Comprehensive Lowered Emission Assessment and Reporting (CLEAR) Methodology for Cooking Energy Transitions

Summary, Context, and Justification for Draft Methodology

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ABSTRACT

This document presents the key approaches to quantify emissions reductions from clean and improved cooking activities laid out in the draft CLEAR methodology developed by the Clean Cooking and Climate Consortium.

While the specific requirements and guidelines are laid out in the methodology, this document serves as a supplementary resource to detail the supporting arguments and evidence for why these requirements and guidelines are recommended, and why the credits resulting from adhering to these approaches should be considered high-integrity.

Comments on this document and the accompanying draft methodology are welcome.

ABOUT THE CLEAN COOKING AND CLIMATE CONSORTIUM

Founded in 2021 and led by the Clean Cooking Alliance (CCA), the Clean Cooking and Climate Consortium (4C) is a group of partners supporting efforts to achieve climate goals through clean cooking action. In addition to CCA, 4C members include the United States Environmental Protection Agency (U.S. EPA), Berkeley Air Monitoring Group, the Climate & Clean Air Coalition (CCAC), Stockholm Environment Institute (SEI), and the United Nations Framework Convention on Climate Change (UNFCCC) secretariat.

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1. INTRODUCTION

1.1. What is the Comprehensive Lowered Emission Assessment and Reporting (CLEAR) Methodology for Cooking Energy Transitions?

The CLEAR Methodology for Cooking Energy Transitions represents a sector-wide effort to increase confidence in carbon financing models for clean cooking. Developed in response to demand from key stakeholders and leveraging the latest scientific data specific to clean cooking, 4C aims for this new methodology to become the standard for cookstove projects under the Paris Agreement (Articles 6.2 and 6.4) and the voluntary carbon market (VCM). It is the first-ever carbon methodology that is applicable to all cooking transition scenarios, including metered and non-metered fuels, which will eliminate the need for multiple methodologies for cookstove carbon projects.

Since its inception in October 2022, the development of this methodology has been a highly collaborative effort, drawing on the expertise and feedback from over 250 key stakeholders, including but not limited to representatives from UNFCCC, recognized voluntary standards bodies such as Gold Standard and Verra, researchers, and project proponents.

In parallel with the development of the methodology, CCA and SEI are building a companion carbon data platform that will make free, accurate, and vetted cookstove sector data available to project proponents and other carbon finance stakeholders, reducing cost barriers to carbon finance development and fostering consistency across the sector. The platform will be publicly available by early 2025, and it will include disaggregated data on the parameters project proponents need most, including baseline fuel consumption and fraction of non-renewable biomass (fNRB).

1.2. Why does the world need another cookstove carbon methodology?

The credibility of emission reductions claimed by clean cooking initiatives has recently come under increased scrutiny. Journalists, carbon rating agencies, and academic publications have raised concerns about the methods used to estimate these emission reductions, which can differ significantly depending on the cookstove technologies and methodology involved. Many of these methodologies rely on outdated scientific approaches or data.

Moreover, the multiple methodologies currently in use, and the disparities in how they assess the emissions reductions from cooking energy transitions, have generated the risk of project proponents choosing the methodology that will maximize credit issuance rather than one that will provide the most robust and reliable results. Such practices not only undermine the credibility of clean cooking carbon projects but also compromise the potential climate, health, and livelihood benefits that these projects deliver.

The CLEAR methodology addresses these concerns by integrating the latest science and increasing the requirements for substantiating the input parameters that have the most impact on emission reduction estimates from clean and improved cooking projects. Furthermore, having one methodology for all cooking transition scenarios is expected to simplify the market for everyone, improve verification processes, and incentivize best practices.

1.3 Why has the tier terminology been removed from the methodology?

Stakeholders who participated in any of the methodology consultations that 4C conducted in the process of preparing this methodology may recall that the approach originally relied on “tier” labels to denote the options available to project proponents for how to estimate each parameter in the emission reductions calculation. In prior drafts, the lower tiers denoted options to use default values or less demanding monitoring approaches and the higher tier offered more rigorous direct measurement options, where those were feasible. The conservativeness of the default values and the guardrails placed around less rigorous monitoring methods were designed to level the playing field, such that the credits generated from any combination of tiers would have equal integrity, while projects that selected a preponderance of higher tier methods could substantiate more credits than those using exclusively or primarily lower tier methods.

