenario and those reported by actual project households during the first project usage survey for primary fuel type and household size. This assessment shall be carried out using retrospective questions of project households during the first usage survey in any given household. Where a material discrepancy between the baseline scenario and project baseline occurs, project owner(s) must either not claim emission reductions for households that do not conform to the baseline scenario profile or follow requirements on adjusting the baseline (toward lower baseline emissions).

11.3.2 Seasonality

185. Projects are required to account for the impact of seasonal variation on fuel-use measurements in the baseline and project scenarios. Prior to project validation, projects must collect data during the baseline scenario survey on the relative fuel use at different times of the year. Project owner(s) are required to incorporate the resulting information into their monitoring plan design and to justify in the PSF on how the approach they are taking will result in accurate baseline and project fuel use measurements. If space heating is common in the project area, the justification must include an explanation of how space heating has been addressed in the project design. If an accurate approach cannot be taken, then the project owner(s) must instead select and justify a conservative approach.

11.3.3 CTEC Monitoring Data

186. For any given project participant or technology, if more than half of the possible CTEC data for a monitoring period is missing, only available CTEC data may be included in emission reduction calculations. If missing CTEC data for a given project participant or technology consists of less than half of the possible data, then the project owner(s) may use the 25th percentile of the available tracked project energy consumption for that project participant or technology as a conservative replacement of the missing data.

11.3.4 Stove use monitoring

187. The algorithm for estimating technology use events must be able to reliably distinguish cookstove use events from other potential factors that could be interpreted as cookstove use events that are caused by external reasons (e.g., temperature fluctuations from typical diurnal patterns). The algorithms shall be clearly presented publicly with associated equations and/or logic rules.

188. The same algorithm and SUM device type shall be used for the duration of the project.

189. Sampling must meet the 95/10 precision guidelines, per the sampling guidance included in Appendix 10.

[57] For project activity intending to undertake issuance prior to completion two year need to undertake the KPT prior to first issuance an the value of KPT will remain valid for the period of two years.

190. SUMs sampling protocols (installation, placement, downloading) and algorithms used to convert raw data into cooking events must not change between sampling during KPTs and sampling following KPTs. Project participants in the SUMs sample shall not receive any support different from or additional to that not in the sample. See Appendix 10.

191. For non-CTEC projects using the KPT and SUMs approach, the average of the cookstove use events per day during the full 1-month of stove use monitoring must be used to adjust for potential Hawthorn Effects and timing for SUM sample-based monitoring should correspond to equation 28. If SUMs data is incomplete or missing, it must be omitted from the analysis.

11.4 Taking into account policies and measures, and relevant circumstances

192. The methodology incorporates the latest scientific data collected in the relevant geographic areas and among the relevant target populations on key parameters. It also contains applicability performance criteria that reflect the types of cooking technologies that have a successful track record in the current LMIC context. It also provides guidance on how to select appropriate data sources that are most relevant to the project context. The guidance is relatively flexible, however, as data on cookstove performance and cooking practices are still scarce for many relevant regions.

11.5 Reversals

193. The activities applicable under the methodology do not involve the direct removal or long-term sequestration of carbon into biomass or soils. Instead, they reduce emissions at the point of fuel use by avoiding the inefficient combustion of non-renewable biomass fuels such as firewood and charcoal, through the adoption of cleaner fuels and/or more efficient cooking technologies.

194. While cookstove projects are not removal activities, it is understood that they may be viewed as emission reduction activities with potential reversal risks, on the basis that biomass not harvested for cooking could later be harvested for other uses (e.g., heating, or industrial/commercial applications). However, for the reasons outlined below, the methodology does not require application of the full suite of provisions contained in the standard “Requirements for activities involving removals under the Article 6.4 mechanism”:

(a) **No defined carbon pool or storage to reverse**: Emission reductions from cookstove projects occur at the moment non-renewable biomass use is avoided or reduced through the adoption of cleaner fuels or more efficient technologies. Unlike afforestation or carbon capture projects, cookstove projects do not create or maintain a physical carbon stock (e.g., in trees or soils) that could later be lost due to a fire, pests, or other disturbances. Therefore, the risk categories listed in section 4.6.1 of the “Requirements for activities involving removals under the Article 6.4 mechanism” standard (ranging from asset ownership and regulatory uncertainty to natural disasters) may affect project continuity or cookstove adoption rates, but they do not create the possibility of a reversal of emissions reductions already achieved. If cookstove use declines in the future, it simply reduces or halts future emission reductions; it does not undo the climate benefit already achieved.

(b) **Indirect and diffuse impacts**: The impact of clean cooking projects on biomass stocks is often diffuse and spread across wide, indeterminate geographic areas. This is especially true for projects that displace charcoal in urban or peri-urban areas, where biomass is sourced from multiple production areas serving multiple markets. This makes it infeasible to delineate specific zones where potential reversals could be measured or monitored. Even if biomass is later harvested for other uses, there is no clear or traceable link between that harvest and previous emission reductions claimed under a specific cookstove carbon project.

(c) **No practical pathway for reversal risk monitoring**: Effective reversal risk monitoring would require establishing a causal relationship between cookstove adoption and observed changes in biomass stocks across wide and variably defined sourcing areas. Even if such areas could be precisely identified and bounded, attributing changes in biomass stock to a specific project remains highly uncertain, as biomass cover is affected by numerous concurrent human and natural factors.

(d) **Focus on degradation, not deforestation**: Scientific literature indicates that non-renewable biomass use for cooking primarily contributes to forest degradation rather than deforestation. Degradation is significantly more difficult to detect and monitor (even without considering the diffuse boundaries and attribution challenges described above). Demonstrating measurable impact on degradation would require the use of sophisticated remote sensing techniques with extensive ground truthing and/or the creation of semi-permanent plots in both project and non-project areas. Both of these options require specialized knowledge and investment that are prohibitively resource-intensive for most project owner(s).

(e) **Methodology already integrates permanence considerations**: The methodology requires the application of a scientifically derived and periodically updated fNRB value to emissions reduction estimates. The fNRB value reflects the balance between tree offtake and regeneration, meaning that emissions reductions are only credited for the portion of biomass that would not have regrown without the project activity, implicitly addressing non-permanence/potential reversal risks. This approach ensures that credits represent real, non-temporary climate benefits and negates the need for impractical use of a buffer pool or additional reversal safeguards.

195. In summary, although cookstove projects reduce demand for biomass, they do not involve removals or the creation of a well-defined carbon pool subject to reversal. While indirect reversal risks may theoretically exist, the methodology already accounts for them through conservative quantification (via fNRB) and a robust emissions reduction framework.

12 Monitoring Methodology

12.1 Parameters not monitored during the crediting period

196. When the project owner apply for crediting period renewal, all methodological parameters shall be reassessed as per the latest version of the methodology available at the time of renewal.

Data / Parameter Table 01

Data / Parameter:	CD
Data unit:	Number
Description:	Days in a calendar year y. Use 366 for leap years
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	365 (non-leap year) or 366 (leap year)
Source of data:	☐ Measured ☐ Other source ☒ N/A
Choice of data or Measurement methods and procedures (if any):	N/A
Equations referred	Eq 11 & 23
Quality Procedure, if any:	N/A
Any comment:	---

Data / Parameter Table 02

Data / Parameter:	$EC_{base,KPT,i}$
Data unit:	TJ/(person*year)
Description:	Energy consumption of baseline fuel i for CTEC projects based on baseline KPT
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	-
Source of data:	☒ Measured ☐ Other source ☐ N/A Source of data- Ex-ante baseline scenario KPT
Choice of data or Measurement methods and procedures (if any):	CTEC projects that use tracked energy consumption and KPTs to determine fuel consumption in the baseline scenario must collect data from a representative sample of households and following the most recent version of the KPT protocol available at this link: https://cleancooking.org/protocols/ The study must meet the minimum confidence and precision of 95/10 for the target parameter of average annual energy consumption per person. The 95/10 rule is applied to the sum of energy consumption across fuels (see parameter $\sum tEC_{base,KPT,i}$ in Appendix 10, which subsumes this parameter). If the target precision is not met, the project owner shall take the conservative bound of the confidence interval as the parameter value, proportionately applied across all of the fuels used. The conservative bound is that which produces a lower CO2e emissions reduction estimate. Baseline fuel consumption caps and flags described in Section 10.1.2: Baseline Energy Consumption Defaults Caps and Flags apply and results shall be cross-checked against these.
Equations referred	Eq 9.

Quality Procedure, if any:	N/A
Any comment:	Frequency of Monitoring – Once per crediting period

Data / Parameter Table 03

Data / Parameter:	$EF_{base,i,CO2}$
Data unit:	tCO_2e/TJ
Description:	CO_2 emission factor for baseline fuel i
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	Refer to Appendix 5: Default Point of Use Emission Factors, Thermal Efficiencies, and NCVs of the methodology
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Default from the latest version of the IPCC Guidelines for National GHG Inventories are provided for most fuels; other fuels (for which emission factor values are not included in Appendix 5 and IPCC default values are not available) project owner shall use data from (a) project-specific field tests using ISO 19867 prior to first verification by a qualified entity that is certified or accredited by National Standards body (b) project-relevant measurement reports by qualified entities (c) national defaults (d) peer reviewed sources (see the notes and references listed in Appendix 5 of the methodology) of the project area/other credible literature.
Equations referred	Eq.2, 9, 10
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 04

Data / Parameter:	$EF_{base,i,nonCO2}$
Data unit:	tCO_2e/TJ
Description:	Non-CO_2 emission factor for baseline fuel i
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	Refer to Appendix 5: Default Point of Use Emission Factors, Thermal Efficiencies, and NCVs of the methodology
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Default values from the latest version of the IPCC Guidelines for National GHG Inventories are provided for most fuels; other fuels for which emission factor values are not included in Appendix 5 and IPCC default values are not available project owner shall use data from (a) project-specific field tests using ISO 19867 prior to first verification by a qualified entity that is certified or accredited by National Standards body (b) project-relevant measurement reports by qualified entities (c) national defaults (d) peer reviewed sources (see the notes and references listed in Appendix 5 of the methodology) of the project area/other credible literature.
Equations referred	Eq. 2, 9, and 10
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 05

Data / Parameter:	$EF_{proj,j,CO2}$
Data unit:	tCO_2e/TJ
Description:	CO_2 emission factor for project fuel j
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	Refer to Appendix 5: Default Point of Use Emission Factors, Thermal Efficiencies, and NCVs of the methodology
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Default values from the latest version of the IPCC Guidelines for National GHG Inventories are provided for most fuels; other fuels for which emission factor values are not included in Appendix 5 and IPCC default values are not available project owner shall use data from (a) project-specific field tests using ISO 19867 prior to first verification by a qualified entity that is certified or accredited by National Standards body (b) project-relevant measurement reports by qualified entities (c) national defaults (d) peer reviewed sources (see the notes and references listed in Appendix 5 of the methodology) of the project area/other credible literature.
Equations referred	Eq.15, 21, and 22
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 06

Data / Parameter:	$EF_{proj,j,nonCO2}$
Data unit:	tCO_2e/TJ
Description:	Non-CO_2 emission factor for project fuel j
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	See Appendix 5: Default Point of Use Emission Factors, Thermal Efficiencies, and NCVs of the methodology
Source of data:	☒ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Default values from the latest version of the IPCC Guidelines for National GHG Inventories are provided for most fuels; other fuels (for which emission factor values are not included in Appendix 5 and IPCC default values are not available) project owner shall use data from (a) project-specific field tests using ISO 19867 prior to first verification by a qualified entity that is certified or accredited by National Standards body (b) project-relevant measurement reports by qualified entities (c) national defaults (d) peer reviewed sources (see the notes and references listed in Appendix 5 of the methodology) of the project area/other credible literature.
Equations referred	Eq.15, 21, and 22
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 07

Data / Parameter:	$EF_{i,upstream}$ and $EF_{j,upstream}$
Data unit:	tCO_2e/TJ
Description:	Upstream emission factor for fuel i in baseline or fuel j in project scenario
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals Purpose of data is calculation of upstream emissions in baseline and project scenarios.
Value (s) applied	-
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Refer to Appendix 4 of the methodology
Equations referred	$EF_{i,upstream}$: Eq. 13 $EF_{j,upstream}$: Eq. 29
Quality Procedure, if any:	N/A
Any comment:	Upstream emissions for fuelwood are considered as zero

Data / Parameter Table 08

Data / Parameter:	$EF_{proj,grid}$
Data unit:	gCO_{2e}/kWh
Description:	Country-specific grid emission factor
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	Refer to Appendix 2 of the methodology
Source of data:	☐ Measured ☒ Other source ☒ N/A
Choice of data or Measurement methods and procedures (if any):	Emissions from grid electricity are country-specific and calculated based (a) Article 6.4 Mechanism tools to derive electricity emission factors (as and when available) (b) grid emission factors from the International Financial Institutions Technical Working Group on GHG Accounting (provided in Appendix 2: Grid Emission Factors) (c) grid emission factors provided by the relevant national authority .
Equations referred	Eq. 17& 24
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 09

Data / Parameter:	$EF_{proj,offgrid,k}$
Data unit:	gCO_{2e}/kWh
Description:	Off-grid emission factor for source k
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	Refer to Appendix 3 of the methodology
Source of data:	☐ Measured ☒ Other source ☐ N/A

Choice of data or Measurement methods and procedures (if any):	Mini-grid Emission Tool from SEforAll, Refer to Appendix 3
Equations referred	Eq. 17& 24
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 10

Data / Parameter:	$fNRB\ i$
Data unit:	Fraction
Description:	Fraction of non-renewable woody biomass fuel i during year y
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	-
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	- National or sub-national default [a] values from CDM TOOL33 [b]; or - Customized project area (not aligned with national or subnational boundaries) using the online MoFuSS Default Scenarios (MoFuSS-DS) interface [c]; or - Where applicable, project proponents may run their own model with webMoFuSS [d] using their own rigorously validated inputs, as stipulated in the model. For demand-side parameters like per capita fuel consumption, input data from population-representative surveys meeting the 95/10 rule or national datasets are acceptable. For supply-side data like land cover, biomass stock, or biomass growth maps, validated maps from reputed international sources or national remote sensing agencies are acceptable. More guidance to be published on webMoFuSS. [a] Sub-national values are appropriate for projects concentrated in specific regions. National values are appropriate for projects that are evenly spread throughout a country. [b] Default fNRB values from CDM TOOL33 (version 3.0) [c] https://mofuss.unam.mx/mofuss-ds/ [d] If UNFCCC determines that a marginal approach to calculating fNRB is allowable, MoFuSS may be used to calculate marginal fNRB for a given project under this methodology.
Equations referred	Eq. 2, 9, 10. 15, 21 & 22
Quality Procedure, if any:	N/A

Any comment:	Frequency of monitoring: Determined once ex-ante. This parameter is only considered when woody biomass is used in either baseline or project scenario. This parameter varies between zero and 1 for fuelwood, charcoal, and other solid biomass fuels that are not fully renewable. When renewable biomass fuels are used, this parameter is equal to zero. When fossil fuels are used, it is equal to 1. Updated at crediting period renewal.

Data / Parameter Table 11

Data / Parameter:	Hs
Data unit:	Persons per household
Description:	Average household size
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	
Source of data:	☐ Measured ☐ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Baseline survey (Option 1/ Option 2) and annual usage surveys, adjusting to the lower value when a decrease in persons per household is observed.
Equations referred	Eq.11, 23, 25 and 26
Quality Procedure, if any:	N/A
Any comment:	The parameter estimate from the survey must meet the minimum confidence and precision of 95/10 to use the mean value. If the target precision is not met, the project proponent shall apply the conservative bounds of the confidence intervals as the parameter value. The conservative bounds are those that produce a lower CO_{2e} emissions reduction estimate.

