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Application of the Oeko-Institut/WWF-US/ EDF methodology for assessing the quality of carbon credits

This document presents results from the application of version 3.0 of a methodology, developed by Oeko-Institut, World Wildlife Fund (WWF-US) and Environmental Defense Fund (EDF), for assessing the quality of carbon credits. The methodology is applied by Oeko-Institut with support by Carbon Limits, Greenhouse Gas Management Institute (GHGMI), INFRAS, Stockholm Environment Institute, and individual carbon market experts. This document evaluates one specific criterion or sub-criterion with respect to a specific carbon crediting program, project type, quantification methodology and/or host country, as specified in the below table. Please note that the CCQI website Site terms and Privacy Policy apply with respect to any use of the information provided in this document. Further information on the project and the methodology can be found here: www.carboncreditquality.org

Criterion:	4.1 Enhancing adoption of low, zero or negative emissions technologies and practices
Project type:	Efficient cookstoves
Date of final assessment:	5 February 2022
Score:	4

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Assessment

Relevant scoring methodology provisions

The scoring approach assesses the degree to which the technologies or practices applied under the project type facilitate the transition towards net zero emissions. The main consideration is whether the project type employs negative, zero or low emissions technologies or practices. Moreover, it is considered whether the project type poses risks for locking-in technologies or practices that may result in an increase in GHG emissions in the long-term, thereby undermining the achievement of net zero emissions, or whether the project type employs innovative technologies or practices which may accelerate the transition to net zero emissions. See further details on the scoring in the methodology.

Information sources considered

1. VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves. Version 1.1. Document issued on 22 July 2021. Online available at: https://verra.org/methodology/vmr0006-methodology-for-installation-of-high-efficiency-firewood-cookstoves/.
2. Gold Standard Technologies and Practices to Displace Decentralized Thermal Energy Consumption. Version 3.1. Document issued on 25 August 2017. Online available at: https://globalgoals.goldstandard.org/407-ee-ics-technologies-and-practices-to-displace-decentrilized-thermal-energy-tpddtec-consumption/.
3. CDM AMS-II.G. Small-scale Methodology. Energy efficiency measures in thermal applications of non-renewable biomass. Version 12.0. Document issued on 14 December 2014. Online available at: https://cdm.unfccc.int/UserManagement/FileStorage/3BX1V2NC87TAWL0EKYHJQ5DRZ6UF94.
4. Ekouevi, Koffi; Freeman, Kate Kennedy; Soni, Ruchi. 2014. Understanding the Differences between Cookstoves. Live Wire, 2014/7. Washington, DC: World Bank. © World Bank. Online available at: https://openknowledge.worldbank.org/handle/10986/18411

Relevant Provisions

Provision 1 Source 1, section 4: “This methodology is applicable under the following conditions:

- Project activities shall be implemented in domestic premises, or in community-based kitchens.
- The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer’s specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove replacing fossil fuel baseline stove, it shall exclusively use renewable biomass.
- Both ‘Projects’ and ‘Large Projects’ can use this methodology.

- Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.
- For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded. Additionally, applicability criteria numbers 8 and 9 set out in Section 2.2 of AMS II.G, version 11.1 shall apply."

Provision 2 Source 1, Section 3: "Improved Cookstove (ICS): Solid-fuel stoves that improve on traditional baseline biomass technologies in terms of fuel savings via improved fuel efficiency and lower emissions through improved combustion efficiency. Examples include, but at not limited to, basic chimney ICS, intermediate ICS, portable ICS etc.

Basic Chimney ICS: Solid-fuel cookstoves whose chimneys feature minimal to moderate improvements in thermal efficiency.

Basic Portable ICS: Portable biomass cookstoves that are unvented and feature moderate improvements in thermal efficiency. This category includes minimally improved ceramic and clay cookstoves simple efficient wood cookstoves and metal insulator-lined cookstove technologies.