As 4C collected stakeholder feedback on this approach, however, it became apparent that any system that distinguished options along a numeric scale, such as tier 1 to tier 3, would inevitably be interpreted by the market as indicating progressive grade of quality, even though this was not the intent. Therefore, 4C has decided to eliminate the tier terminology. Instead, the current iteration of the methodology presents the direct measurement and conservative defaults/caps options without any numbering system, with the approach that allows the project proponent to substantiate the most credits presented first.

2. METHODOLOGICAL COMPONENTS

2.1. fNRB

- **The concern:**

fNRB has been integral to carbon methodologies for clean cooking since the first projects were developed in the late 2000s. Its purpose is to allow project proponents to account for the fact that some of the trees that are cut for fuel will regenerate; not all avoided forest harvesting results in reduced carbon emissions.

Over time, the UNFCCC and voluntary carbon standards bodies have modified their methodologies to improve the approaches for determining fNRB. To date, project proponents have had two options: (a) use a default value of 30%; or (b) calculate project-specific fNRB values using UNFCCC’s “TOOL30 Calculation of the Fraction of Non-Renewable Biomass,” which was first released in 2017 and has been refined several times since. Cookstove projects have typically claimed fNRB values between 80% and 90%, implying that in those countries, the wood was being harvested at 5-10 times the rate at which forests and woodlands regenerate nationwide. This has raised concerns about over-crediting and raised doubts about the value of carbon credits from clean cooking.

The 30% default value for fNRB was based on research published in 2015 using the WISDOM model (Bailis, R. et al., 2015), which is described in more detail below. In this study, researchers assessed fNRB across 90 low- and middle-income countries (LMICs) located mostly in tropical regions. The data used to establish the 30% default value, by now over a decade old, is likely to be outdated and based on assumptions that are no longer applicable. Furthermore, results from the 2015 research showed substantial geographic variation in fNRB values, which raises doubts about the suitability of a single global default. In some well-forested or sparsely populated areas, fNRB was considerably lower than 30%, while “hotspots” in East Africa and South Asia had fNRB values exceeding 50%.

Over time, it became apparent that this universal default value of 30% has seldom been applied in cookstove carbon projects. Instead, most projects have opted for using TOOL30, which yields much higher fNRB values. Specific to the use of TOOL30, this method to determine fNRB requires project proponents to have access to estimates of forest areas and forest productivity defined by the “mean annual increment” or MAI. For forest areas, the tool suggests using data from a 2000 FAO publication. However, this is both outdated and inadequate because it ignores trees outside forests, which are important sources of woodfuel. For biomass growth rates, TOOL30 recommends using data from Table 4.9 of the IPCC’s 2019 “Refinement to the 2006 Guidelines for National Greenhouse Gas Inventories”. This is a more recent source of data, which makes it more appropriate for current estimates. However, the data presented for each land-use and land-cover category includes up to three values that vary with the age of the forest area in question. These growth rates can differ by up to a factor of 10 and therefore, project proponents can obtain vastly different fNRB values depending on which growth rates they choose to use (see Figure 1).