Data / Parameter Table 12

Data / Parameter:	LEy
Data unit:	Percentage
Description:	Percentage deduction to account for leakage emissions during year y
Purpose of the data	☐ Baseline emissions/ removals ☐ Project emissions/ removals ☒ Leakage emissions/ removals
Value (s) applied	2%
Source of data:	☒ Measured ☒ Other source ☐ N/A

Choice of data or Measurement methods and procedures (if any):	Project owner(s) shall either: -Apply a default adjustment factor of 2% to the emission reductions to approximate leakage emissions; or -Evaluate the relevant potential sources of leakage and provide an evidence-based description and estimated quantification of each potential source and its relevance for the project. If utilizing the latter, for each source for which the leakage assessment expects an increase in fuel consumption by non-project households attributable to the project activity, then calculations must be undertaken to account for the leakage from this source. Leakage is either calculated as a quantitative emissions volume (tCO_2e) or as a percentage of total emission reductions. The project documentation shall include a projection of leakage emissions based on available data and information. The monitoring plan must include monitoring parameters to be registered during the leakage investigation every two years to populate the leakage calculation. When using the latter, the project proponent must conduct a leakage investigation every two years using relevant methods. For example, surveys to determine parameters for the leakage calculation may be combined with project monitoring surveys, as is applicable. Monitoring plans should include field-based measurement methods, especially for the quantification of fuel, as data on fuel use estimated via surveys are often insufficiently accurate.
Equations referred	Eq. 13 and 22
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 13

Data / Parameter:	$NCVx$ ($also$ $NCVj$)
Data unit:	TJ/tonnes
Description:	Net calorific value of fuel x (or j)
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	Refer to Appendix 5 of the methodology
Source of data:	☒ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Default values from the latest version of the IPCC Guidelines for National GHG Inventories are provided for most fuels in Appendix 5 of the methodology). Use of these values for wood and charcoal are required. For other fuels, project level tests using ISO 19867 may be used. Significant variance between such outputs and the values above must be noted and justified in the PSF. If a fuel is not included in Appendix 5, then use literature-based values or project level tests using ISO 19867. In absence of IPCC data, NCV based on project-relevant measurement reports, or project specific field tests may be used.
Equations referred	Eq. 1
Quality Procedure, if any:	N/A
Any comment:	Not applicable for electricity as energy source in baseline or project scenario

Data / Parameter Table 14

Data / Parameter:	$ntEC_{base,i,y}$
Data unit:	TJ/(person*year)
Description:	Energy consumption of baseline fuel i for non-CTEC projects
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals Calculation of baseline emissions for non-CTEC projects
Value (s) applied	-
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Global default value from Section "10.1.2": Baseline energy consumption default, caps and flags or results from baseline KPT. Projects that choose the KPT approach to determine fuel consumption in the baseline scenario must collect data from a representative sample of households and follow the most recent version of the KPT protocol available at this link: https://cleancooking.org/protocols/
Equations referred	Eq. 15
Quality Procedure, if any:	The study must meet the minimum confidence and precision of 95/10 for annual fuel energy consumption per person to use the mean values. The 95/10 rule is applied to the sum of energy consumption across fuels. If the target precision is not met, the project proponent shall take the conservative bound of the confidence interval as the parameter value, proportionately applied across all of the fuels used. The conservative bound is that which produces a lower CO_{2e} emissions reduction estimate.
Any comment:	-

Data / Parameter Table 15

Data / Parameter:	$SC_{b,i}$
Data unit:	MJ / kg food
Description:	Specific energy consumption of a baseline cookstove using fuel i to cook a given amount of food
Purpose of the data	☒ Baseline emissions/ removals[58] ☐ Project emissions/ removals ☐ Leakage emissions/ removals Back-calculation of baseline fuel consumption for CTEC projects using the back-calculation approach for displaced baseline energy consumption
Value (s) applied	-
Source of data:	☒ Measured ☐ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Most recent version of the CCT protocol available at this link: https://cleancooking.org/protocols/ Also refer to appendix 8 of the methodology for additional information. Description of measurement methods are provided in the CCT protocol. 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 over the course of the year.
Equations referred	Eq. 3

[58] Back-calculation of baseline fuel consumption for CTEC projects using the back-calculation approach for displaced baseline energy consumption

Quality Procedure, if any:	The parameter estimate from the test results must meet the minimum confidence and precision of 95/10 to use the mean value. If the target precision is not met, the project proponent shall apply the conservative bounds of the confidence intervals as the parameter value. The conservative bounds are those that produce a lower CO_{2e} emissions reduction estimate. Requirements per the CCT protocol. Additionally: ▪ A minimum of 15 CCTs by 3 different cooks (5 repeats per cook) must be conducted per cookstove model. ▪ The CCTs must be alternated between the baseline and project cookstoves to limit potential bias in increased cook efficiency over repeats. For artisanal cookstoves, at least three randomly-selected samples of each cookstove model must be tested.
Any comment:	Frequency of Monitoring – Before Validation

Data / Parameter Table 16

Data / Parameter:	$SC_{p,j}$
Data unit:	MJ / kg food
Description:	Specific energy consumption of a project cookstove using fuel j to cook a given amount of food
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals Back-calculation of baseline fuel consumption for CTEC projects using the back-calculation approach for displaced baseline energy consumption
Value (s) applied	
Source of data:	☐ Measured ☐ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Measurement method is provided in the CCT protocol. Most recent version of the CCT protocol available at this link: https://cleancooking.org/protocols/ . Also refer to appendix 8 of the methodology for additional information. Description of measurement methods are provided in the CCT protocol. 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 over the course of the year.
Equations referred	Eq. 3
Quality Procedure, if any:	The parameter estimate from the test results must meet the minimum confidence and precision of 95/10 to use the mean value. If the target precision is not met, the project proponent shall apply the conservative bounds of the confidence interval as the parameter value. The conservative bounds are those that produce a lower CO2e emissions reduction estimate. Requirements per the CCT protocol. Additionally: i. A minimum of 15 CCTs by 3 different cooks (5 repeats per cook) must be conducted per cookstove type. ii. The CCTs must be alternated between the baseline and project cookstoves to limit potential bias in increased cook efficiency over repeats. For artisanal cookstoves, at least three randomly-selected samples of each cookstove model must be tested.
Any comment:	Frequency of measurement – Before submission for registration, and every 2 years thereafter

Data / Parameter Table 17

Data / Parameter:	$TDLy$
Data unit:	Percentage
Description:	Average technical T&D losses for providing electricity in year y
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	--
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	T&D loss values should come from the following sources: ▪ If available, the percentage published by the national grid's operator should be used. ▪ If the value from the national grid's operator is not available, then national T&D loss percentages from international, reputable sources such as the World Bank or the International Energy Agency should be used. ▪ If none of the options above are available, a 20% conservative default for T&D losses should be applied. Frequency of monitoring: Determined once ex-ante
Equations referred	Eq. 6 and 19
Quality Procedure, if any:	N/A
Any comment:	-

Data / Parameter Table 18

Data / Parameter:	$\eta_{new,j}$
Data unit:	NA
Description:	Efficiency of the device of each type i and batch j implemented as part of the project activity
Purpose of the data	☐ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	--
Source of data:	☐ Measured ☒ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Efficiency shall be measured/estimated as per the following: (i) The efficiency of the project devices shall be based on certification by a national standards body or an appropriate certifying agent recognized by that body. (ii) Manufacturer specifications on efficiency based on water boiling test (WBT) may be used. The WBT shall be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the WBT Protocol13,14 or ISO 19867-1 listed by Clean Cooking Alliance (See https://www.cleancookingalliance.org/technology-and-fuels/testing/protocols.html)). For (i) and (ii) above, the sampling test of stoves by such certification bodies/agents or manufacturers shall be conducted following a 95/10 precision.
Equations referred	N/A
Quality Procedure, if any:	N/A
Any comment:	Efficiency of cooking device is essential for ascertaining the applicability of the project device.

Data / Parameter Table 19

Data / Parameter:	Baseline Scenario Assessment
Data unit:	Scenario assessment finding (based on sample survey or complete enumeration)
Description:	Baseline scenario study is to be carried out within the target population to determine critical information on the target population including dominant baseline cooking technologies and the percentage of their use by the target population, fuel types and the percentage of their use by the target population, fuel consumption pattern for the type of service provided by project technology, stacking patterns, and household size etc.
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Value (s) applied	--
Source of data:	☒ Measured ☐ Other source ☐ N/A
Choice of data or Measurement methods and procedures (if any):	Option 1: Baseline survey carried out across a sample population within the target population. Project activity applying CTEC/non-CTEC based approach should conduct baseline scenario survey using digital application that enables seamless survey data collection and uploading of the survey results/outcome in the digital database . Project owner to ensure that the audit trail of such survey like verification of the unique ID of the cookstoves, id of the authorised representative of the households, and geo-tagged photographs. Where feasible, the survey results may be cross-checked with appropriate national or regional datasets or published literature. As an alternative to sample survey, project owner may refer to secondary literature (appropriate national or regional datasets or published literature) for determining the baseline scenario. The official publications/official statistics published by national/ sub-national Government or report published[59] by independent agencies may also be referred to, provided that the report is not more than 3 years old and represents the baseline information of the target population. Option 2: Capture baseline data for 100% of the beneficiary as a part of the digital customer onboarding process i.e., when customers receive the stove. Baseline scenario survey should at minimal obtain the following information a. Beneficiary details including – Name, Address / location b. End user characteristics – Economic profile including average family income (e.g. US$ 200/month), number of people served by baseline technology/ family size (e.g.- six members), typical baseline technology usage patterns and tasks (commercial, institutional, domestic, etc.) c. Baseline technology and fuels - Types of baseline technologies used and estimated frequency, types of fuels used and estimated quantities, seasonal variations in baseline technology and fuel use d. Sources of fuels: purchased, hand-collected, or etc., and prices paid or effort made, e.g. walking distances, persons collecting, opportunity cost
Equations referred	Not applicable
Quality Procedure, if any:	-
Any comment:	-

[59] Reports that are “indexed,” journal and/or published by a national or multi-national agency."

12.2 Parameters monitored during the crediting period

Data / Parameter Table 01

Data / Parameter:	Dissemination/Sales Record and digital database	
Description:	The dynamic digital database will include information of all project technology device that are sold or distributed under the project activity along with the unique identifier details, beneficiary details, deployment date, and corresponding information of the baseline and project scenario. The dynamic database to be updated based on the change/ variation in the beneficiary level information and the technology in place.	
Data unit:	NA	
Equations referred	NA	
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals	
Measurement methods and procedures (if any):	Project owner to keep a record of beneficiary wise details of the project technology sold/distributed including the following information's for each device/ technology option: a. Project Stove Description (Model of cookstove (if multiple models). b. Product description including capacity (as applicable), fuel type , metered/non-metered, etc. c. Date of sale/ dissemination (the date from which the device is deemed activity. Typically, the date it is sold or installed) d. Unique ID of the device/technology option (Unique code that is attached to the project stove or provided as separate card to the households and tracked in the database) e. Date of replacement at the end of technical lifetime/ product malfunction f. GPS Coordinates (Longitude and Latitude of customer) g. Customer contact information and Id (Information required to contact and identify the owner of the cookstove, including name, ID number, phone number, address) h. User Type (domestic/ institutional/ commercial user) The aforesaid information for all the technology options is to be obtained from the beneficiary at the point of sale/dissemination and to be updated after the end of the technical lifetime of the device or damage of the device requiring replacement of the cooking device prior to the end of the technical lifetime of the project device.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	N/A
	Accuracy Class	N/A
	Calibration Requirements	N/A
	Location	N/A
Monitoring frequency:	Continuously. When onboarding the customer/ beneficiary)	
Quality Procedures, if any.	The information regarding the number of technology unit/ device to be cross checked from the sales record (distribution record in case of non-commercial device and applicable only for free distribution to beneficiary).	

Any comment:	Technologies aged beyond their technical life, and not replaced or retrofitted, are removed from the project database and no longer credited.

Data / Parameter Table 02

Data / Parameter:	Usage Survey
Description:	Assessment of the usage practice and presence of the baseline and other non-project technology (stove stacking) by the project technology end users along with usage of project device/ technology option.
Data unit:	Usage survey result
Equations referred	NA
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals

Measurement methods and procedures (if any):	In person usage survey to be carried out using digital application to determine use of project technology along with presence of baseline device. Digital survey enables seamless survey data collection (on a sample basis) and real time data uploading in the digital database. Project owner to ensure that the audit trail of such survey like verification of the unique ID of the cookstoves, id of the authorised representative of the households, and geo-tagged photographs. In addition, to the information gathered through survey checklist surveyor should carry out the following activities a. Kitchen observations- The surveyor shall visit the household to gather objective information to support the usage survey findings (e.g. if the cooking device is warm to touch, ashes present etc.). This is to counter against survey bias from the respondent answering questions in a way that they think the interviewer wants to hear. If the cooking device is not physically present or observed not be in use the beneficiary should be considered as an non-user. b. Interview with primary cook - The surveyor shall interview the primary cook of the household to gather information on project technology use patterns, including information on duration and frequency of use, as well as information on multiple stove use ('stove stacking') and seasonal trends. c. Photos of cooking areas - The surveyor shall take photographs of the project technology to gather visual data on the status of the project technology; whether the stove is abandoned, damaged, or being actively used shall all be shown using clear photographs. A photo should show the whole kitchen, including all the stoves in use. The photos should be clear and in good light. Photos also serve to provide confirmation that the household was visited. d. GPS coordinates - The surveyor shall record the GPS coordinates of the household as they provide verification that the household was visited. Alternatively, date stamped, and location specific photos of the household shall be taken as a verification of the household visit. Photographs taken may also be used to meet this requirement. **Usage survey for project technologies**: The usage survey determines the usage proportion for each age cohort of technologies/ devices being considered for each project scenario. The age cohorts in the survey are established as follows: a. End users in a usage survey with technologies in the first year of use (age 0-1) must have technologies that have been in use on average at least 0.5 years or longer. b. End users in a usage survey with technologies in the second year of use (age1-2) must be conducted with technologies that have been in use on average at least 1.5 years, and so on. Since the parameter of interest is the usage proportion for each age cohort, the sample size is defined for each age cohort following the general requirements for sampling. **Usage survey for other stoves**: As part of the usage survey, the project owner must also collect data on the presence and usage practices of baseline and other non-project technology by project technology end users including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices, or monitoring surveys to capture the number of meals cooked. The same method of in person interviews and expert observation within the kitchen in question is suitable to collect these data.

Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	N/A
	Accuracy Class	N/A
	Calibration Requirements	N/A
	Location	N/A
Monitoring frequency:	Annual	
Quality Procedures, if any.	Whether or not the existing baseline technology is discarded/ removed, when an old technology remains in use in parallel with the improved technology, or another technology is put in use in parallel, the corresponding emissions must be accounted for so that emission reductions are not overestimated.	
Any comment:	The usage parameter must be established to account for drop off rates with age of protect technologies/ devices and are replaced or for reduced use by end users/ beneficiaries for other causes. Usage survey to be carried out amongst the beneficiary/ end users currently using project technology. For project activity undertaking issuance prior to the first annual usage survey needs to undertake the usage survey prior to generation of the automated PMR (project monitoring report). The findings of the usage survey will be valid for a year starting from the date of completion of first usage survey. Project activity can use the finding of the usage survey for a period of one year starting from the date of the completion of the usage survey.	