Intermediate ICS: A wide range of solid fuel cookstoves with significant improvements in fuel efficiency (>25%). Intermediate cookstoves utilize rocket stove principles (i.e., an L-shaped combustion chamber design) for wood/crop or waste/ dung fuel cooking or have other design features that promote thermal efficiency as in the case of intermediate coal and charcoal ICS. Stoves in this category can be portable, semi-portable or built in and may be either unvented or combined with chimneys, depending on the design.

Advanced Cookstoves (ACS): Fan draft or natural draft biomass gasification cookstoves. Stoves in this category include natural draft models, fan draft rocket style stoves, and top loading fan gasifiers."

Provision 3 Source 2, Section 1.0: "This methodology is applicable to programmes or activities introducing technologies and/or practices that reduce or displace greenhouse gas (GHG) emissions from the thermal energy consumption of households and non-domestic premises. Examples of these technologies include the introduction of improved biomass or fossil fuel cookstoves, ovens, dryers, space and water heaters (solar and otherwise), heat retention cookers, solar cookers, bio-digesters, safe water supply and treatment technologies that displace the boiling of water, thermal insulation in cold climates, etc. Examples of practices include the improved application of such technologies, a shift from non-renewable to renewable fuel (e.g. shift to plant oil fired stoves), humidity control through improved storage and drying of fuels, etc. Project activities that claim emission reductions from improved practices only (e.g. there is no installation of improved devices) are expected to provide a detailed discussion of the chosen monitoring approach so as to demonstrate that emission reductions do indeed result from the practices introduced by the project activity."

Provision 4 Source 3, paragraph 2: "This methodology comprises efficiency improvements in thermal applications of non-renewable biomass. Examples of applicable technologies and measures include the introduction of high efficiency biomass fired project devices (cookstoves or ovens or dryers) to replace the existing devices and/or energy efficiency improvements in existing biomass fired cookstoves or ovens or dryers.[1] ([1] Implementation of Greenfield applications is not covered in this methodology.)"

Provision 5 Source 3, paragraph 3: "In the case of cookstoves, the methodology is applicable to the introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 20 per cent. Refer to the requirements indicated in "Data / Parameter table 14" which details the options for testing and certification as well as supporting documentation (e.g. certificate issued by third party or test results) that needs to be presented to the validating DOE."

Provision 6: Source 3, paragraph 4: "The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input."

Provision 7 Source 4: "A critical goal of promoters of the first generation of fuel-efficient cookstoves was to help slow the pace of deforestation by reducing the volume of fuelwood needed for cooking. Fuel-efficient cookstoves were designed primarily to improve the efficiency of heat transfer to the cooking pot, thereby saving fuel and reducing pressure on forest resources. Fuel-efficient cookstoves can reduce fuel use by 20–50 percent relative to the three-stone fire. There are various types of fuel-efficient cookstoves. Many are designed with the cook in mind and aim not to change cooking practices but to accommodate a cook's habits, fuel choice, and traditional cuisine. So-called rocket stoves use rocket design principles. Rocket stoves are defined by improvements to an insulated, L-shaped combustion chamber that allows for partial combustion of gases and smoke inside the cookstove. Rocket stoves follow 10 design principles to improve heat transfer using insulation and narrow channels that direct the flow of hot gases closer to the pot or griddle. Stoves that incorporate a griddle for cooking flat breads are most prevalent in Latin America, and throughout this region are referred to as plancha stoves. The plancha stove is designed to enclose the fire to heat the griddle surface and to expel through a chimney the particulate matter and toxic vapors resulting from incomplete combustion. Although fuel efficiency was the main concern of designers of fuel-efficient cookstoves, in some parts of the world—notably Latin America and South Asia—some cookstoves were also provided with chimneys or hoods. These help reduce indoor air pollution by diverting wood smoke out of the kitchen, though they do nothing to curb outdoor pollution or climate change (Smith 2010). The reduction of indoor emissions varies significantly. Some fuel-efficient cookstoves deliver little or no reduction, whereas others can reduce particulates and carbon monoxide by up to 90 percent in laboratory testing. Stoves with a well-fitted chimney kept in good condition and regularly cleaned can dramatically reduce indoor air pollution.