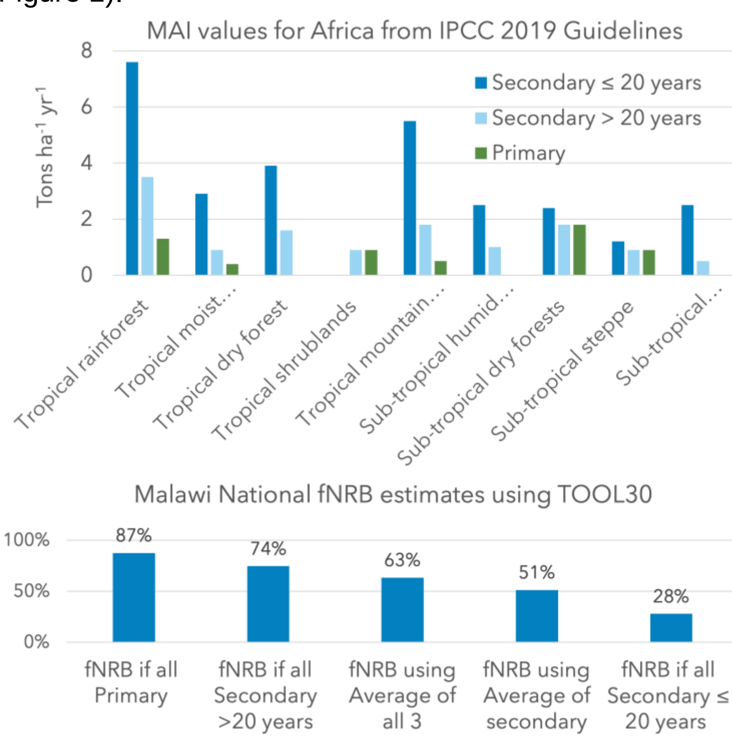

Figure 1: Example of the range of fNRB values generated from TOOL30 for Malawi.

- **CLEAR approach:**

To address concerns related to fNRB values, in 2023, UNFCCC commissioned new research to update fNRB estimates using the latest available data on woody biomass supply and demand. The study was finalized in June 2024 and is [open for public comment] on the UNFCCC website until August 1, 2024. This assessment uses the peer-reviewed [MoFuSS model], which was developed by scientists from the National Autonomous University of Mexico (UNAM) and SEI. MoFuSS is a bottom-up spatial model that can be aggregated to any level, allowing for fNRB estimates to be made for any administrative unit (districts, counties, states, provinces, etc.) as well as project-specific areas that cut across administrative boundaries. In addition, the model relies on harmonized global datasets that are regularly updated, which will make it easy to periodically update the fNRB defaults.

Results from this research indicate that while fNRB values for Sub-Saharan Africa vary widely, in most cases, country-level fNRB values are higher than the previous global default of 30% but lower than the values generated using UNFCCC's TOOL30.

The new UNFCCC-supported MoFuSS model represents the most robust fNRB approach to date. As such, the CLEAR methodology requires using the national or subnational default values from the MoFuSS model when available. National values are appropriate for projects that are evenly spread throughout a country. Sub-national values are appropriate for projects concentrated in specific regions. When relevant, the CLEAR methodology offers projects the option to query MoFuSS results for geographic regions that do not necessarily align with national or sub-national boundaries.

While there is no feasible direct measurement approach for assessing fNRB, 4C is working with the proponents of the MoFuSS model to create an online version that allows users to upload their own input data and run the model on a cloud-based server. This is currently under development, and 4C will provide updates when possible.

The CLEAR methodology does not allow for the use of either the 30% default or TOOL30.

2.2. Adoption

Cookstove adoption is composed of two parts: "uptake," which denotes whether a technology or fuel has been integrated into the household's cooking practices in such a way that the household can be classified as a "user," as defined by the project; and "usage," which measures the extent of that integration, and by extension, the extent to which the baseline practices have been displaced.

- **The concern:**

Surveys and self-reported usage, which have been widely used in carbon methodologies in the past, are often unreliable methods for estimating the displacement of baseline cooking technologies due to several factors that can bias participants' responses. When asked about their use of an improved cookstove provided by a project, participants may over-report its usage due to social desirability bias, where they want to please the surveyors or align with the perceived objectives of the project. They may also believe that reporting higher usage could influence future benefits, such as additional support or upgrades from project sponsors. Furthermore, self-reported data can suffer from recall bias, as participants may not accurately remember or may overestimate the frequency and duration of their use of the new technology. These biases lead to an inflated perception of displacement of traditional cookstoves, obscuring the actual adoption and impact of the improved cookstoves. Thus, relying solely on survey data and self-reports can result in a misleading assessment of the success and environmental impact of such interventions.

- **CLEAR approach:**

For projects that are not directly and continuously metered[1], the methodology considers adoption as a function of uptake and usage rates, and addresses stacking through conservative assumptions of baseline cookstove displacement or through the use of Kitchen Performance Tests (KPTs). Uptake is whether a project household is considered a user or non-user. Project proponents can determine their own criteria for what constitutes a user v. non-user, but they must consistently use those categories as they have defined them for all project accounting, and the assessment of the criteria must be done using survey questions or sensors, and project cookstove observation. Further, uptake is capped at 90% for projects that incorporate after-sales support and educational/behavior change activities and at 75% for all other projects.

