www.oeko.de

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

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

Sub-criterion:	1.1.4 Barriers
Project type:	Efficient Cookstoves
Date of final assessment:	20 May 2022
Score:	Rural areas: 4 Urban areas: 1

Contact
info@oeko.de
www.oeko.de

Head Office Freiburg
P. O. Box 17 71
79017 Freiburg

Street address
Merzhauser Straße 173
79100 Freiburg
Phone +49 761 45295-0

Office Berlin
Borkumstraße 2
13189 Berlin
Phone +49 30 405085-0

Office Darmstadt
Rheinstraße 95
64295 Darmstadt
Phone +49 6151 8191-0

Assessment

Relevant scoring methodology provisions

Some mitigation activities are financially viable but still face other obstacles such as information deficits or capacity constraints that hinder their implementation. In some instances, the institutional set-up of carbon crediting projects and the issuance of carbon credits can help to overcome these barriers. The methodology therefore employs an expert judgment on the likelihood that barriers prevent the implementation of a project type and that these barriers indeed can be overcome through the incentives of carbon credits. In arriving at this judgment, the aspects in the following should be evaluated:

Question
Does the project type face considerable non-financial barriers that can be identified in an objective and verifiable manner?
Is it possible to produce objective and verifiable evidence that the identified barriers are unique to the project type and do not apply to alternatives?
Is the market uptake of the technology underpinning the project type low although it is financially viable/competitive?
Can the barriers for this project type not be mitigated by additional financial means (and hence be assessed through the investment analysis)?
Is it possible to produce objective and verifiable evidence that carbon credits are indeed decisive for overcoming the barrier and does the incentive of carbon credits matches the strength of the barrier? (Note that this criterion can be assessed by analyzing the ΔIRR in the analysis of financial viability. The higher the Delta IRR is in relation, the more likely it may be that the revenues from the carbon credits are help overcoming the barriers.)

The scores are applied as follows:

	Score
It is very likely that barriers prevent the implementation of this project type and that the incentives through carbon credits will overcome these barriers.	5
It is very likely that barriers prevent the implementation of this project type and it is likely that the incentives through carbon credits will overcome these barriers. OR It is likely that barriers prevent the implementation of this project type and it is very likely that the incentives through carbon credits will overcome these barriers.	4
It is likely that barriers prevent the implementation of this project type and that the incentives through carbon credits overcome these barriers.	3
It is likely that barriers prevent the implementation of this project type, but it is uncertain that the incentives through carbon credits will overcome these barriers.	2
It is likely that barriers do not prevent the implementation of this project type and that the incentives through carbon credits do not help the project to overcome these.	1

Note that the application of this sub-criterion is optional. This sub-criterion should be used in combination with the sub-criterion on *financial attractiveness*. It may function as an additional criterion for activities where the assessment of the financial attractiveness has shown a high financial attractiveness even without carbon credits.

Information sources considered

1 Cames, M., Harthan, R. O., Fussler, J., Lazarus, M., Lee, C. M., Erickson, P. and Spalding-Fecher, R. (2016). *How Additional Is the Clean Development Mechanism? Analysis of the Application of Current Tools and Proposed Alternatives*. CLIMA.B.3/SERI2013/0026r. Prepared for DG Clima by Oko-Institut, INFRAS, Stockholm Environment Institute (SEI), Berlin. https://ec.europa.eu/clima/sites/clima/files/ets/docs/clean_dev_mechanism_en.pdf

2 Lambe, F., Jürisoo, M., Lee, C. and Johnson, O. (2015). Can carbon finance transform household energy markets? A review of cookstove projects and programs in Kenya. *Energy Research & Social Science*, 5. 55–66. DOI: 10.1016/j.erss.2014.12.012

3 Clean Cooking Alliance (2019). *Clean Cooking Industry Snapshot: An Inaugural Report on Sector Investment and Innovation*. Clean Cooking Alliance. https://www.cleancookingalliance.org/reports/2019-Clean-Cooking-Industry-Snapshot/2019-Clean-Cooking-Industry-Snapshot.html#page=1

4 Adane, M. M., Alene, G. D., Mereta, S. T. and Wanyonyi, K. L. (2020). Facilitators and barriers to improved cookstove adoption: a community-based cross-sectional study in Northwest Ethiopia. *Environmental Health and Preventive Medicine*, 25(1). 14. DOI: 10.1186/s12199-020-00851-y

5 Mamuye, F., Lemma, B. and Woldeamanuel, T. (2018). Emissions and fuel use performance of two improved stoves and determinants of their adoption in Dodola, southeastern Ethiopia. *Sustainable Environment Research*, 28(1). 32–38. DOI: 10.1016/j.serj.2017.09.003

6 Donofrio, S., Maguire, P., Zwick, S. and Merry, W. (2020). Voluntary Carbon and the Post-Pandemic Recovery. Ecosystem Marketplace.