Data / Parameter Table 03

Data / Parameter:	$Days_{y,h}$	
Description:	Number of maximum possible project-technology days during the year y in household h	
Data unit:	Number	
Equations referred	Eq. 12	
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals Calculation of baseline and project emissions for non-CTEC projects	
Measurement methods and procedures (if any):	For each project household this is determined using the date the project-technology was obtained by the household, and the dates of the monitoring period.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	N/A
	Accuracy Class	Exact number of days
	Calibration Requirements	N/A
	Location	Project household
Monitoring frequency:	Annual	
Quality Procedures, if any.	-	
Any comment:	-	

Data / Parameter Table 04

Data / Parameter:	$EC_{proj,grid,KPT,y}$ and $EC_{proj,offgrid,KPT,y}$	
Description:	Electricity consumption in project KPT in year y	
Data unit:	kWh/(person*year)	
Equations referred	Eq. 25 and 26	
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals	
Measurement methods and procedures (if any):	A representative sample with built-in or external data loggers, where they conform with industry standards and are calibrated according to manufacturer recommendations and/or relevant national requirements as applicable, shall be used during KPTs.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Built-in or external data loggers attached separately to the electric cooking appliances to measure the electricity consumption of the electric cooking appliance(s). The Built-in or external data loggers may be used, where they conform with industry standards and are calibrated according to manufacturer recommendations and/or relevant national requirements as applicable.
	Accuracy Class	-
	Calibration Requirements	Calibrated according to manufacturer recommendations and/or relevant national requirements as applicable
	Location	During KPTs in project households
Monitoring frequency:	Every two years during project	
Quality Procedures, if any.	The study must meet the minimum confidence and precision of 95/10 for the target parameter of average annual energy consumption per person. The 95/10 rule is applied to the sum of energy consumption across fuels (see parameter $\sum tEC_{base,KPT,i}$ in Appendix 10, which subsumes this parameter). If the target precision is not met, the project owner(s) shall take the conservative bound of the confidence interval as the parameter value, proportionately applied across all the fuels used. The conservative bound is that which produces a lower CO_{2e} emissions reduction estimate.	
Any comment:	-	

Data / Parameter Table 05

Data / Parameter:	FC_x ($FC_{i,h,y}$ or $FC_{j,h,y}$)	
Description:	Fuel consumption for the respective fuel and scenario x (also Fuel consumption for fuel j or i in household h in year y)	
Data unit:	Tonnes	
Equations referred	Eq. 1	
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals	
Measurement methods and procedures (if any):	KPT	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Weighing Scale

	Accuracy Class	Scales will have the capacity to weigh the respective solid fuels encountered during KPT. They will have a minimum resolution of 10g or 2% of the expected difference between daily weighing for the primary fuel type.
	Calibration Requirements	Scales will be checked during every day of use that they are within 1% of a certified calibration weight.
	Location	Baseline and project households
Monitoring frequency:	at baseline and every two years for project KPT.	
Quality Procedures, if any.	Scales must remain stable at a zero reading after taring. Scales will be checked during every day of use that they are within 1% of a certified calibration weight. The calibration weight will be within +/- 50% of typical weights for the primary fuel type. For example, if bundles of wood are typically 10kg, then the calibration weight will be between 5 and 15 kg. If a scale indicates it is out of compliance, measurements from the that scale will be discarded until the previous, valid check.	
Any comment:	-	

Data / Parameter Table 06

Data / Parameter:	fk,y	
Description:	Fraction of off-grid electricity provided by source k in year y	
Data unit:	Percentage	
Equations referred	Eq. 17 &24	
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals	
Measurement methods and procedures (if any):	Electric meters measuring off-grid sources	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Electric Meter measuring off-grid sources Project activity opting for DMRV system to use Smart meters (confirming to DLMS/COSEM[60]) that can continuously record followed by its aggregation and transmission of monitored data at designed interval to a secure on-site or cloud server/ digital database of the DMRV system for storage and backup.
	Accuracy Class	-
	Calibration Requirements	As per manufacturer specification.
	Location	Project household
Monitoring frequency:	Annual	
Quality Procedures, if any.	Measured generation shall be cross-checked with off-grid source installed capacity and load factor.	
Any comment:	Purpose of data: Apportioning fraction of electricity use for off grid emission factors	

[60] DLMS (Device Language Message Specification)/ COSEM (Companion Specification for Energy Metering) is a standard protocol and a companion specification for smart energy metering, providing interoperable data exchange between energy meters (like electricity, water, gas, or heat) and head-end systems for remote reading and management. It uses an object-oriented model (COSEM) to represent meter data and an application layer protocol (DLMS) to manage the exchange of this data in a secure, efficient, and standardized manner.

Data / Parameter Table 07

Data / Parameter:	H_s	
Description:	Average household size	
Data unit:	Persons per household, segregated by age or gender (number)	
Equations referred	Eq. 11, 23, 25 & 26	
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals	
Measurement methods and procedures (if any):	Baseline survey (Option 1/ Option 2) and annual usage surveys, adjusting to the lower value when a decrease in persons per household is observed.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Survey
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Annual	
Quality Procedures, if any.	The parameter estimate from the survey must meet the minimum confidence and precision of 95/10 to use the mean value. If the target precision is not met, the project owner(s) shall apply the conservative bound of the confidence interval as the parameter value. The conservative bound is that which produces a lower CO_{2e} emissions reduction estimate.	
Any comment:	-	

Data / Parameter Table 08

Data / Parameter:	$ntECproj,j,y$	
Description:	Energy consumption of project fuel j for non-CTEC projects as measured by the project KPT	
Data unit:	TJ/(person*year)	
Equations referred	Eq. 23	
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals	
Measurement methods and procedures (if any):	Representative sample using a KPT	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	KPT
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Every two years	

Quality Procedures, if any.	The study must meet the minimum confidence and precision of 95/10 for the target parameter of average annual energy consumption per person. The 95/10 rule is applied to the sum of energy consumption across fuels (see parameter $\sum tEC_{base,KPT,i}$ in Appendix 10, which subsumes this parameter). If the target precision is not met, the project owner(s) shall take the conservative bound of the confidence interval as the parameter value, proportionately applied across all the fuels used. The conservative bound is that which produces a lower CO_{2e} emissions reduction estimate.
Any comment:	-

Data / Parameter Table 09

Data / Parameter:	$PC_{b,i}$	
Description:	Proportion of cooking events conducted using baseline fuel i	
Data unit:	Percentage	
Equations referred	This parameter does not appear in emissions reduction quantification equations, see Additional Comment field.	
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals The purpose of the data is to estimate the proportion of cooking events conducted using baseline fuel i, used in conjunction with Parameter PCp,j to calculate a material difference between the baseline scenario and actual project households, for non-CTEC and CTEC with KPT projects. This parameter does not appear in emissions reduction quantification equations.	
Measurement methods and procedures (if any):	Baseline scenario surveys or stove use monitoring. The survey must ask to identify all the cooking devices present in the household. For all cooking devices present in the household, ask “How many times did you cook using [cooking device] yesterday?” to determine the number of usage events per day per device. When multiple devices/fuels are used in the baseline by the end user in the same premises, the proportional use shall be established from surveys or stove use monitoring as described in Appendix 9 of the methodology.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Baseline scenario surveys or stove use monitoring
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Once per crediting period	
Quality Procedures, if any.	The parameter estimate from the survey must meet the minimum confidence and precision of 95/10 for the percentage of baseline cooking conducted using baseline fuel i, with a minimum of 200 households. In case project activity/ programme of activity uses SUM (stove use monitor) it should be ensured that SUM should be installed in higher than minimum required sample size should be considered to accommodate potential device failure, measurement gaps from individual measurement devices.	

Any comment:	When multiple devices/fuels are used in the baseline by the end user in the same premises, the proportional use shall be established from surveys or stove use monitoring as described in Appendix of the methodology.

Data / Parameter Table 10

Data / Parameter:	$PC_{p,j}$	
Description:	Proportion of cooking events conducted using project fuel j	
Data unit:	Percentage	
Equations referred	This parameter does not appear in emissions reduction quantification equations, see Additional Comment field.	
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals The purpose of the data is to estimate the proportion of cooking events conducted using project fuel j, used in conjunction with Parameter $PC_{b,i}$ to calculate a material difference between the baseline scenario and actual project households, for non-CTEC and CTEC with KPT projects. This parameter does not appear in emissions reduction quantification equations.	
Measurement methods and procedures (if any):	Project usage surveys or stove use monitoring. The survey must ask to identify all the cooking devices present in the household. For the project cookstove and each other cooking device present in the household, ask "How many times did you cook using [cooking device] yesterday?" to determine the number of usage events per day per device.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Project usage surveys or stove use monitoring
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Once per crediting period	
Quality Procedures, if any.	The parameter estimate from the survey must meet the minimum confidence and precision of 95/10 for the percentage of baseline cooking conducted using project fuel j. In case project activity/ programme of activity uses SUM (stove use monitor) it should be ensured that SUM should be installed in higher than minimum required sample size to accommodate potential device failure, measurement gaps from individual measurement devices.	
Any comment:	When multiple devices/fuels are used in the baseline by the end user in the same premises, the proportional use shall be established from surveys or stove use monitoring as described in Appendix 9 of the methodology.	

Data / Parameter Table 11

Data / Parameter:	PTC_m
Description:	Average project technology cooking events per day over 1 month from SUMs measurements
Data unit:	Cooking events/day (Number)
Equations referred	Eq. 28

Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals Calculation of project emissions through KPT and usage surveys complemented with SUMs	
Measurement methods and procedures (if any):	Installation of SUMs on a representative sample of project technology cookstoves. SUMs sampling protocols (installation, placement, downloading) and algorithms used to convert raw data into cooking events must not change between sampling during KPTs and sampling during ongoing project operation. Month long usage data shall be analysed to determine the cooking events/day.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	SUMs
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Once for a one-month duration during the first monitoring period of the crediting period	
Quality Procedures, if any.	The study must meet the minimum confidence and precision of 95/10 for the target parameter of average cooking events per day per project technology cookstoves. If the target precision is not met, the project owner(s) shall take the conservative bound of the confidence interval as the parameter value. The conservative bound is that which tends to underestimate project technology cooking events. SUMs sampling protocols (installation, placement, downloading) and algorithms used to convert raw data into cooking events must not change between sampling during KPTs and sampling during ongoing project operation. The algorithm used to process the raw data into cooking events should be thoroughly documented and cross checked by the manufacturer/ other authorised third party at the beginning of the crediting period.	
Any comment:	Users in the SUMs sample shall not receive any support different or additional to those not in the sample. Project activity/ programme of activity using SUM (stove use monitor) should ensure that SUM should be installed in higher than minimum required sample size should be considered to accommodate potential device failure, measurement gaps from individual measurement devices.	

Data / Parameter Table 12

Data / Parameter:	PTC_{KPT}
Description:	Average project technology cooking events per day over the project KPT from SUMs measurements
Data unit:	Cooking events/day (Number)
Equations referred	Eq. 28
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals Calculation of project emissions through KPT and usage surveys complemented with SUMs

Measurement methods and procedures (if any):	Installation of SUMs on the project technology cookstoves during the project KPT. SUMs sampling protocols (installation, placement, downloading) and algorithms used to convert raw data into cooking events must not change between sampling during KPTs and sampling during ongoing project operation.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	SUMs
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Once during the project KPT	
Quality Procedures, if any.	The study must meet the minimum confidence and precision of 95/10 for the target parameter of average cooking events per day per project technology cookstoves. If the target precision is not met, the project proponent shall take the conservative bounds of the confidence intervals as the parameter value. The conservative bounds are those that tend to underestimate project technology cooking events. SUMs sampling protocols (installation, placement, downloading) and algorithms used to convert raw data into cooking events must not change between sampling during KPTs and sampling during ongoing project operation.	
Any comment:	Data obtained to be used for calculation of project emissions through KPT and usage survey complemented with SUM. Project activity/ programme of activity using SUM (stove use monitor) should ensure that SUM should be installed in higher than minimum required sample size should be considered to accommodate potential device failure, measurement gaps from individual measurement devices.	

Data / Parameter Table 13

Data / Parameter:	$SC_{p,j}$
Description:	Specific energy consumption of a project cookstove using fuel j to cook a given amount of food
Data unit:	MJ / kg food
Equations referred	Eq. 3
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals Back-calculation of baseline fuel consumption for CTEC projects using the back-calculation approach for displaced baseline energy consumption.
Measurement methods and procedures (if any):	Most recent version of the CCT protocol available at this link: https://cleancooking.org/protocols/ Description of measurement methods are provided in the CCT protocol. 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 over the course of the year.

Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	CCT
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Before submission for registration, and every 2 years thereafter	
Quality Procedures, if any.	The parameter estimate from the test results must meet the minimum confidence and precision of 95/10 to use the mean value. If the target precision is not met, the project owner(s) shall apply the conservative bound of the confidence interval as the parameter value. The conservative bound is that which produces a lower CO2e emissions reduction estimate. QA/QC procedures: Requirements per the CCT protocol. Additionally: - A minimum of 15 CCTs by 3 different cooks (5 repeats per cook) must be conducted per cookstove type. - The CCTs must be alternated between the baseline and project cookstoves to limit potential bias in increased cook efficiency over repeats. For artisanal cookstoves, at least three randomly-selected samples of each cookstove model must be tested.	
Any comment:	At renewal of the crediting period, the project developer shall carry out a survey to check if the end users utilise the project device 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 Table 14

Data / Parameter:	$tEC_{proj,grid,h,y}$
Description:	Tracked grid electricity consumed for cooking in household h in year y
Data unit:	kWh
Equations referred	Eq. 18
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Measurement methods and procedures (if any):	Metered electricity uses for each household (sample monitoring not allowed)
Entity/ person responsible for the measurement	Project Owner

Measuring instrument(s)	Type of Instrument	Applies for households consuming energy from the grid. Built-in or external data loggers attached separately to the electric cooking appliances to measure the electricity consumption of the electric cooking appliance(s), may be used, where they conform with industry standards and are calibrated according to manufacturer recommendations and/or relevant national requirements as applicable. Project activity opting for CTEC approach to use Smart meters (confirming to DLMS/COSEM[61]) that can continuously record followed by its aggregation and transmission of monitored data at designed interval to a secure on-site or cloud server/digital database of the DMRV system for storage and backup. The connection is accompanied by header information like stove unique ID to ensure that electricity consumption is allocated to correct stoves in the database.
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	The measuring device shall be in conformity with industry standards and calibrated according to relevant national requirements/ manufacturer specification.
	Location	Project household
Monitoring frequency:	Continuously monitored and aggregated on annual basis	
Quality Procedures, if any.	Measured project technology electricity use shall be cross checked with the wattage of the project-technology and the estimated operating hours for a sample of project-technology units. Additionally, the recorded electricity consumption (for household device) should be compared against a normative reference value of 1 kWh/capita/day. If the project energy use (including grid and off-grid sources) 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. If the results cannot be further substantiated, then 1 kWh per capita is to be applied as a cap on the electricity consumption per capita. Under CTEC approach if the smart meter experience intermittent or continuous loss of network connection with the cloud server/ digital database and the monitored data cannot be transmitted or retrieved from the local storage, for each day of non-connectivity the average energy consumption of all connected project devices may be applied as that day's energy consumption. To ensure avoidance of data gap, data concentrator/ smart meter should be enabled with a memory card/chip to hold the monitored data while data buffers over the web.	
Any comment:	In case the electric cookstove is covered under PAYGO model where the backend PAYGO software /service providers monitor electricity consumption and receives payment from the users via phone application or local mobile money kiosks, the record of payment can be used to cross check the electricity consumption.	