The methodology offers multiple approaches to determine non-metered fuel consumption, which includes assessing usage or displacement rates. These approaches involve various combinations of surveys, usage sensors, Controlled Cooking Tests (CCTs), and KPTs.

- For projects that use the CCT to estimate project fuel consumption, and base usage rates on surveys alone, average baseline cookstove displacement is capped at 40%.
- For projects that use the CCT to estimate project fuel consumption, and base usage on surveys plus Stove Use Monitors (SUMs) on the project cookstove in a representative sample of households, baseline cookstove displacement is capped at 60% if the SUMs demonstrates at least two cooking events per day of at least 20 minutes each. If not, baseline cookstove displacement is capped at 40%.
- For projects that measure fuel consumption through KPTs complemented by surveys, baseline cookstove displacement is capped at 90%.
- For projects that measure fuel consumption through KPTs complemented by surveys and a SUMs (during and following the KPT) that demonstrate continued use of the project cookstove following the KPT period (to mitigate any Hawthorne effect), baseline cookstove displacement is not capped. In this instance, SUMs could include sensors that use continuous monitoring of temperature, infrared light, or fuel consumption as a proxy for usage. Systems that also continuously track fuel consumption in homes such as the FUEL[2] system can also be applied.

[1] Metered projects are those which continuously measure fuel or energy consumption directly on all project cookstoves through data loggers, including for electric cookstoves, liquified petroleum gas (LPG), ethanol, and biogas, or through fuel sales for pellet cookstoves.

[2] https://www.sciencedirect.com/science/article/abs/pii/S0973082619300547

Fuel consumption for metered projects is measured directly and reported as such, with an optional KPT component.

The methodology will provide sampling guidance for surveys, SUMs, KPTs, and CCTs, as well as guidance for conducting baseline and project surveys. Guidance for conducting KPTs and CCTs will also be provided, along with SUMs guidance.

2.3. Energy consumption

- **The concern:**

The Clean Development Mechanism (CDM) currently sets default values for baseline cookstove efficiencies that are lower than those reported in the existing literature, which could potentially undermine the accuracy of project evaluations. Moreover, while KPTs are used to measure these efficiencies, they exhibit high variability that is often dictated by specific field conditions. This introduces an element of inconsistency in the data collected. In comparison to KPTs, surveys are generally more biased, as they rely on self-reported data, which can be influenced by the respondents' desire to conform to perceived expectations or to provide socially desirable answers. Although KPTs are an improvement over surveys in terms of objectivity, they are not completely immune to biases, underscoring the need for careful interpretation and validation of the results they generate.

- **CLEAR approach:**
    - For non-metered projects:

To address the concerns regarding the accuracy and variability in measuring cookstove efficiencies and energy consumption in non-metered scenarios, a comprehensive approach has been developed. Baseline fuel consumption for non-metered projects may be measured using a KPT (as defined in the methodology, per the guidance indicated) or using a global default.

For KPT-based estimates in non-Latin American countries, energy consumption values for primary fuelwood baselines are capped at 0.0156 TJ/capita/year (1 t/cap/year of air-dried wood), and values above 0.0124 TJ/capita/year (0.8 tons/capita/yr of air-dried wood) are flagged for more intensive verifier review.

For KPT-based estimates in Latin America, energy consumption values for primary fuelwood baselines are capped at 0.035 TJ/capita/year (2.25 tons/capita/year of air-dried wood), and values above 0.023 TJ/capita/year (1.5 ton/capita/year of air-dried wood) are flagged for more intensive verifier review.

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    - For metered projects:

For metered projects, baseline fuel consumption can be measured using a KPT (with the same caps and flags as above) or the baseline can be back-calculated from project cookstove energy consumption using specific fuel consumption ratios of the baseline and project cookstoves for energy delivered, determined via CCTs as defined in the methodology, per the guidance indicated.