In contrast to fuel-efficient cookstoves, advanced-combustion stoves focus primarily on cleanliness. In other words, the task of designers of advanced-combustion cookstoves is to maximize combustion efficiency, defined as how much of the energy and carbon in the fuel is converted to heat and carbon dioxide. Advanced-combustion cookstoves perform at varying levels of combustion efficiency depending on the efficiency of the fuel used. Emerging types are forced-air cookstoves and gasifier cookstoves. Forced-air biomass cookstoves use a fan powered by a battery, electricity, or a thermoelectric couple that blows jets of air into the combustion chamber. With a fan, the jets of air induce superior mixing of flame, gas, and smoke and can be extremely clean. Gasifier cookstoves force the gases and smoke that result from incomplete combustion back into the cookstove's flame, where the heat of the flame continues to combust the particles until combustion is nearly complete, resulting in few emissions. Each type of advanced-combustion cookstove has its own fuel requirements. Some use unprocessed fuelwood; others require processed fuels in the form of pellets or small cuttings. In laboratory tests, advanced-combustion cookstoves show fuel savings of 45 percent or more. They also reduce carbon monoxide and particulate matter by 95 percent or more and nearly eliminate black carbon. The best advanced-combustion cookstoves reduce indoor air pollution to levels close to those of cookstoves using liquefied propane gas or other clean fuels. This is done by raising the combustion efficiency of the stove to the point where only a negligible amount of fuel is left unburned (Mukhopadhyay 2012). Realizing all these benefits depends, of course, on proper, sustained use of the cookstoves. The cost of fuel-efficient and advanced-combustion cookstoves can vary drastically, but the cost depends largely on the type of fuel used in the stove (charcoal, wood, other), the material from which the stove is made (metal, ceramic, cement, clay), and how the stove was made (artisanal, semi-industrial, industrial). In Kenya, for example, the cost of a basic (artisanal) improved stove can range from $5 to $12; a stove produced in a semi-industrial or industrial fashion ranges from $15 to $50; and an advanced stove (a Philips, for example), between $80 and $120. The plancha stove in Latin America, in part due to its size and the metal plancha required for tortillas, generally costs more ($150 or more). Costs and cost drivers vary widely by stove design and local conditions, however, and additional costs are associated with providing the necessary electricity supply needed for fans or other accessories. The price paid by the consumer may be influenced by still other factors, such as import tariffs or the availability of effective subsidies from carbon financing."

Assessment outcome

The project type is assigned a score of 4.

Justification of assessment

The scoring approach for enhancing adoption of low, zero or negative emission technologies and practices as set out in the methodology assigns efficient demand side technology a score of 4 and highly efficient demand side technology a score of 5. The methodology further clarifies that a "score of 4 applies to technologies or practices that have a superior alternative or do not represent the best available technology, for example, because they are less energy efficient than already available alternatives”.

The literature differentiates between fuel-efficient or improved cookstoves and advanced(-combustion) cookstoves. (Fuel-)efficient cookstoves primarily focus on improving heat transfer and “can reduce fuel use by 20-50 percent relative to the three-stone fire” (Provision 7). This category includes basic chimney cookstoves or so-called rocket stoves that are characterized by an L-shaped combustion chamber design (see also Provision 2). In contrast to fuel-efficient cookstoves, advanced-combustion cookstoves are very high-performing cookstoves whose aim it is to maximize combustion efficiency for reduced emissions. Typical examples are forced air stoves and gasifier stoves (Provision 7).

Since the cookstoves referred to in the methodologies do not necessarily represent the best available technology (Provisions 1 to 6) and there could be more energy efficient alternatives, this project type is assigned a score of 4.