[61] Device Language Message Specification / Companion Specification for Energy Metering.

Data / Parameter Table 15

Data / Parameter:	$tEC_{proj,KPT,j}$	
Description:	Energy consumption of each fuel j used in project households from project KPT for CTEC projects	
Data unit:	TJ/(person*year) or (in the case of electricity) kWh/(person*year)	
Equations referred	Eq. 21	
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals Calculation of project emissions for CTEC projects that use tracked energy consumption and KPTs	
Measurement methods and procedures (if any):	CTEC projects that use tracked energy consumption and KPTs must collect data on all cookstoves operating in parallel with the project cookstove, from a representative sample of households and following the most recent version of the KPT protocol available at this link: https://cleancooking.org/ protocols/	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	KPTs
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Once per crediting period	
Quality Procedures, if any.	The study must meet the minimum confidence and precision of 95/10 for the target parameter of average annual energy consumption per person. The 95/10 rule is applied to the sum of energy consumption across fuels (see parameter $\Sigma\ tEC_{base,KPT,i}$ in Appendix 10, which subsumes this parameter). If the target precision is not met, the project owner(s) shall take the conservative bound of the confidence interval as the parameter value, proportionately applied across all the fuels used. The conservative bound is that which produces a lower CO_{2e} emissions reduction estimate.	
Any comment:	-	

Data / Parameter Table 16

Data / Parameter:	$tEC_{proj,KPT,j-project}$
Description:	Tracked energy consumption of project fuel j for project cookstove only based on project KPT
Data unit:	TJ/(person*year) or (in the case of electricity) kWh/(person*year)
Equations referred	Eq. 9 and 21
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals Calculation of project emissions for CTEC projects that use tracked energy consumption and KPTs
Measurement methods and procedures (if any):	CTEC projects that use tracked energy consumption and KPTs must collect data on all cookstoves operating in parallel with the project cookstove, from a representative sample of households and following the most recent version of the KPT protocol available at this link: https://cleancooking.org/ protocols/ $EC_{proj,KPT,j-project}$ is extracted from the same measurements and comprises energy consumption of project fuel *j* for project cookstove only. It also may be expressed in kWh/(person*year) if the project-technology consumes electricity.

Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	KPTs
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Once per crediting period	
Quality Procedures, if any.	The study must meet the minimum confidence and precision of 95/10 for the target parameter of average annual energy consumption per person. The 95/10 rule is applied to the sum of energy consumption across fuels (see parameter $\Sigma\ tEC_{base,KPT,i}$ in Appendix 10, which subsumes this parameter). If the target precision is not met, the project owner(s) shall take the conservative bound of the confidence interval as the parameter value, proportionately applied across all the fuels used. The conservative bound is that which produces a lower CO_{2e} emissions reduction estimate.	
Any comment:	-	

Data / Parameter Table 17

Data / Parameter:	$tEC_{proj,offgrid,h,y}$
Description:	Tracked off-grid electricity consumed for cooking in household h in year y
Data unit:	kWh
Equations referred	Eq. 19
Purpose of the data	☐ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals Calculation of project emissions for CTEC projects
Measurement methods and procedures (if any):	Metered electricity use for each household
Entity/ person responsible for the measurement	Project Owner

Measuring instrument(s)	Type of Instrument	Applies for households consuming energy from off-grid sources. All project technologies are monitored continuously. Built-in or external data loggers attached separately to the electric cooking appliances to measure the electricity consumption of the electric cooking appliance(s), may be used, where they conform with industry standards and are calibrated according to manufacturer recommendations and/or relevant national requirements as applicable. Project activity opting for DMRV system to use Smart meters (confirming to DLMS/COSEM) that can continuously record followed by its aggregation and transmission of monitored data at designed interval to a secure on-site or cloud server/ digital database of the DMRV system for storage and backup.
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	As per manufacturer specification.
	Location	Project household
Monitoring frequency:	Continuously monitored and aggregated on annual basis	
Quality Procedures, if any.	Measured project technology electricity use shall be cross checked with the wattage of the project-technology and the estimated operating hours for a sample of project-technology units. For DMRV based system if the smart meter experience intermittent or continuous loss of network connection with the cloud server/ digital database and the monitored data cannot be transmitted or retrieved from the local storage, for each day of non-connectivity the average energy consumption of all connected project devices may be applied as that day's energy consumption. To ensure avoidance of data gap, data concentrator/ smart meter should be enabled with a memory card/chip to hold the monitored data while data buffers over the web.	
Any comment:	-	

Data / Parameter Table 18

Data / Parameter:	$tEC_{proj,j,h\,y}$
Description:	Tracked consumption of project fuel j in project household h in year y
Data unit:	Mass or Volume unit
Equations referred	Eq. 16
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals
Measurement methods and procedures (if any):	Direct measurement by metering or purchase record on a device basis. Remote monitoring methods may be applied.
Entity/ person responsible for the measurement	Project Owner

Measuring instrument(s)	Type of Instrument	Measurement of fuel consumption (solid, liquid and/or gaseous fuel) using credible and calibrated equipment (built-in or external data loggers attached separately to the cooking devices) with mechanisms that ensure alternative use of the measured fuel is not possible. Applies for households consuming fuel and adopting CTEC process for estimating of baseline and project emission. In case direct metering is not feasible, then the fuel purchases record, which are summarised on a monthly basis, are to be fed to cloud server/ digital database along with proof of payment or such information can be directly fed from the account of the users. CTEC approach For metered system, the project owner to ensure that monitored /recorded data are aggregated and transmitted (at designed interval) to a secure on-site or cloud server/ digital database of the DMRV system for storage and backup. The parameter can also be monitored using proxy indicator like fuel purchase record, evidenced from mobile transaction records. The fuel purchase record/ information is to be fed to the DMRV system.
	Accuracy Class	Scales will have the capacity to weigh the respective solid/ liquid fuels used. They will have a minimum resolution of 10g or 2% of the expected difference between daily weighing for the primary fuel type. Scales remain stable at a zero reading after taring. Check that scales are within 1% of a certified calibration weight. The calibration weight should be within +/- 50% of typical weights for the primary fuel type. For example, if bundles of wood are typically 10kg, then the calibration weight should be between 5 and 15 kg. If a scale indicates it is out of compliance, measurements from the that scale should be discarded until the previous, valid check
	Calibration Requirements	Measuring device shall be in conformity with industry standard and calibrated according to relevant national requirements. The calibration weight will be within +/- 50% of typical weights for the primary fuel type. For example, if bundles of wood are typically 10kg, then the calibration weight will be between 5 and 15 kg. If a scale indicates it is out of compliance, measurements from the that scale will be discarded until the previous, valid check.
	Location	Project household
Monitoring frequency:	Continuous (for metered system)/ monthly (for proxy indicator) and aggregated on annual basis	
Quality Procedures, if any.	Scales will be checked during every day of use that they are within 1% of a certified calibration weight.	
Any comment:	-	

Data / Parameter Table 19

Data / Parameter:	$tPC_{b,i}$	
Description:	Proportion of cooking events conducted using fuel-stove combination I for CTEC projects	
Data unit:	Percentage	
Equations referred	Eq. 3	
Purpose of the data	☒ Baseline emissions/ removals ☐ Project emissions/ removals ☐ Leakage emissions/ removals Estimate the displacement of the baseline cookstove(s) in the CTEC back-calculating option	
Measurement methods and procedures (if any):	Baseline scenario surveys or stove use monitoring. The survey must ask to identify all the cooking devices present in the household. For the project cookstove and each other cooking device present in the household, ask “How many times did you cook using [cooking device] yesterday?” to determine the number of usage events per day per device. When multiple devices/fuels are used in the baseline by the end user in the same premises, the proportional use shall be established from surveys or stove use monitoring as described in Appendix 9 of the methodology.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Baseline scenario surveys or stove use monitoring
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Once per crediting period	
Quality Procedures, if any.	The parameter estimate from the survey must meet the minimum confidence and precision of 95/10 for the percentage of baseline cooking conducted on each cookstove-fuel combination present in the baseline.	
Any comment:	When multiple devices/fuels are used in the baseline by the end user in the same premises, the proportional use shall be established from surveys or stove use monitoring as described in Appendix 9.	

Data / Parameter Table 20

Data / Parameter:	$\Psi_{Survey,y}$
Description:	Percent of project households with cookstoves present, where project cookstove is used at least once per week, determined via survey and visual observation or estimated with SUM in year y
Data unit:	Percentage
Equations referred	Eq. 12
Purpose of the data	☒ Baseline emissions/ removals ☒ Project emissions/ removals ☐ Leakage emissions/ removals

Measurement methods and procedures (if any):	Household surveys of project households with cookstoves present for which participants are asked if they use the cookstove more than once per week on average. The cookstove must also be visually observed and indicate signs of consistent intended use: - Cookstove is unpacked - Present in an easily accessible area - Not being used for a non-cooking purpose - Appears in working condition - Does not have signs of disuse such as being covered in dust or filled with spider webs Capped at 90% for projects that undertake customer support actions as described below and 75% for those that do not. **Customer support actions**: To be eligible to claim up to 90% of maximum PTDs, project owner(s) not estimating PTDs with SUMs must take the following customer support actions and provide details of how each condition has or will be met on the PSF during the design phase of the project. • Demonstrate that the project has selected technologies and fuels that meet the cooking needs of the target population, either by citing robust research or conducting an investigation of cooking practices and attitudes during the project design phase. • Provide evidence of project ownerst support activities. These may include such things as providing materials (print, in-person, or video) on how to operate the cookstove to prepare common local foods, how to troubleshoot common operational issues, and how to make minor repairs (including how to access any necessary parts). All project participant communications and materials shall be provided in local language(s) commonly used in the project area. • Project owners must be able to contact the project owner(s) to access support (e.g., maintenance and repair services) through a commonly used, toll-free communications channel. Project owner(s) who do not undertake all three of these customer support actions may claim up to 75% of maximum PTDs. These caps are waived when PTDs are estimated using SUMs.	
Entity/ person responsible for the measurement	Project Owner	
Measuring instrument(s)	Type of Instrument	Household surveys
	Accuracy Class	See QA/QC procedures
	Calibration Requirements	-
	Location	Project household
Monitoring frequency:	Annual	
Quality Procedures, if any.	Sampling must be conducted to meet the 95/10 precision guideline on the target parameter of the percentage of project households with cookstoves present in which project cookstove is used at least once per week.	
Any comment:	-	

12.3 Monitoring of Cook Stove Stacking

197. Baseline scenario survey within the target population should also determine the staking pattern in accordance to Clean Cooking Alliance’s Fuel Stacking Toolkit. The baseline survey (Option 1/ Option 2) to capture information on cooking habits, use of baseline and other cooking devices including quantification of use of baseline devices, by formulating questions and/or collecting evidence to determine the frequency of usage. The information regarding cooking habits, use of project device and other cooking appliance including quantification of use of project devices to be carried out during the usage survey. For non-CTEC project type, project owner should ensure that the event of staking is considered so that emission reductions are calculated only from real reduction of or replacement of baseline fuel use. The information may be cross checked with national/ regional studies if available.

12.4 Monitoring of suppressed demand conditions

198. Project owner using suppressed demand baseline is required to monitor and reassess whether ongoing conditions continue to indicate that suppressed demand would persist in the absence of the project activity, using one or more indicators.

   (a) Indicators may be parameters such as average household income or others relevant for the BHN being addressed and the conditions of the project population prior to the project activity;

   (b) The monitoring to assess ongoing suppressed demand conditions shall exclude the direct impact of the project activity on the conditions of the project population.

199. Reassessment of level of service for meeting BHN shall be undertaken at least every five years. If the ongoing conditions of an activity are found to exceed the threshold defined as meeting suppressed demand, then that location is deemed ineligible for the baseline for which suppressed demand is recognized, and a new baseline may be proposed following an approved methodology via the post-registration changes procedure.

Appendix 1: Assessment of Leakage

Section below presents the potential sources of leakage for cooking energy projects. Project owner(s) shall identify all leakage sources relevant to their project and take the necessary prescribed steps to address it.

Table 7. Source of Leakage

Source	Scenario description	Impact on ERs	Evidence base	Notes	Required action
Baseline equipment transfer	When a household primarily reliant on fuelwood or charcoal at baseline receives a more efficient biomass cookstove, they may sell or gift their baseline cookstove to a household outside the project boundary.	None	Sector expertise	In the LMIC[62] context, projects promoting more efficient biomass cookstoves are almost always replacing three stone fires or very rudimentary traditional cookstoves. As these types of cookstoves are ubiquitous, there is no incentive to move them to a household outside the project boundary.	No leakage adjustment needed
Baseline equipment transfer	When a household using an efficient biomass cookstove at baseline benefits from a fuel-switch program, they may sell or gift their existing biomass cookstove to a household outside the project boundary.	Likely positive	Sector expertise	A household with a higher quality improved biomass cookstove that they no longer needed might sell or gift it to a household outside the project boundary. Experience suggests the receiving household would only adopt such a cookstove if their baseline cookstove was a three stone fire or low performing biomass cookstove. This would create a positive impact on ERs.	No leakage adjustment needed
Baseline equipment transfer	When a household using improved cookstoves at baseline benefits from a program promoting a different one of these clean fuels like biogas, ethanol , LPG or electricity they may sell or gift their existing clean cooking system to a household outside the project boundary.	Likely positive	Sector expertise	In the LMIC context where biomass cooking remains such a significant source of climate pollution relative to other cooking fuels, it would be extremely unlikely for a project owner(s) to propose this activity. It is further very likely that this case would result in a positive ER impact, as the relocated cookstove would likely reduce	No leakage adjustment needed

[62] Low- and Middle-Income Countries

Source	Scenario description	Impact on ERs	Evidence base	Notes	Required action
				emissions in its new location given the prevalence of biomass across the LMIC context.	
Competition for resources	When wood fuel use is reduced due to project activity, it may result in a decrease in wood harvesting outside the project boundary. The woody biomass left intact due to the project activity may be harvested by households outside the project boundary to increase their use of biomass for cooking beyond subsistence levels. It may also be harvested by fuel producers or other industrial actors.	Negative	Gill-Wiehl et al., in preparation, 2025	The existing evidence (which only covers the rural context) suggests that leakage from an increase in household cooking outside the project boundary is less than 1%. Commonly in the LMIC context, the household cooking volume is limited by the availability of food and water as well as access to refrigeration in addition to the availability of fuel. In many cases, it is unnecessarily burdensome to require a project owner(s) to determine the magnitude of this leakage. It maybe measurable if the baseline fuel source is a well-defined area. However, in the urban context, chain of custody data is almost never available for charcoal, which is frequently produced illegally and commonly transported further than fuelwood.	Projects reducing biomass use or replacing the biomass used in the baseline shall measure leakage from affected biomass sources where feasible. Where this is not feasible, projects may opt to apply a 2% discount.
Competition for resources	A project produces pellets or briquettes for cooking fuel from agricultural waste, which reduces the natural fertilizer on agricultural land and results in an increase in synthetic fertilizer	Likely negative	Sector Expertise	We have not found any evidence of this situation. For it to occur, the profit gained from selling agricultural waste as fuel feedstock would have to exceed the cost of synthetic fertilizer, which is highly unlikely in the LMIC context.	No leakage adjustment needed
Competition for resources	If a project facilitates the electrification of multiple large institutional kitchens in the same community,	Likely negative	Sector Expertise	For material leakage to occur, a significant portion of households would need to already be cooking with	No leakage adjustment needed.