2.4. Rebound effect

- **The concern:**

Rebound occurs when individuals cook more after being provided with a new cookstove, thus negating some of the emissions reductions created by the cooking technology or fuel transition facilitated by the carbon project. There is very little data in the published literature estimating rebound. It is clear that many cookstove carbon projects operate in LMICs where food insecurity is often also present, suggesting that rebound is not a universal phenomenon.

- **CLEAR approach:**

The methodology addresses rebound and stacking by incentivizing direct fuel consumption measurements (through KPTs), which capture both factors, and by applying a conservative cap for estimating baseline fuel displacement with data from CCTs and surveys.

2.5. Firewood-charcoal conversion

- **The concern:**

The UNFCCC's default charcoal conversion factor of 4:1 is lower than values in the literature.

- **CLEAR approach:**

After reviewing the literature, 4C has set a default of 6:1 for the CLEAR methodology. This corresponds to the value that the Food and Agriculture Organization (FAO) uses in their woodfuel statistics.

To support this recommendation, CCA and 4C partner SEI conducted a charcoal conversion factor literature review. CCA and SEI compiled five studies that include nearly 100 individual efficiency measurements from traditional charcoal kilns. The team complemented this initial analysis with a systematic literature review to locate the most up-to-date studies and identified a total of 221 articles for their review and more closely analyzed 41 of those articles. Most of these focused on non-traditional charcoal kilns, and only two articles included new efficiency measurements of traditional kilns that the team had not already cataloged. The remaining 39 articles included measurements of improved or advanced kilns that were useful for comparisons.

The results of this analysis support 4C's conclusion that a 6:1 ratio is more realistic than the current UNFCCC default (Figure 2). 4C is aware that additional studies of charcoal conversion and loss are underway in a few countries in Sub-Saharan Africa, and these studies will be added to the analysis as they become available.

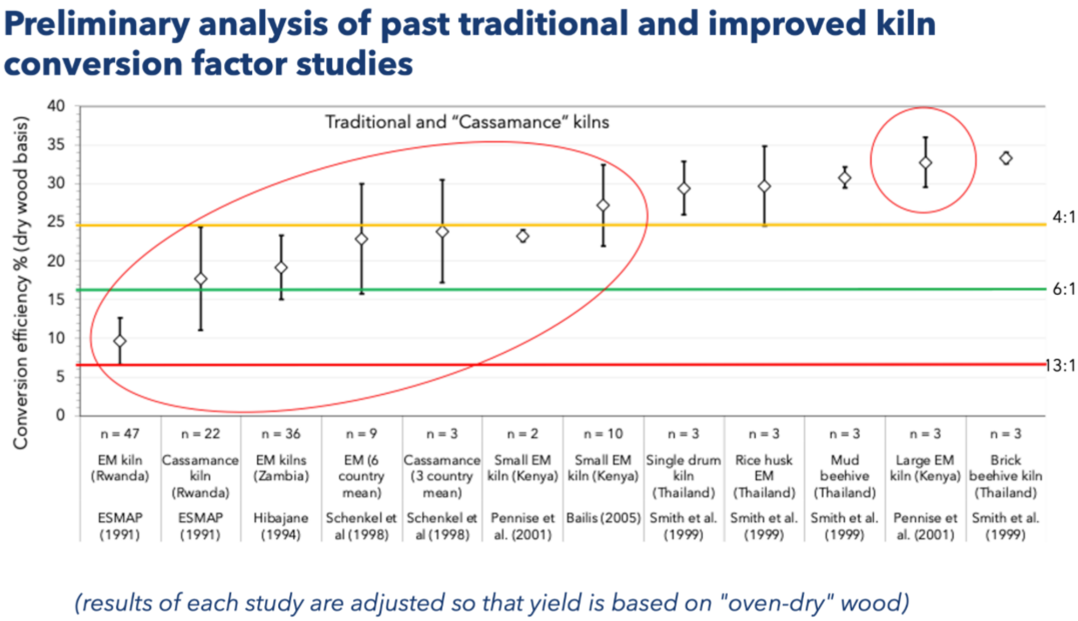

Figure 2: Preliminary analysis of traditional and improved kiln conversion factor studies.

2.6. Upstream emissions

- **The concern:**

The profiles of upstream emissions of various cooking fuels vary widely in the field, depending on characteristics like moisture content, wood type, sourcing of feedstock, characteristics of production, etc. Some methodologies have made upstream emissions accounting optional contributing to the risk of over-crediting from cooking carbon projects.

- **CLEAR approach:**

Under the CDM, upstream emissions are treated as leakage, but the CLEAR methodology treats them as a separate emissions source. Under this approach, upstream emissions from the production and processing of fuels are included in the calculation of CO2e.

2.7. Leakage and Permanence

- **The concern:**

As applied in cooking carbon projects, leakage refers to spillover externalities, such as baseline cookstoves displaced through carbon projects being re-used outside of the project boundary and/or market factors that increase the use of more polluting fuels outside of the boundary due to the project implementation. For example, if a project reduces the demand for a baseline fuel within the project boundary, prices for that fuel may decrease and it may become more desirable for existing consumers outside of the project boundary and potentially also become accessible to a new consumer segment there.

Permanence in this context refers to the length of time that non-renewable biomass that would have been harvested if the project activity had not taken place will remain unharvested. Forests and woodlands face many destructive threats that could prematurely eliminate the carbon savings substantiated through the project.

- **CLEAR approach:**

Very little empirical data exists to inform an approach for either leakage or permanence. However, anecdotal evidence from sector operations over the last twenty years suggests that leakage is rare. In most LMIC contexts, there are few reports of households seeking to adopt a used baseline technology, especially that they themselves likely already have access to and which does not offer any performance advantages.

On the permanence issue, 4C believes that introducing a requirement to track the biomass saved by cooking carbon projects is impractical for many reasons. While emission reductions from projects that displace non-renewable biomass consumption are functionally similar to credits derived from carbon removal projects, there are significant differences that impede this approach:

- Cooking project activities that displace non-renewable biomass consumption are highly diffuse, and it is very difficult to define the boundaries of areas that are impacted by specific projects. This constraint applies to projects that displace firewood collected by participating households and is even more relevant for projects that displace charcoal in urban or peri-urban centers because the biomass often originates from multiple production areas serving multiple markets.
- Even if those areas could be identified and precisely bounded, attributing changes in biomass stocks to project activities is very difficult, because in most cases, biomass cover is affected by multiple human and natural processes.
- There is consensus in the scientific community that consumption of non-renewable biomass linked to the use of fuelwood and charcoal contributes mainly to degradation rather than deforestation. Degradation is much more difficult to measure (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 beyond the capabilities of most or all project implementers.

Given the impracticalities of tracking saved biomass directly, cooking carbon projects have instead applied a value for fNRB to the estimate of emissions reductions generated from their activities. This approach incorporates some permanence risk by accounting for the balance between tree offtake and regeneration. In other words, by applying an fNRB value, emissions reductions are only created from biomass that would not have regrown without the project activity.

The CLEAR methodology requires projects to continue to apply an fNRB to their estimated emissions reductions, using values derived from the latest scientific research. Therefore, given the assumed low rates of leakage in most cooking project contexts, and addressing some permanence risk as part of fNRB, the CLEAR methodology uses a blanket 5% discount to address the remaining risk of over-crediting from leakage and permanence. Most current methodologies include a 5% deduction for leakage and do not separately consider permanence, as that has not been a requirement to date.

2.8. Baseline approaches

UNFCCC has provided guidance for baseline setting approaches under the Article 6.4 mechanism: best available technology; ambitious benchmark; or existing actual or historical emissions adjusted downwards. The CLEAR methodology is consistent with all three of these approaches:

- Best available and economically feasible technology: "Economically feasible" in energy poverty contexts common in LMICs provides a clear rationale that the actual baseline technologies are the best available and economically feasible. Therefore the CLEAR methodology provides the option to use a KPT to measure the fuel consumption of these devices.
- Benchmarking performance with top-performing technologies: this approach could be appropriate in areas where top-performing technologies in project areas are still simple minimally improved cookstoves.
- Adjust historical emissions estimates conservatively: the CLEAR methodology allows for the use of a default value (0.5t/cap/yr)[3], considered to be conservative based on the