Source	Scenario description	Impact on ERs	Evidence base	Notes	Required action
	it could cause the affected utility to adopt load-shedding measures among residential customers cooking with electricity, causing them to substitute more polluting fuels, such as biomass, for cooking.			electricity. This is not common in the current LMIC context.	

Appendix 2: Grid Emission Factors

The methodology uses grid emission factors. These grid emission factors should be sourced from the estimates provided by the International Financial Institution's Technical Working Group (IFI-TWG) on GHG Accounting, or from the grid emission factors provided by the relevant national authority. Final approved version of the "A6.4-MEP010-A01- Draft Methodological tool Emissions from electricity generation and/or consumption" can also be used as and when available for estimating the grid emission factor

The IFI-TWG uses the Combined Margin (CM) grid emission factor for Electricity Consumption. CM is a weighted average of each country's Operating Margin (33%) and Build Margin (67%). Operating Margin is the cohort of existing power plants that are most likely to be brought online to meet an additional unit of demand. Build Margin is the cohort of power plants expected to come online based on a country-specific assessment of planned and expected new generation capacity.

For IFI-TWG estimates, the most recent values should be used where available. To obtain a grid emission factor for a specific country, download the full database and use the data from Column E "Electricity Consumption". For reference, grid emission factors from 2024 for several countries are provided below.

Country / Territory / Island	gCO2/kWh	Country / Territory / Island	gCO2/kWh	Country / Territory / Island	gCO2/kWh
Afghanistan	193	Gabon	533	Palau	497
Algeria	397	Gambia	591	Panama	230
Angola	748	Ghana	276	Papua New Guinea	315
Bangladesh	412	Guam	428	Paraguay	0
Belize	183	Guatemala	427	Peru	252
Benin	576	Guinea	460	Philippines	525
Bhutan	0	Guinea-Bissau	577	Rwanda	416
Bolivia, Plurinational State of	393	Guyana	616	Samoa	434
Botswana	1070	Haiti	765	Sao Tomé & Principe	565
Brazil	150	Honduras	359	Senegal	656
Burkina Faso	539	India	608	Seychelles	479
Burundi	197	Indonesia	675	Sierra Leone	246
Cambodia	588	Jamaica	498	Solomon Islands	563
Cameroon	354	Kenya	274	Somalia	582
Cape Verde	505	Kiribati	530	South Africa	786
Central African Republic	77	Lao People's Democratic Republic	555	South Sudan	704
Chad	581	Lebanon	567	Sri Lanka	506
Chile	235	Liberia	374	Sudan	398
China (PRC and Hong Kong)	485	Libya	493	Suriname	565
Colombia	208	Madagascar	567	Tajikistan	106
Comoros	589	Malawi	243	Tanzania, United Republic of	336
Congo, Democratic Republic of	0	Mali	623	Thailand	351
Congo, Republic of	405	Mauritania	513	Timor-Leste	589
Costa Rica	39	Mauritius	543	Togo	597
Côte d'Ivoire	314	Mexico	359	Tonga	533
Cuba	391	Micronesia	557	Tunisia	348
Djibouti	575	Morocco	547	Turkmenistan	676
Dominica	433	Mozambique	111	Tuvalu	497
Dominican Republic	426	Myanmar	407	Uganda	116
Ecuador	280	Namibia	139	Uruguay	65
Egypt	406	Nauru	521	Uzbekistan	467
El Salvador	275	Nepal	0	Vanatu	504
Equatorial Guinea	361	Nicaragua	372	Venezuela, Bolivarian Republic of	368
Eritrea	704	Niger	718	Viet Nam	381
Eswatini	0	Nigeria	358	Yemen	615
Ethiopia	0	Pakistan	386	Zambia	197
Fiji	334	Palestinian Authority	517	Zimbabwe	880

Appendix 3: Off-Grid Emission Factors for Select Technologies

If the project activity includes electric cooking from off-grid or mini-grid sources, then the emissions associated with those sources must be accounted for. Off-grid or mini-grid power may be derived from petrol or diesel generators as well as renewable sources. If off-grid or mini-grid power is derived from petrol or diesel generators, then emission factors should be taken from the table below: values from the SEforAll Mini-Grid Emissions Tool. Alternatively default value of "Emission factors for diesel generator systems" as per CDM tool 33 may also be used.
If off-grid or mini-grid power is derived from renewable sources, then CLEAR assumes the upstream emissions are negligible and does not require they be included in assessing emission reductions. Additionally, Article 6.4 Mechanism tools to derive electricity emission factors are currently under development.

Table: Off-Grid Emission Factors for Select Technologies

Electricity Generation Technology	gCO_{2e}/kWh	Source
Petrol Generator	1252	https://www.seforall.org/system/files/2021-08/SEforALL_Carbon-emissions-methodology-note.pdf
Diesel Generator	1000	https://www.seforall.org/system/files/2021-08/SEforALL_Carbon-emissions-methodology-note.pdf

Appendix 4: Upstream Emissions from Other Fuels in tonne/TJ

Table: Upstream Emissions from Other Fuels in tonne/TJ[63]

Fuel	CO_2	CH_4	N_2O	CO_2e
Kerosene[a]	9.0	0.10	0.00016	11.9
LPG from crude oil	18.4	0.12	0.00029	22.1
LPG from natural gas	9.9	0.15	0.00019	14.5
LPG derived from a mix of crude and natural gas inputs[b]	13.6	0.11	0.00019	16.8
Coal mining and cleaning	1.5	0.23	0.00003	8.3
Sugarcane-based ethanol[c,d,e]	-9.8	0.58	0.061	24.2
Pellets	4.6	0.0085	0.0014	5.2
Charcoal (traditional kiln assuming 6:1 conversion) [f, 1-6]	130	3.0	0.005	CO_2 must be multiplied by fNRB before adding up to CO_2e
Charcoal (traditional kiln assuming 4:1 conversion)[f]	72	1.7	0.005	

Project owner(s) must use the emissions factors for the fuels provided here. These values come from Floess et al. 2023. For pellet fuels, which can have widely varying feedstocks, project owner(s) may estimate their own upstream emissions factors or justify values through published literature.

GWPs from the IPCC Sixth Assessment Report (AR6.4) should be multiplied by the emission factors to convert them to CO_{2e} as follows:

- CO_2: 1
- CH_4 fossil fuels: 29.8
- CH_4 non fossil fuels: 27.2
- N_2O: 273

Notes:

(a) Kerosene emissions are based on jet fuel from the GREET model
(b) Combined LPG is a weighted average using the 2021 global input mix, which was 37% crude and 63% natural gas
(c) CO_2 is negative because it accounts for carbon fixed during plant growth
(d) CH_4 emissions are due to field burning, which is common for cane produced in many LMICs
(e) Life Cycle Assessment impacts are allocated by mass assuming 20% of farm-gate output goes toward ethanol
(f) Charcoal production emission factors are taken from six peer-reviewed studies of emissions from traditional kilns. The average conversion rate from those studies is 3.7 tonnes of oven-dry wood per tonne of charcoal. However, those studies were conducted under controlled conditions, which tend to yield higher conversion efficiencies than those typically observed in field conditions. In more industrialized contexts, a charcoal conversion factor 4:1 is appropriate. However, research supports a 6:1 charcoal conversion factor for LMIC contexts, as noted in the Explanation of Decisions document. For this methodology, we use a default conversion rate of 6:1 to better reflect conversion efficiencies observed in the field. This is incorporated into emissions factors here and fNRB calculations. Using a rate of 6:1 means that more wood, and therefore more carbon, is required to obtain the same amount of charcoal compared to the controlled studies. This

[63] From Floess et al. 2023.

results in higher carbon emissions. Accordingly, we proportionally adjust CO2 and CH4 emission factors to reflect this increased input. Nonetheless, this table also includes emissions factors based on a 4:1 conversion factor, to enable ICVCM Core Carbon Principles (CCP) eligibility.

Sources:

[1]Bertschi, Isaac T., Robert J. Yokelson, Darold E. Ward, Ted J. Christian, and Wei Min Hao. “Trace Gas Emissions from the Production and Use of Domestic Biofuels in Zambia Measured by Open-Path Fourier Transform Infrared Spectroscopy.” Journal of Geophysical Research-Atmosphere 108 (2003): 5–1, 5–13

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Appendix 5: Default Point of Use Emission Factors, Thermal Efficiencies, and NCVs

Table: Default Point of Use Emission Factors, Thermal Efficiencies, and NCVs

Fuel	Net Calorific Value (TJ/tonnes)	Thermal efficiency	Default Emission Factor		
			CO_2 Emission Factor (tonnes/TJ)	CH_4 Emission Factor (tonnes/TJ)	N_2O Emission Factor (tonnes/TJ)
Biogas[1]	0.0504[1]	50%	54.6[1]	0.005[1]	0.0001[1]
Charcoal[1,2-5]	0.0295	25%	78.5	0.2	0.008
Kerosene[1]	0.0438	50%	71.9	0.01	0.0006
LPG[1]	0.0473	50%	63.1	0.005	0.0001
Wood[1]	0.0156	15%	112	0.3	0.004
Dung[1, 6-9]	0.012	15%	80.4	.83	0.004
Other liquid biofuels [1]	0.0274	50%	79.6	0.01	0.0006
Anthracite[1]	0.0267	Project-specific	98.3	0.3	0.0015
Other (Bituminous Coal)[1]	0.0258	Project-specific	94.6	0.3	0.0015
Sub-Bituminous[1]	0.0189	Project-specific	96.1	0.3	0.0015

Notes:

(a) To avoid double-counting, the fuel emission factors above do not include upstream emissions, which are accounted for separately.
(b) Project owner(s) must use the NCV values for wood and charcoal listed here. For other fuels, project-level tests using ISO 19867 may be used.
(c) Default net calorific values and default emission factors for other fuel types (e.g., specific types of coal) can also be found in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories or may be justified from literature and/or testing reports.
(d) GWPs from the IPCC Sixth Assessment Report (AR6.4) should be multiplied by the emission factors to convert them to CO_{2e} as follows:

- CO_2: 1
- CH_4 fossil fuels: 29.8
- CH_4 non-fossil fuels: 27.2
- N_2O: 273.

(e) The tonnes CO_{2e} per TJ for CO_2, CH_4, and N_2O should be summed.

Sources:

[1] Gomez, Darío R., and John D. Watterson. 2006. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. edited by S. Eggleston, L. Buendia, K. Miwa, T. Ngara, and K. Tanabe. Kamiyamaguchi Hayama, Japan: Institute for Global Environmental Strategies.

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[9]Akagi SK, Yokelson RJ, Wiedinmyer C, et al. Emission factors for open and domestic biomass burning for use in atmospheric models. Atmospheric Chemistry and Physics. 2011;11:4039–4072.

[10]The Earth's Energy Budget, Climate Feedbacks and Climate Sensitivity, Table 7.15 in AR6 WG1 Chapter 7. https://doi.org/10.1017/9781009157896.009

Appendix 6: Requirements and Best Practices for Baseline and Project Surveys

Overview

Surveys are an integral part of the methodology for developing the baseline scenario ex-ante, conducting a baseline Kitchen Performance Test (KPT) ex-ante, measuring usage on annual basis, and completing a project KPT on biennial basis.

This Appendix provides:

- General guidance on conducting high quality surveys;
- Resources with sample questionnaires related to clean cooking; and
- Particular instructions for each required survey.

Requirements and guidance for selecting samples of appropriate size and representativeness can be found in Appendix 10.

General Survey Requirements and Guidance

All surveys undertaken for the methodology must be conducted by trained enumerators. Best practice is for these enumerators to be independent of the project owner's organization. At a minimum, enumerators must not be engaged in a customer-facing role for the project owner(s) or its implementation partners, such as selling, marketing, distributing, or providing customer service for project technologies.

Before conducting surveys, the project owner(s) where needed and relevant must ensure that relevant local authorities and community leaders have been consulted. All laws for the jurisdiction must be followed, and local customs should also be respected.

Wherever possible, all surveys should be conducted using an electronic platform with built-in quality checks.

All surveys should be conducted with the main household cook, who must give her informed consent prior to the start of the interview. Consent must be documented as part of the survey form. If cultural or domestic constraints require that the interview be conducted with someone else, the main cook should be present at the interview, and the enumerator should endeavour to vet the answers with her. If the main household cook is a dependent child, both the child and their guardian must provide consent and be present for the interview.

If the enumerators do not speak the local language fluently, an interpreter must be brought in to assist with administration of the questionnaire.

Surveys should be as concise as possible. Enumerators must provide a realistic estimate of the time needed to complete the survey, and efforts should be made to schedule interviews at times that minimize disruptions to the household.

Retrospective questions should ask the cook to report on their activities on a certain day, commonly "yesterday," as this approach has been shown to be more accurate than asking interviewees to aggregate or approximate their activities over a longer period of time, such as "last week."

The methodology uses the term "cooking event" to refer to any occurrence where useful energy is delivered from a cookstove to fulfil a discrete task or set of tasks, such as cooking a meal (which may include multiple dishes), preparing tea, or heating water for bathing. Surveys undertaken for the methodology should use similar language, and project owner(s) must ensure that respondents include all types of tasks conducted using their cookstoves in their responses.

General guidance on conducting high quality surveys in the low- and middle-income country (LMIC) context can be found in the following documents:

- Household Sample Surveys in Developing and Transition Countries
- Designing Household Survey Samples: Practical Guidelines
- WHO WORLD HEALTH SURVEY SURVEY MANUAL
- Siwatu,Gbemisola Oseni; Palacios-Lopez,Amparo; Mugera,Harriet Kasidi; Durazo,Josefine. Capturing What Matters : Essential Guidelines for Designing Household Surveys (English). LSMS Guidebook Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/381751639456530686

Specific survey guidance and tested questions relating to various aspects of household energy patterns and transitions, including cooking carbon projects, can be found in the following resources. Not all questions may be relevant for the application of the methodology.

- Guidance on survey design from the authors of Gill-Wiehl, A., Kammen, D.M. & Haya, B.K. Pervasive over-crediting from cookstove offset methodologies. Nat Sustain 7, 191–202 (2024). https://doi.org/10.1038/s41893-023-01259-6
- Clean Cooking Alliance's Fuel Stacking Toolkit

Baseline Scenario Survey
Purpose:

- Establish household size;
- Identify cooking fuels and technologies used;
- Document the percentage of cooking events carried out on each fuel-technology combination;
- Capture seasonal or other variation in the percentage of cooking events carried out on each fuel-technology combination over the course of one year; and
- Understand the impact of space heating on fuel consumption (if any).

Project owner(s) are required to incorporate the resulting information on seasonal or other variations in fuel use into their monitoring plan design and to justify on the Project Information Cover Sheet how the approach they are taking will result in accurate baseline and project fuel use measurements. If space heating is common in the project area, the justification must include an explanation of how space heating has been addressed in the project design. If an accurate approach cannot be taken, then the project owner(s) must instead select and justify a conservative approach.

Baseline and Project KPT surveys
Purpose:

- Track the number of people cooked for; and
- Document any unusual cooking events.

Usage Survey
Purpose:

- Determine the presence of the project technology, and frequency with which the household uses the project technology in order to determine if the household may be counted as a user household. Note that SUMs monitoring may be used to measure the frequency of the use, but the survey must still be conducted to determine the presence of the project technology.
- Assess the types and characteristics of seasonal variations that may affect the project's emission reductions.

Project owner is required to frame up questionnaire for the purpose of the usage survey in line with the guidelines outlined under https://cleancooking.org/protocols/ and available at "Cookstove Field Study Resources". The guiding document provides resources to assist teams in developing and implementing field studies to evaluate the performance of cookstoves.

Usage survey results shall be corroborated with a visual inspection using a standardized checklist to assess if the project technology is present in the kitchen and shows signs of recent use. Enumerators must also take photographs with a Geographic Information System (GIS) and time record of all the cookstoves present in the household, as well as of the cooking area(s). The photographs must include both close-ups of each technology and its fuel (if present) and wider compositions showing the position of the cookstoves within or near the household.

Supplemental purpose of first usage survey administered for any given household

- Establish household size;
- Identify cooking fuels and technologies used prior to acquisition of project technology (retrospective baseline);
- Document the percentage of cooking events carried out on each fuel-technology combination used prior to acquisition of project technology (retrospective baseline);

This supplemental usage survey activity is used to check how well the project household characteristics match the ex-ante baseline scenario. Retrospective questions are added to the first usage survey conducted in any given household. To the extent possible, these retrospective questions should be identical to the questions in the baseline scenario survey, just asked retrospectively. Project owner(s) must identify any mismatch between the primary fuel type and household size documented during the baseline scenario and those reported by actual project households during the project roll-out (see Section 8 for further details).

Appendix 7: Requirements and Best Practices for KPTs

Overview

The KPT is a field-based methodology used to estimate household fuel consumption under real-world conditions. Within the methodology, the KPT serves as the primary tool for assessing fuel savings needed to calculate emissions reductions.

This document provides context for how the KPT protocol should be applied in the methodology. It refers to the latest version of the KPT protocol available on the CCA website at https://cleancooking.org/protocols . Where guidance provided here conflicts with the directives of the KPT protocol, guidance here should be followed for projects using the methodology, including the energy consumption estimates on a per capita fuel consumption basis rather than per standard adult basis.

Sampling Requirements

Projects must meet the 95/10 precision guideline for the total energy consumption (TJ/(person*year)) for the project and baseline KPTs or use the conservative 95% confidence bound that results in the lower emissions reduction estimate.

For baseline and project KPTs, households shall be selected from the group of households included in the baseline scenario survey and project usage surveys, respectively. Households are anticipated to be statistically similar to those of the larger surveys and must be within 10% of the household size and proportion of cooking done with the primary fuel for the respective baseline and project scenarios. If either of these conditions are not met, the project will conduct additional sampling until these conditions are met. This requirement is separate and additional to checking that the baseline scenario is representative of the project scenario (see Section 8 of the methodology). For the project scenario, sampling shall be stratified across technology ages to ensure representative results.

Given that simple random sampling may result in impractical logistics for four days of consecutive household visits, a household may be excluded if all of the following conditions are met:

1. The household requires more than one hour of transportation from the next nearest household in the sample;
2. The households in the area where the samples are excluded can be demonstrated to be similar in household size, fuel use type, and energy demand; and
3. The total number of excluded households is not greater than 10% of households initially selected for the KPT sample.

Measurements and Sample Integrity
<u>Scale Checks</u>

- Scales must be checked with a certified calibration weight (5–20 kg) at least weekly during field campaigns and results of calibration checks clearly recorded to facilitate verification by Validation and Verification Bodies (VVBs).
- The scale must be accurate within 1% of the calibration mass.
- If a scale fails a check, any data collected since the last successful check must be excluded from the analysis.

Accounting for Wood Moisture

- Default energy conversions assume air-dried wood (~20% moisture, wet basis) with a Net Calorific Value (NCV) of 0.0156 TJ/tonne.
- This NCV should be applied to wood quantities before making any moisture adjustments.

- While NCV assumptions provide a standardized approach, it is best practice to measure actual moisture content (using moisture sensor/meter), particularly to:
  - Identify potential outliers
  - Assess seasonal variations in fuel characteristics

Fuel Provision

Because providing fuel to households can introduce substantial bias, fuel should not be provided to households for use during the KPT in most cases.

In situations where households normally collect their fuel (e.g., wood, crop residues, dung) daily and are not able to collect and store a full day's fuel in advance, project owner(s) may provide fuel for the KPT under the following conditions:

- The number of households that are unable to collect and store a full day's fuel in advance must comprise more than 40% of the KPT sample; otherwise, those households should simply be excluded from the sample.
- Where fuel is provided, the household must be identified as having been provided fuel, and a 20% discount must be applied to the fuel consumption measured for that household during the baseline KPT.
- The amount of fuel provided must not exceed 30 MJ/(person*day) (approximately 2kg/(person*day)).
- If fuel is provided to a household for the baseline KPT, the same amount of fuel must also be provided to that household for the project KPT.

For households where the primary fuel is purchased in discrete quantities, and it is impractical to store three times the amount typically used in a day, projects must follow the KPT protocol guidance for fuel purchases and estimate weights accordingly.

Alternatively, rather than providing fuel, project owner(s) may use fuel-weighing sensors that measure fuel consumption in real-time. This option may be used for any KPT, regardless of household fuel constraints.

Data Quality and Outlier Handling
<u>Outliers Identification and Exclusion Criteria</u>

Outliers shall be defined as data points that fall beyond 1.5 times the interquartile range (IQR) from its endpoints. Outliers may only be excluded if there is a clear, documented reason for their removal. Any excluded data must be retained along with an explanation. Acceptable reasons for exclusion are:
- Data entry errors;
- Documented unusual events (e.g., party, non-household members using the cookstove); or
- A per capita fuel consumption >175 MJ/(person*day) for any single day (equivalent to ~10 kg of wood/(person*day)).

<u>Minimum Data Requirements</u>

- Only households with at least three complete days of data may be included in the analysis.
- These three days do not need to be consecutive if:
  - Some data are missing due to measurement failures; and
  - Additional visits were conducted to compensate.
  - All data collection must occur within a two-week period.

CTEC KPT considerations

The CTEC KPT approach for determining energy consumption in the project scenario requires quantifying the energy consumption of all technologies used in the project scenario based on a project KPT. The project must use metered energy consumption data for the project technology/fuel specific to the KPT period where available.

Where metered energy consumption is not available specific to the KPT period, the traditional fuel-weighing KPT approach must be used. Fuel-weighing must always be used for fuel consumption based on purchase tracking data.

Digital Kitchen Performance Test (dKPT)

The section details the procedure for executing the digital KPT towards increasing the accuracy, transparency and efficiency over traditional analog methods of KPT. The dKPT leverages on digital datalogging scales for firewood measurements (digital scale logs fuel weight continuously thereby replacing manual daily logging), laser thermometers, wood humidity/ moisture sensors, thermal cameras and stove use monitors (SUMs) to fully automate data collection, real time data tabulation and synchronizing of the collected information with cloud-based server/ digital database

Overview of dKPT

dKPT to be carried out for a period of 3–7 days (minimum 3 days) to assess daily fuelwood consumption per person will involve following steps:

1. Selection of households - One way to minimize potential sources of bias is through the careful selection of the households where the tests are to be carried out. The best way to avoid bias is to choose families randomly from a list that includes all of the participating families. This ensures that all families have equal probability of being selected for the survey.
2. Record the moisture content of the initial stock of solid fuels and the demographic data (age/gender) of household members[64].
3. Deployment of data-logging scales (resolution of 1g or better)[65] for each fuel type and stove use monitors for the project device and other stoves.
4. Training of the households to ensure that only the fuel that has been placed in the secured holder of the digital scale is being used during the testing period and is not be given away or sold. The training will encompass on how the fuel holders is to be refilled after the existing fuel in it is fully consumed and stabilize the refilling before subsequent use and retain the left over in the fuel holder after the completion of test.
5. The enumerator will responsible for undertaking of the monitoring at the beginning and end of the 3-7 days (generally 3 days) test towards minimizing the risk of behavioral change (Hawthorne effect) caused from direct observation during the test period.
6. The data from digital scale and SUM will either be directly communicated/ transmitted to the server from the monitoring device itself or will be downloaded and fed to the server. Data monitored for the parameters like moisture content (initial stock and that of remaining fuel) will be downloaded and fed to the server.
7. The fuel-use events (from scale drops) and stove-use events (from SUM detection) with corresponding timestamps will be cross checked within a defined time window.
8. Comprehensive audit trail for the KPT is to maintained including GPS tracking of the cooking device location, verification of the unique ID of the cooking device and id of the authorized representative of the households, and photographs to prevent duplicates and verify implementation.

[64] The number of people present at each meal shall be normalized and expressed as a Standard Adult equivalent using the following factor (1) Child: 0-14 years - Fraction of standard adult ~ 0.5 (2) Female: over 14 years- Fraction of standard adult ~ 0.8 (3) Male: 15-59 years Fraction of standard adult ~ 1 (4) Male: over 59 years -Fraction of standard adult ~ 0.8

[65] Solid biomass fuel must be placed in an appropriate fuel holder below a single hanging scale dedicated to that fuel type. Compressive scales may be used for LPG canisters, provided the scale is placed on a hard, flat, and level surface. All scales must be calibrated before and after the KPT campaign using a reference weight (accurate to 0.05% of nominal weight). If the post-campaign deviation exceeds 5%, the data must be corrected for linear drift.

Appendix 8: Requirements and Best Practices for CCTs

Overview

The CCT is a field test used to measure cookstove performance in a controlled setting using local fuels, pots, and cooking practices, with local cooks preparing a pre-determined local meal, which may include multiple dishes. This standard meal is defined as all the prepared foods that are commonly eaten together by a household at the time of day when that household consumes their largest amount of food.

Within the methodology, the CCT is used to assess the specific energy consumption of both baseline and project cookstoves, the ratio of which is used to back-calculate displaced baseline energy consumption in continuously tracked energy consumption (CTEC) projects.

This document provides context for how the CCT protocol should be applied in the context of the methodology. It refers to the latest version of the CCT protocol available on the CCA website at https://cleancooking.org/protocols . Where guidance provided here conflicts with the directives of the CCT protocol, guidance here should be followed for projects using the methodology.

Sampling Requirements

To ensure robust and representative data collection for the CCT within the methodology, the following sampling and testing requirements must be adhered to.

1. **Selection and Testing of Baseline and Project Cookstoves**

- Baseline technologies must be tested in order to be included in baseline fuel consumption displacement. Untested baseline technologies shall not be included in calculating displaced fuel consumption. For example, if project surveys indicate that a baseline technology accounts for 10% of cooking events and the project does NOT conduct a CCT with that baseline technology, then the 10% displacement that would have been attributed to that baseline technology is disregarded and not included in the back calculation, nor is it redistributed to the other cookstove types, resulting in a lower baseline than could otherwise be claimed;
- The most common type of a given type of baseline cookstove should be selected (see section on cookstove types below). For example, if there are multiple simple open-fire cookstove types (e.g., three-stone fire or U-shaped mud cookstove), the most common, representative type should be chosen. This selection should be made as part of the process with project area cooks to determine the standard meal, per the CCT protocol[66];
- At least three samples of each baseline cookstove type must be tested to account for inter-stove type variability;
- Each cook must prepare at least three meals per baseline cookstove type (at least one on each baseline cookstove type sample) to capture variability in performance.
- All project technologies must be tested.
- When CCTs are conducted as part of ongoing project monitoring, including to account for any degradation over time, then at least three cookstoves per vintage randomly sampled from project households, should be tested (households should receive a new replacement cookstove).

[66] For example, common baseline wood cookstove types (i.e., categories) include three stone fires and sunken wood pits. For projects where both exist, project proponents would need to test one example of each type to be able to count displacement for both types in their emissions reductions. Displacement can be considered for stove types tested.

2. Selection of Cooks

- At least three local cooks, who are unfamiliar with each other and reside in different locations within the project area, shall be recruited for testing;
- Cooks recruited for testing must not be affiliated with the project beyond their participation in the CCTs. Ideally, they would not be project participants, but if they are they must not receive any special treatment beyond what is required for the CCT. All cooks may be compensated for their time and travel for the CCT testing;
- The cooks should be familiar with and comfortable cooking on all of the baseline cookstove phenotypes;
- If any of the cooks do not yet have the project cookstove, they should be given one to use at their household for a minimum of two weeks before starting the CCT. They should be given the same training and support (and no extra) that regular project participants receive; and
- Ideally, the same cooks should be used for the initial CCTs conducted during the validation phase and for subsequent project monitoring periods. If not possible, alternate cooks may be selected using the same criteria as above.

Testing Matrix and Precision Guidelines

The figure below represents the minimum required testing configuration for a CCT given the set of stoves listed above. Each of the three cooks should conduct an equal number of tests across all cookstove types. The cookstove types included in the example below are:

- CTEC cookstove (e.g., electric, LPG, ethanol, or biogas cookstove);
- LPG cookstove (baseline);
- Charcoal cookstove (baseline); and
- Simple wood cookstove (baseline, e.g., three-stone fire or mud cookstove).

To minimize bias, cookstove models should be rotated systematically so that no cook follows the same sequence repeatedly.

As shown in the example below (Figure 1), each set of three tests is conducted simultaneously, with Cook 1, Cook 2, and Cook 3 testing different cookstoves at the same time. The cookstove type order changes for each test block to ensure that no cook consistently follows the same cookstove sequence.

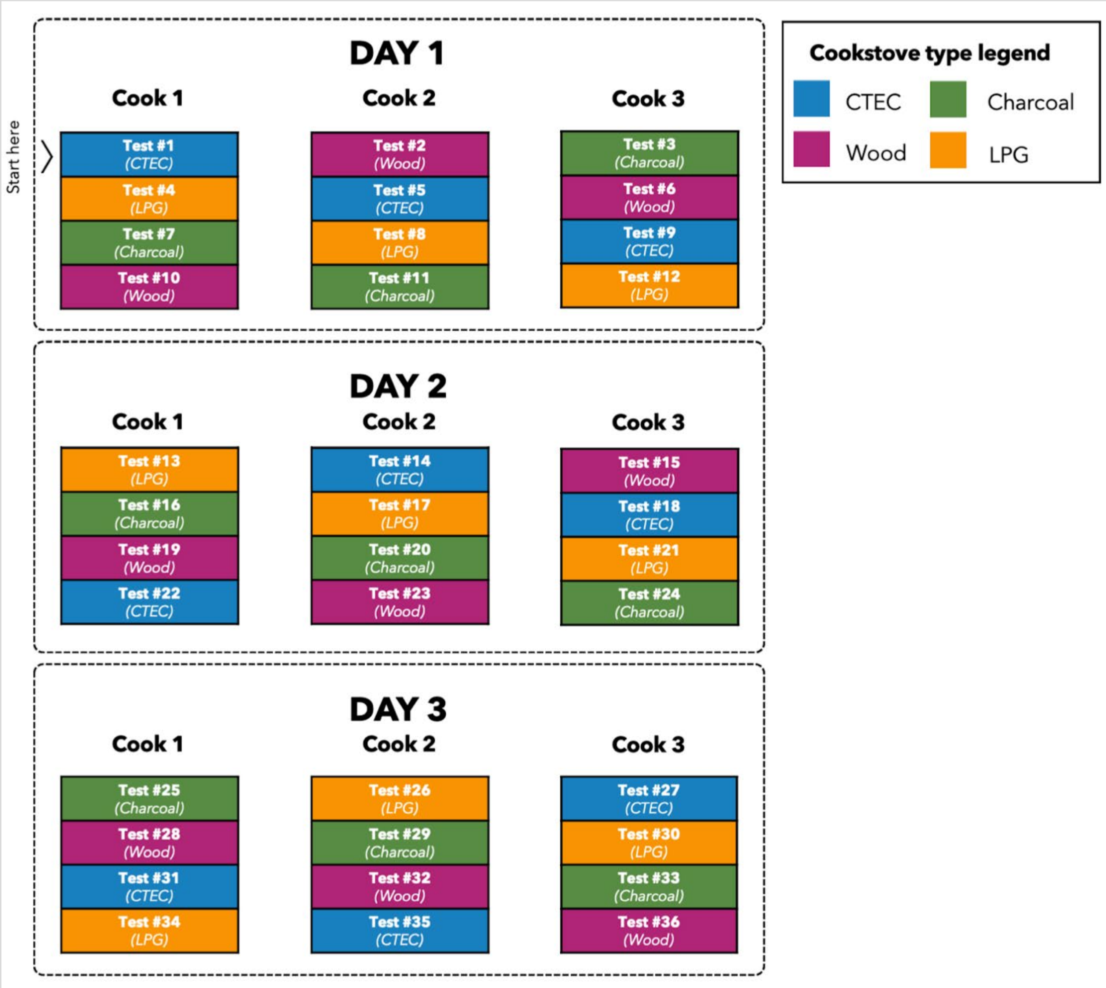

Figure 1: Minimum Testing Configuration and Example Schedule for CCT

Measurements and Sample Integrity
<u>Scale Checks</u>

- Scales must be checked with a certified calibration weight (5–20 kg) daily during the testing campaign;
- The scale must be accurate within 1% of the calibration mass; and
- If a scale fails a check, any data collected since the last successful check must be excluded from the analysis.