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[3] This default energy consumption translates into 0.0012 TJ delivered per person per year, and is close to the 0.4t/cap/yr from the UNFCCC's recent review: https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20220713221018839/MP88_EA19_CN_Cookstove%20default%20values.pdf. The value is also on the lower end of fuelwood baselines found in the literature: Johnson, Michael A., Verónica Pilco, Rafael Torres, Sandeep Joshi, Rajeev M. Shrestha, Mahesh Yagnaraman, Nicholas L. Lam, Brenda Doroski, John Mitchell, Eduardo Canuz, and David Pennise. 2013. "Impacts on Household Fuel Consumption from Biomass Stove Programs in India, Nepal, and Peru." *Energy for Sustainable Development* 17(5):403–11. doi: 10.1016/j.esd.2013.04.004. Garland, Charity, Kirstie Jagoe, Emmy Wasirwa, Raphael Nguyen, Christa Roth, Ashwin Patel, Nisha Shah, Elisa Derby, John Mitchell, David Pennise, and Michael A. Johnson. 2015. "Impacts of Household Energy Programs on Fuel Consumption in Benin, Uganda, and India." *Energy for Sustainable Development* 27:168–73. doi: 10.1016/j.esd.2014.05.005. Wallmo, Kristy, and Susan K. Jacobson. 1998. "A Social and Environmental Evaluation of Fuel-Efficient Cook-Stoves and Conservation in Uganda." *Environmental Conservation* 25(02):99–108. Ventrella, Jennifer, Olivier Lefebvre, and Nordica MacCarty. 2020. "Techno-Economic Comparison of the FUEL Sensor and Kitchen Performance Test to Quantify Household Fuel Consumption with Multiple Cookstoves and Fuels." *Development Engineering* 5:100047. doi: 10.1016/j.deveng.2020.100047. Lam, Nicholas L., Basudev Upadhyay, Shovana Maharjan, Kirstie Jagoe, Cheryl L. Weyant, Ryan Thompson, Sital Uprety, Michael A. Johnson, and Tami C. Bond. 2017. "Seasonal Fuel Consumption, Stoves, and End-Uses in Rural Households of the Far-Western Development Region of Nepal." *Environmental Research Letters* 12(12):125011. doi: 10.1088/1748-9326/aa98cc.

latest available data, while still accounting for suppressed demand (Modi, V., et al., 2005). The conservativeness of the default should be reassessed at regular intervals, as the methodology is updated.

Suppressed demand is a 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 human development needs. In the context of cookstove carbon projects, accounting for suppressed demand means that the baseline scenario is based on the assumption that households use the amount of cooking fuel necessary to provide for human needs rather than a potentially lower, actual amount of fuel used for cooking. We have adopted the UNFCCC value for the minimum energy services required for cooking.

3. FAQ

Q: Why does the CLEAR methodology allow for different parameter-specific options (e.g., default values and direct measurements) instead of just prescribing the best practice across all parameters?
A: 4C's goal is to provide one methodology that will allow all types of cooking energy transition projects to substantiate credible emissions reductions and access carbon finance while requiring large-scale projects and incentivizing as many other projects as possible to employ direct measurement approaches. We recognize that these projects are diverse along many dimensions, including target populations, technology and fuel types, as well as size and access to resources. 4C's flexible "mix-and-match" approach allows project proponents to maximize their credits by pursuing direct measurement options wherever their resources and circumstances permit. For projects that are estimated to reduce energy consumption by 780 TJ/yr or more (e.g., approximately equivalent to saving 50% of fuelwood in 50,000 households[4]), direct measurement for project fuel consumption is required. As a further guardrail against abuse of the flexible approach, all projects are required to disclose the values and approaches they have chosen for each parameter.