Data Quality and Outlier Handling
<u>Outliers Identification and Exclusion Criteria</u>

Outliers shall be defined as data points that fall beyond 1.5 times the interquartile range (IQR) from its endpoints. Outliers may only be excluded if there is a clear, documented reason for their removal. Any excluded data must be retained along with an explanation. Acceptable reasons for exclusion are:

- Data entry errors;
- Documented unusual events (test was interrupted, weather impacts, etc.); and
- A cook reports a problem with the specific test.

Minimum Data Requirements

- There must be equal numbers of successfully completed CCTs for each cook-technology combination; and

- A minimum of three cooks and three repeated CCTs per cook-technology combination must be completed.

Classifying Baseline Cookstove Types

Baseline cookstoves can be categorized into distinct types based on their physical structure. This classification helps standardize the selection of representative cookstove models for performance testing and emissions reduction calculations. The types described here are common examples found in many regions, but they are not exhaustive. Different contexts, geographies, and cultural cooking practices will influence the specific baseline cookstoves used in a given project.

Project owner(s) must identify and justify the most appropriate types for their specific setting, ensuring that selected models accurately represent the prevailing baseline cooking technologies. These types should be used as the basis for testing fuel consumption, thermal efficiency, and emissions when establishing baseline parameters.

Examples of Common Wood Cookstove Types

1. Three-Stone Fire
   - A setup using three stones or bricks arranged in a triangular shape to support a cooking pot, with an open fire in the center.
   - Materials: Natural stones, bricks, or compacted earth.

2. Sunken Pit Cookstove
   - A shallow pit dug into the ground where wood is burned.
   - Materials: Bare earth or reinforced with clay.

3. U-Shaped Mud Cookstove
   - A simple mud or clay structure in a U-shape, designed to hold a pot over an open fire.
   - Materials: Locally sourced mud or clay, sometimes reinforced with straw.

4. Traditional Chulha/Chulho
   - Cookstove A raised, built-in clay or brick cookstove with one or more burner holes for pots.
   - Materials: Clay, bricks, or mud, sometimes with cow dung.

5. Plancha Cookstove (Traditional)
   - A raised clay or metal cookstove with a flat griddle (plancha) for cooking tortillas or flatbreads.
   - Materials: Clay, bricks, metal griddle.

Examples of Common Charcoal Cookstove Types

1. Metal Bucket Cookstove
   - A metal bucket or shallow metal bowl with ventilation holes at the bottom and a top grate for placing charcoal.
   - Materials: Sheet metal, iron, steel.

2. Ceramic-Lined Charcoal Cookstove
   - A metal bucket cookstove with a ceramic liner inside for heat retention and insulation.
   - Materials: Sheet metal exterior with a ceramic inner lining.

3. Clay Pot Cookstove
   - A clay vessel with an opening for airflow and a flat surface for a cooking pot.
   - Materials: Fired clay or terracotta.

Appendix 9: Requirements and Best Practices for Stove Use Monitors (SUMs)

In the context of the methodology, non-continuously tracked energy consumption (non-CTEC) projects may choose from two approaches to determine energy consumption in the project scenario, differentiated by application (or non-application) of SUMs, which correspond to two different methods for accounting for the Hawthorne Effect.

When projects complement Kitchen Performance Tests (KPTs) and surveys with SUMs measurements, the ratio of project technology usage (cooking events/day) measured during the KPT to project technology usage measured during the month prior to or following the KPT is used as a multiplier in the emission reduction estimate calculation (only when that value is less than 1).

When projects measure fuel consumption through KPTs, complemented by usage surveys only without SUMs, maximum emission reductions are capped at 75% of the KPT-based estimate to account for the Hawthorne Effect (the equivalent of a 75% ratio of project technology usage described above).

Project owner(s) opting to use the SUMs method must place SUMs on the project cookstoves for the duration of the KPT, as well as for the contiguous 30 days (before, after, or any combination of before and after) to serve as a reference point.

SUMs may also be used to characterize the primary fuel-stove combination usage for identification of a potential mismatch between the baseline and project scenario profiles or to determine the proportion of cooking done on baseline cookstoves for back-calculating the baseline energy consumption (tPCb,i).

SUMs may also be used to estimate Ψ, the percent of project households with the project cookstove present, where the project cookstove is used at least once per week. Projects must use the same measurement period (at a minimum) as that used for determining a potential Hawthorne effect, and the same sampling requirements for Ψ as those outlined in Appendix 10. If sampling includes homes where KPTs are being conducted, the frequency of use estimates must not include data from days when KPTs are occurring. For households where SUMs installation is not possible because the project cookstove is not present, these households must be included as non-users in the estimate Ψ.

This appendix provides requirements and best practice guidance for using SUMs within the methodology.

Requirements for the Use of SUMs in the Methodology

- The algorithm for estimating cookstove usage must be able to reliably distinguish cooking events from other potential factors that could be interpreted as cooking events but that are actually caused by external circumstances (e.g., temperature fluctuations from typical diurnal patterns).
- The algorithm shall be clearly presented publicly with associated equations and/or logic rules, such as publishing in a paper, or on a website.
- The same algorithm and SUM device type shall be used for the duration of the project. If a different SUM device and/or algorithm is used, then the project must demonstrate that the stove use estimates between the two approaches are unbiased. This can be demonstrated by conducting a side-by-side comparison in a representative subsample of households, where both devices/algorithms are applied simultaneously, and the resulting cooking event estimates are compared. Statistical tests such as paired t-tests, regression analyses, or Bland–Altman plots may be used to assess whether systematic bias exists. The results of these tests, along with all supporting data and documentation, must be provided to GCC.

- Sampling must meet the 95/10 precision guidelines, per the sampling guidance included in Appendix 10
- SUMs sampling protocols (installation, placement, downloading) and the algorithm used to convert raw data into cooking events must not change between sampling during the KPTs and sampling prior to or following the KPTs.
- Project owners in the SUMs sample shall not receive any support different or additional to those not included in the sample.
- Project owner(s) shall ensure that photographs of the SUMs placement in each sampled household are taken and retained as part of the monitoring record.
- The average of the cooking events per day during the full 30 days of cookstove use monitoring must be used to adjust for potential Hawthorne Effects. If SUMs data is incomplete or missing, it must be omitted from the analysis.

Deployment of SUM

- SUM can be installed on sample cookstoves where sample size must meet the 95/10 precision guidelines, as per the sampling guidance included in Appendix 10.
- The beneficiary for sample SUM installation is to be randomly selected from the digital database based on the sample size.
- Since the digital database is dynamic in nature due to periodic addition of beneficiary, project owner should ensure that the updated database (containing sales/ beneficiary record for preceding one year) is used for determination of sample size for deployment of SUM so that sample size for each year meets the 95/10 precision guidelines.

Additional Requirements for the Use of SUMs to characterize fuel-stove use proportions

- If SUMs sampling is being used to characterize the primary fuel-stove combination usage for identification of a potential mismatch between the baseline and project scenario profiles (PCb,i) and (PCp,j), or for determination of proportion of cooking done on baseline cookstoves for back-calculating the baseline energy consumption (tPCb,i), the following guidelines must be followed:
    - The guidance in the above bullet points must be followed, including the sample size guidance in Appendix 10
    - SUMs must be placed on all cookstove-fuel combinations (in each household) that are to be included in the baseline.

Best practice guidance for using SUMs
<u>Installation</u>

Project owner(s) should follow manufacturer installation requirements (if provided) for the SUMs instrumentation being used. Unless specifically indicated otherwise, placement of the device should generally follow these key guidelines.

- The project cookstoves' temperature profiles during cooking events should be analyzed before the field campaign to determine optimal placement.
- Temperature sensors and loggers should not be placed in a location where temperatures exceed their maximum operating/sensing temperature specifications.
- Sensors and data loggers should be placed in a manner that the monitored temperature is high enough to be easily and reliably detected as a cooking event.
- Sensor placements should provide a maximum temperature differential between ambient and cookstove temperature (without exceeding maximum operating temperature for the sensor).
- Cookstoves and sensing units (e.g., thermocouple leads) should be kept out of direct sunlight, when possible, to reduce sensors logging the radiant heat of the sun, which can be confounded with cooking. In addition, the sensors should be adequately protected to withstand the environmental conditions (e.g. rain) of the deployment locations.
- Sensor placement must be standardized as much as possible across the sample.

- Sensor placement should not get in the way of the pot, or obstruct or interrupt the cooking, or be located where liquids are likely to collect or boil over.
- Sensor placement should not interfere with participants' normal activities. Placement should also minimize risk of the sensor being accessed, moved, and/or damaged by participants, other people, or common household features, such as water, insects, or animals.
- Project owner(s) should explain to household members that the SUMs are for measuring temperature and should not be tampered with. Household members should not press buttons, move parts, or disconnect or connect the sensors to computers or power.
- The placement of temperature sensors and loggers should be maintained consistently throughout the crediting period and shall be identical to the placement used during the KPT.
- Data from the SUMs will be collected during the monitoring period to assess the technology usage.

Cookstove Temperature Analysis

Project owner(s) should follow manufacturer guidelines for data analysis[67] where available. Unless specifically indicated otherwise, analysis should generally follow these key guidelines.

- Subtracting ambient temperature generally improves the ability to resolve a temperature response during cookstove events from normal diurnal and seasonal temperature variation.
- Perform validation or sense checks on the algorithms used to determine cookstove use. These can include:
  - Having a person with expertise manually inspect at least a subset of analyzed files to check that the algorithm is determining apparent cooking events as intended.
  - Cross-referencing observational data on cooking events with the analyzed data.
  - Using common sense checks with what is generally known about cooking behaviors in the region. For example, if only one cooking event per week is being estimated when it's known that people are using several kg of fuel every day, the placement or algorithm are not working properly.

Emergency Preparedness

- In case of malfunctioning and/or damage of the loggers or sensors, such that data relating to daily cooking event(s) cannot be successfully retrieved the household shall be considered as having non-valid data for the particular monitoring period. A new set of loggers and sensor is to use for replacement of the existing one, once such events is reported.
- Households with partial data may be considered in they posses' valid data regarding the cooking events for a total of one month before or after the KPT during the monitoring period.

Public presentation of stove use algorithms

To support transparency and reproducibility in stove use monitoring, all algorithms used to convert raw SUM data into cooking events must be publicly available, following the requirements below.

1. **Algorithm logic description.** Provide a clear explanation of how the algorithm detects cooking events, including:
   - Physical parameter(s) monitored (e.g., temperature, power)
   - Logic for identifying events (e.g., threshold crossings, sustained changes)
   - Preprocessing steps (e.g., filtering, smoothing)
   - Contextual adjustments (e.g., ambient corrections, diurnal patterns)

67 Of note, data analysis can be challenging for cookstoves that are frequently moved indoors and outdoors for cooking, due to solar radiation affecting heating and cooling rates, so piloting placement of temperature monitors or probes is critical for such applications

2. **Formal equation or code.** Present the algorithm as:
   - Equations and logic rules, or
   - Annotated code outlining the decision steps.

3. **Parameter definitions and units.** All thresholds and time-related values must:
   - Be listed with units (e.g., °C, seconds).
   - Be applied consistently across devices and time.

4. **SUM device specifications.** These include:
   - Manufacturer, model, and firmware version
   - Sampling rate and sensor types
   - Any known limitations affecting performance

5. **Data sample publication.** Share at least three anonymized raw data files (2 weeks or more of data) for three different project cookstoves with their processed output to demonstrate algorithm performance. Data must:
   - Be in a usable format (e.g., CSV, JSON)
   - Include clear headers, units, and time zone information

6. **Hosting and access**. Publish the algorithm and sample dataset on a stable public platform (e.g., project website, registry, GitHub). Include the link in the Project Information Cover Sheet.

Appendix 10: Sampling Requirements and Best Practices for Surveys, KPTs, CCTs, SUMs

Note: Sampling requirements and guidance from this appendix may be revised in accordance with forthcoming Article 6.4 standard and guidance on sampling.

This appendix supports project proponents in planning sample sizes for data collection and ensuring that monitored parameters meet required precision standards. Specifically, it addresses the 95/10 precision guideline, which stipulates that sample sizes must be sufficient to achieve a 95% confidence interval with less than 10% margin of error. If a monitored parameter estimate does not meet the precision guideline, then additional sampling must be conducted, or the confidence bound that results in a lower emission reduction estimate must be applied.

For projects of 25,000 or more project households, the minimum required sample sizes for all monitored parameters, except those based on specific consumption from CCTs, shall scale by 0.05% in proportion to the total number of project households above 25,000.

Examples:

- A project with 25,000 households requires 100 KPTs and 200 surveys (minimums).
- A project with 250,000 households requires:
  - KPTs: 100 + (0.0005 × [250,000 − 25,000]) = 213
  - Surveys: 200 + (0.0005 × [250,000 − 25,000]) = 313

Projects must still demonstrate that the final sample achieves the 95/10 precision threshold. Projects using cluster sampling must account for design effects in both planning and analysis stages. If the achieved sample does not meet precision requirements, additional sampling or the application of a conservative confidence bound must be undertaken.

The appendix is structured into four components. First, it presents sampling method approaches. Next, a table outlining the monitored parameters that require sample size determination, including their descriptions, data sources, and applicable rules. This table provides direction on which sampling guidance section to follow for each parameter. The third section focuses on proportional parameters, such as the proportion of cooking conducted using a primary fuel, detailing methods for determining sample sizes. The last section provides guidance for continuous variables, such as baseline energy consumption, incorporating statistical approaches for variables with skewed normal distributions.

Sampling methods
Two sampling approaches are used in the methodology: Simple Random Sampling and Cluster Random Sampling. The choice between these methods depends on the characteristics of the target population and logistical considerations. For both approaches, when sampling parameters for the project scenario, sampling shall be stratified proportionally across installed cookstove age groups (<1 year, 1–2 years, 2-3, 3-4, and 4> years) to ensure that performance and usage estimates reflect the distribution of cookstove ages in the project. Projects using cluster sampling must ensure that age stratification is preserved within and/or across clusters, as appropriate.

Regardless of the sampling approach used, the project proponent must document and provide verifiable materials to demonstrate how randomization was conducted and how it can be independently verified. Acceptable documentation may include a record of the random number generator or software used, screenshots of the randomization process, or signed attestations from third parties who witnessed the selection. These materials shall be maintained as part of the project record and made available to the validation and verification body upon request.