Q: One of the largest sources of uncertainty within the new methodology is the fNRB values. How does the MoFUSS approach address this?
A: There are uncertainties in biomass stocks and growth rates. In MoFuSS, researchers show uncertainties explicitly by using "Monte Carlo" (MC) simulations. Basically, they rerun the model dozens of times and randomly select each key input from a distribution of possible values. The uncertainties derived from the MC simulations will be included in the final MoFuSS results website. There are also demand-side uncertainties including consumption per capita and wood-to-charcoal conversion efficiency. These are not explicitly included in the MC simulations, but could be examined by comparing MoFuSS models using different values of consumption while holding other inputs constant. Note, the same uncertainties affect TOOL30, but they're ignored

[4] 0.5 tons of fuelwood/person x 4 persons/household x 50,000 households = 100,000 tons/year. 100,000 tons / year x 0.0156 TJ/tons = 1560 TJ/year. A project which saves 50% on the fuel consumption would result in 780 TJ/year of estimated energy savings.

in the calculations (see the columns labeled “Uncertainty” and “Uncertainty Type” in Table 4.9 of the IPCC's "2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories").

Q: How does the fNRB model treat beneficial trees? Are they included in the forest definition? In other words, does the MoFuSS model assume that all standing biomass is considered to be fuel or is there any differentiation for higher value trees that should not be included as fuel supply?
A: The model is not currently set up to account for beneficial trees. Researchers are currently examining whether such trees could or should be accounted for in future iterations of MoFuSS.

Q: How is 4C addressing the fact that KPTs can generate inaccurate results if they are implemented poorly?
A: In addition to implementing the regional caps and flags for KPT results, 4C is developing guidance documents that will include KPT sampling requirements. 4C also aims to develop guidelines for auditors and rating agencies on how to recognize a robust KPT. These guidance materials will be finalized after the methodology undergoes public commentary in Q3 2024.

4C will also soon release an accompanying calculator tool that will facilitate emission reduction calculations and flag values outside of expected ranges for more intensive verifier review.

Q: How does the methodology address potential overlap between REDD+ and cookstove projects?
A: To 4C’s knowledge, this is currently low risk. We will continue to track this potential overlap, and if necessary, we will address it in a future version of the methodology.

Q: Given that the CLEAR methodology takes an inventory approach, why is electricity use not accounted for in the baseline?
A: In some contexts, households within the boundaries of a clean cooking project may be using some electricity for cooking tasks in the baseline. Electric kettles and rice cookers are prevalent in some places in households that otherwise rely on biomass for the majority of their cooking. However, we found it difficult to envision a current project scenario that would offer an intervention that would substantially change that electricity use in the project scenario, creating a material impact on emissions reductions. Therefore, we decided not to include electricity use in the baseline at this time. Projects with electricity use in the baseline can still use the methodology, and guidance will be provided on how to adjust it to cover this circumstance.

Q: Why does the methodology require using marginal and not average grid emissions factors whenever possible?
A: Average grid emissions factors refer to the amount of emissions generated over the course of a year, divided by the amount of energy produced in that time. Therefore, average emissions are based on the predominant generation source (i.e., based on the aggregated emissions from all of the coal, gas, solar, wind, hydroelectric, etc. power plants that supply power to the area). Marginal emissions factors, on the other hand, refer to the rate at which emissions would

change due to adjustments in electrical load in a given time frame (e.g., when customers increase or decrease electricity use, certain power plants adjust to match that increase or decrease). Therefore marginal emissions factors are the more appropriate and conservative value to use in the assessment of carbon project activities that alter how households use electricity for cooking. This is the approach taken by international development agencies when they assess the impacts of interventions in the power sector.[5] The online data platform currently under development by SEI and CCA will include a database of marginal grid emission factors for all countries with clean cooking interventions.

Q: How is 4C ensuring that the CLEAR methodology does not disincentivize electric cooking?
A: We are aware that some project proponents have experienced reduced credits for electric cooking projects developed using the Gold Standard Methodology for Metered and Measured Energy Cooking Devices relative to the Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC) methodology and potentially other methodologies. We hope the CLEAR methodology will address this issue in part by leveling the playing field for all cookstove projects in the carbon market by offering conservative defaults and incenting more accurate field measurements.

We also recognize that questions remain regarding the accuracy of back-calculating the baseline from the project scenario. While we do not find the evidence sufficient to discourage this method, the CLEAR methodology also offers the option to measure the baseline using a KPT if the project conditions suggest that this would be a more accurate estimation of the baseline.

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[5] See the UNFCCC's "List of harmonized GHG accounting standards/approaches and guidelines developed" for a full explanation.

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