Simple random sampling

- Each household in the population has an equal probability of being selected.
- Suitable when the population is relatively homogeneous, such as within the same climate zone or socio-economic setting.
- Provides unbiased estimates.
- Can be costly and time-consuming, particularly if the population is spread over a large geographical area.

Cluster random sampling

- The population is divided into clusters, such as villages or communities, and a random selection of clusters is made. All or a subset of households within selected clusters are then sampled.
- Useful when the population is widely dispersed, reducing costs and logistical challenges.
- More efficient for large-scale studies but requires adjusting for the intraclass correlation coefficient (ICC), which measures the degree of similarity between households within the same cluster. A high ICC indicates that households within a cluster are more alike, meaning that the effective sample size is smaller than the actual number of observations, often requiring an increase in the number of clusters to achieve the desired precision.
- Assumes that each cluster represents the overall population, which may introduce bias if clusters are highly variable.
- The design and calculations for this approach are more complex. Projects applying cluster sampling must involve someone with sufficient statistical expertise to ensure appropriate design, analysis, and interpretation.

Parameter	Description	Unit	Data source	Rule and guidance	Reference section for guidance
$tPC_{b,i}$	For CTEC back-calculated baseline projects: Proportion of cooking events conducted using baseline fuel-stove combinations *i*	Percentage	Baseline scenario surveys or Stove use Monitor (SUMs)	95/10 for the primary cookstove-fuel combination Minimum 200 households + 0.05% of households additional to 25,000	Proportional distribution
$PC_{b,i}$	For non-CTEC and CTEC with KPT projects: Proportion of cooking events conducted using baseline fuel *i*	Percentage	Baseline scenario surveys or Stove use Monitor (SUMs)	95/10 for the primary fuel type Minimum 200 households + 0.05% of households	Proportional distribution

				additional to 25,000	
$PC_{p,j}$	For non-CTEC and CTEC with KPT projects: Proportion of cooking events conducted using project fuel *j*	Percentage	Project usage surveys or SUMs	95/10 for the primary fuel type Minimum 200 households + 0.05% of households additional to 25,000	Proportional distribution
H_s	Average household size	Persons per household (Number)	Baseline and project usage surveys	95/10 Minimum 200 households + 0.05% of households additional to 25,000	Continuous distribution
$\sum EC_{base,i}$	Total energy consumption of baseline fuels (*i*) non-CTEC projects (summed over all fuels used in households)	TJ/(person*year)	KPT	95/10 Minimum 100 households + 0.05% of households additional to 25,000	Continuous distribution
$\sum EC_{proj,j}$	Total energy consumption of project fuels (*j*) non-CTEC projects (summed over all fuels used in households)	TJ/(person*year)	KPT	95/10 Minimum 100 households + 0.05% of households additional to 25,000	Continuous distribution
$SC_{b,i}$	Specific energy consumption of a baseline fuel-stove combination *i* to	MJ/kg food	CCT	95/10 Minimum 15 CCTs per cookstove type	Continuous distribution

	cook a given amount of food				
$SC_{p,j}$	Specific energy consumption of a project fuel-stove combination *j* to cook a given amount of food	MJ/kg food	CCT	95/10 Minimum 15 CCTs per cookstove type	Continuous distribution
$\sum tEC_{base,KPT,i}$	Total energy consumption of baseline fuels (*i*) for CTEC projects from KPT	TJ/(person*year)	KPT	95/10 Minimum 100 households + 0.05% of households additional to 25,000	Continuous distribution
$\sum tEC_{proj,KPT,j}$	Total energy consumption of all fuels in project scenario (*j*) for CTEC projects from KPT	TJ/(person*year)	KPT	95/10 Minimum 100 households + 0.05% of households additional to 25,000	Continuous distribution
PTC_m	Average project technology cooking events per day over 1 month from SUMs measurements	Cooking events/day	SUMs	95/10 Minimum 100 households + 0.05% of households additional to 25,000	Continuous distribution
PTC_{KPT}	Average project technology cooking events per day over the project KPT from SUMs measurements	Cooking events/day	SUMs	95/10 Minimum 100 households + 0.05% of households additional to 25,000	Continuous distribution

Ψ	Percent of project households with cookstoves present and used at least once per week	Percentage	Project usage survey or SUMs	95/10 Minimum 200 households + 0.05% of households additional to 25,000	Proportional distribution

Sample size guidance: continuous variables

Estimation of required sample size

To estimate the required sample size for continuous variables, project proponents must first determine the coefficient of variation (CoV), which represents the variability of the data relative to the mean. The lookup table provided applies only to simple random sampling and assumes a normally or skew-normally distributed variable. If project proponents do not have prior data to estimate CoV, they should conduct a small pilot study to generate an approximation. Additionally, project proponents should plan for oversampling to account for potential data loss due to non-responses, measurement errors, or incomplete records, ensuring that the final sample size meets the precision requirement.

For cluster sampling, where participants are grouped into clusters such as villages or communities, the required sample size will be larger than in simple random sampling due to intra-cluster correlation. This means that the effective sample size is smaller than the actual number of observations. In such cases, design effects must be accounted for, and sample size determination should be conducted with the assistance of a statistician.

Simple random sampling: CI: 95%	
CV(%)	***Relative precision 10%***
5	25
10	25
15	25
20	25
25	40
30	55
35	75
40	100
45	125
50	155
55	185
60	220
65	255
70	295
75	340
80	385
85	435
90	490
95	545
100	605

Determination of meeting precision guidelines

Once data collection is complete, project proponents must verify whether the achieved sample size meets the 95/10 precision guideline. This requires calculating the actual CoV from the collected data and confirming that the confidence interval is within 10% of the mean estimate. Project proponents should utilize the **sample size calculator** to determine whether their sample meets the required precision and the 95% confidence bounds that result in lower emission reductions estimates if the precision guideline is not met.

For **cluster sampling**, meeting the precision requirement is more complex due to the need to adjust for design effects. In such cases, a statistician should evaluate whether the collected data meets the required confidence and precision levels. If the required precision is not met, the conservative confidence bound must be applied, or additional sampling may be needed.

Sample size guidance: proportional variables

Estimation of required sample size
To estimate the sample size for proportional variables (e.g., the proportion of households using primary fuel), project proponents must first determine an expected proportion for the population. This can be based on prior research, survey data, or a pilot study. The lookup table provided is only applicable to simple random sampling and assumes a binomial distribution.

95% CI: Simple random sampling	
Prevalence (%)	Precision
	10%
10	35
15	49
20	61
25	72
30	81
35	87
40	92
45	95
50	96
55	95
60	92
65	87
70	81
75	72
80	61
85	49
90	35

As with continuous variables, oversampling is necessary to account for expected data loss due to incomplete responses or participant dropouts. For cluster sampling, the required sample size will be larger due to intra-cluster correlation, meaning the actual number of surveyed participants must exceed the effective sample size. In such cases, a statistician should be consulted to correctly adjust for design effects.

Determination of meeting precision guidelines
Once the survey is completed, project proponents must verify that the achieved sample meets the 95/10 precision requirement by calculating the actual proportion and confirming that the confidence interval remains within 10% of the estimated proportion. Project proponents should utilize the **sample size calculator** to determine whether their sample meets the required precision and the 95% confidence bounds that result in lower emission reductions estimates if the precision guideline is not met.

For cluster sampling, verification of precision must account for the design effect, which reduces the effective sample size. This requires statistical expertise, and a statistician should be involved in determining whether the collected sample meets the required confidence and precision levels. If precision is not met, additional sampling or conservative confidence bounds should be applied.

Appendix 11: Survey Questionnaire

The appendix present questionnaire for a sample/census survey for baseline and project scenario assessment.

Baseline Scenario Assessment

1. Generation Information

Name of Project owner(s) Organisation	
Focal Point of Project Owner	
Contact Details: **Phone:** **Email**	
Title of the project activity/CPA/PoA	
Project ID:	
Project location:	
Crediting period start date:	
Crediting period end date:	

2. Survey Details

Name of the Organisation undertaking survey	
Name of the Surveyor	
Date of Survey	
Period of measurement (for consumption rate)	

3. Household Profile

Name (Household representative)	
Identification details of the beneficiary representative	
Household size (total number of people)	
- Adult	
- Children	
Gender	
- Male (segregated by age)	
- Female(segregated by age)	
Address	
Phone number (if available)	
Mobile number (if available)	
GPS-Coordinate	Lat: Lon:
Photos of the cooking location	

4. Baseline cookstove type/s, model/s prior to project implementation

Baseline cookstove description (type/s, model/s)	**Primary** ☐ Three-stone/ open fire/ traditional stoves using non-renewable biomass-based stoves using firewood/ charcoal ☐ Improved cookstoves used under the project activity ☐ Fossil fuel cookstove (coal/ kerosene/ LPG) ☐ Electric cookstove ☐ Biogas Stoves ☐ Ethanol Stove ☐ Solar Cookers ☐ Combination of above options ☐ Others -------------------------------------- **Secondary** ☐ Three-stone/ open fire/ traditional stoves using non-renewable biomass-based stove using firewood/ charcoal ☐ Improved cookstoves used under the project activity

	☐ Fossil fuel cookstove (coal/ kerosene/ LPG) ☐ Electric cookstove ☐ Biogas Stoves ☐ Ethanol Stove ☐ Solar Cookers ☐ Combination of above options ☐ Others ------------------------------------ **Others** ☐ Three-stone/ open fire/ traditional stoves using non-renewable biomass-based stove using firewood/ charcoal ☐ Improved cookstoves used under the project activity ☐ Fossil fuel cookstove (coal/ kerosene/ LPG) ☐ Electric cookstove ☐ Biogas Stoves ☐ Ethanol Stove ☐ Solar Cookers ☐ Combination of above options ☐ Others ------------------------------------	
Number of Cookstove each type	**Cook stove Type/s. model/s**	**Number of cookstove each type/s, model/s**
Household fuel consumption pattern prior to the project implementation[68]- **How many meals did you prepare last week or last month?**	Meals/week or month	
Is there any difference with the number of meals prepared during a typical weekend day?		
Describe any other ways in which you used your stove last week (e.g., water boiling for drinking, water boiling for hygiene, space heating).		
Place of cooking	Indoor/ Open/Semi-Open	

5. Fuel use for cooking

Baseline Fuel Type	Yes/No	Quantity of usage	Unit	Collected/ purchase	Source/ location of fuel
Charcoal			kg/month or year		
Wood			kg/month or year		
LPG			Kg or cylinders /month or year		
Kerosene			Litres/month or year		
Coal			kg/month or year		

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

Baseline Fuel Type	Yes/No	Quantity of usage	Unit	Collected/ purchase	Source/ location of fuel
Electricity			kWh/month or year		
Other Fuels					
Relative to the amount of fuel you used this week (during survey), are there other times of the year when you use more fuel? If so, when? And/or less fuel?					

6. Baseline fuel Source (predominant fuel)

Baseline fuel Source	Collected from Local Forest - ☐ Yes ☐ No
	Locally Purchased - ☐ Yes ☐ No
	Others (Please specify) - ☐ Yes ☐ No

Project Scenario Assessment

1. Generation Information

Name of Project owner(s) Organisation	
Focal Point of Project Owner	
Contact Details: **Phone:** **Email**	
Title of the project activity/CPA/PoA	
Project ID:	
Project location:	
Crediting period start date:	
Crediting period end date:	

2. Survey Details

Name of the Organisation undertaking survey	
Name of the Surveyor	
Date of Survey	
Period of measurement (for consumption rate)	

3. Household Profile

Name (Household representative)	
Identification number of the beneficiary representative	
Household size (total number of people) – Project Scenario	
- Adult	
- Children	
Gender (total number– Project Scenario)	
- Male (segregated by age)	
- Female (segregated by age)	
Household size (total number of people) – Baseline Scenario)	
- Adult	
- Children	
Gender (total number– Baseline Scenario)	
- Male (segregated by age)	
- Female (segregated by age)	
Address	
Phone number (if available)	
Mobile number (if available)	
GPS-Coordinate	Lat: Lon:
Photos of the cooking location	

4. Project cookstove type/s, model/s

Project cookstove description (type/s, model/s(	☐ Improved cookstoves using non-renewable biomass (Wood/ charcoal) ☐ Improved cookstoves using renewable biomass(pellets/ ethanol, etc) ☐ Solar Powered Cookstoves (solar cooker/ solar concentrator/ solar PV based, etc.) ☐ Biogas ☐ Electric cookstove ☐ Combination of above options ☐ Others --------------------------------------			
Project Cookstove Type/s, model/s	**Cook stove Type/s, model/s (name and number**	**Number of cookstove each type/s, model/s**	**Date of Installation**	**Unique ID**

Environmental information of the project device	**Cook stove Type/s, model/s (name and number**	**Project cookstove(s) ISO thermal efficiency/ies:**	**ISO tier(s) for PM2.5 emissions (optional):**	**ISO tier(s) for CO emissions (optional):**
Photos of project cooking device and location				

5. Household fuel consumption pattern post project implementation

Do you use the project cookstove? (Physically check the stove)[69].	**Yes/no**	
If yes, have you used the stove regularly since you installed it?[70]	Yes/no	
When have you used the project cookstove last?	Today /Yesterday / Before 2 days / Before 3 days / Prior to more than 3 days ago	
If yes, proportion of cooking events conducted using project fuel	How many times did you cook using [cooking device] yesterday?	
If yes, is your stove in good condition?[71]	Yes/no	
Surveyor to confirm on whether the stove have signs of use (ashes inside the stove and fuel nearby, the stove is warm when touched, etc.)		
If no, why did you stop using the stove?		
How many meals did you prepare using project cookstove last week or last month?	Meals/week or month	
Do you use your baseline cookstove also?	Yes/no	
If yes, how many meals did you prepare using traditional (baseline) cookstove last week or last month?	Meals/week or month	
Do you use any other stove (other than the bassline and project device)?	Yes/no	
If yes, list the types and number of other non-project stoves		
How many times a week do you use the non-project stoves?		
Proportion of cooking events conducted using project fuel j	Cooking device	Number of usage event per days
	Project Stove/ device	
	Pre-project device	
	Other stove type/ device in use	
How much do you spend on fuel for cooking/type of cooking device in a week/month?		
Place of cooking	Indoor/ Open/Semi-Open	

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

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

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

6. Fuel use for Cooking (Project Scenario)

Project Fuel Type	Yes/No	Quantity of usage*	Unit	Money spent on fuel / month/ year
Charcoal			kg/month or year	
Wood			kg/month or year	
Pellets/Briquettes			kg/month or year	
LPG			Kg or cylinders /month or year	
Biogas			Kg or m^3 /month or year	
Kerosene			Litres/month or year	
Bio- Ethanol			Litres/month or year	
Coal			kg/month or year	
Solar			Capacity of the device	
Electricity			kWh/month or year	
Other Fuels				
Relative to the amount of fuel you used this week (during survey), are there other times of the year when you use more fuel? If so, when? And/or less fuel?				

*Describe on how the seasonality aspects is being taken care off -

7. Baseline fuel Procurement

Baseline fuel Procurement	Collected from Local Forest - ☐ Yes ☐ No
	Locally Purchased - ☐ Yes ☐ No
	Others (Please specify) - ☐ Yes ☐ No

8. Consumer support service

Describe on how the customer support activities are provided in terms of operations and maintenance support activities.	Yes/no
Describe on how the customer support activities are provided in terms of support communication channels availability to project participants	Yes/no

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V 1.0	19/01/2026	Initial draft adoption for public consultation