Assessment outcome

The project type is assigned a score of 4 for projects implemented in rural areas and 1 for projects implemented in urban areas.

Justification of assessment

This assessment is applied to the following project type: “Distribution of energy efficient fuel wood or charcoal cookstoves to households or institutions (e.g. schools), thereby replacing the use of less energy efficient fuel wood or charcoal cookstoves.”

Existence of non-financial barriers

Typical barriers to efficient cookstove projects identified in the literature (Sources 2-4) include the following:

- Household poverty (especially in rural areas), making efficient cookstoves unaffordable even in circumstances where microfinance options are available
- Lack of affordability of, or access to, fuels used in efficient stoves (e.g., charcoal) compared to baseline alternatives (e.g., fuelwood) – especially in rural areas
- Lack of incentives for households to improve fuelwood-use efficiency given that it is a non-priced (“free”) fuel – primarily a rural barrier, since urban households more frequently already use purchased charcoal

- Household unfamiliarity with efficient cookstove technologies – along with incompatibility with household needs in some cases – both of which may have led to past failures and ongoing consumer scepticism
- Higher cost of efficient cookstoves compared to less efficient alternatives
- High upfront capital costs for project proponents combined with lack of access to credit / working capital

Overall, it is very likely that the use of efficient cookstoves thus faces significant barriers, at least in rural areas.

Application of the barriers to the project type and not to alternatives

The barriers identified above typically apply to improved cookstoves with a higher efficiency but not to the use of traditional cook stoves, such as a simple three stone stove. The latter is available for free and is traditionally used in many areas and thus does not face barriers for its use.

Market uptake of efficient cookstoves

Both Lambe et al (2015) and Adane et al (2020) (Sources 3 and 4) indicate significant differences between rural and urban areas in the market uptake of efficient cookstoves in the absence of carbon revenues. For example, in a study of primarily rural households in Northwest Ethiopia, Adane et al found the adoption rate for clean cookstoves was around 12%. By contrast, a separate study of efficient cookstoves in an urban area (Dodola) of south eastern Ethiopia found an adoption rate of 75% (Source 5). The Adane et al study primarily cites Northwest Ethiopia's rural geography as the reason for this difference, although it notes that other factors – including broader geographic and cultural factors – might explain the low adoption rates in Northwest Ethiopia as well. Even in urban areas of developing countries, however, use of efficient cookstoves is not universal (Sources 3 and 4). These findings suggest that market penetration is either quite low in the absence of carbon revenues (rural areas), or lower than might be expected based on the financial and health benefits that accrue to clean cookstove users (all areas). Market penetration varies significantly, however, based on a range of factors, with large observed differences between urban and rural locations.

Overcoming of barriers through carbon credits

Lambe et al. (Source 3) conclude that "carbon finance can help build a vibrant market for improved cookstoves by attracting international actors and technologies, helping establish standards for monitoring stoves and facilitating better follow-up and after-sales support" (Source 1). They cite project developers who claim carbon revenue allow them to (1) subsidize cookstoves or provide them free of charge; and (2) "cover operational costs, including maintenance and replacement of stoves, training of cookstove users, outreach and marketing to households, microcredit systems and distribution." The latter options in particular indicate how carbon revenues could be used to overcome what are essentially non-financial barriers.

The available information suggests that carbon credit revenues could indeed be important for overcoming the identified barriers. Carbon credit revenues would allow to significantly subsidize the sale of efficient cookstoves or even to distribute them for free, depending on the type of cookstove and the carbon credit prices. Subsidization seems likely to be profit-maximizing given that carbon revenue would typically be much higher than average cookstove margins. As reported by the Clean

Cooking Alliance, for example, typical margins on cookstove units are around USD 9-12, whereas each cookstove could generate 1-3 tCO_2e reductions per year under most methodologies. At an average sales price of nearly USD 4 per carbon credit (Source 4), this would easily exceed per-unit profit margins, leading to a profit-maximizing strategy that seeks to boost sales volumes through subsidization (thereby generating additional profits and carbon revenues). If that is the case, then reducing or removing carbon revenues would likely make it difficult to sustain pre-collapse sales volumes. For projects or programmes that use carbon revenues to not only subsidize sales but also fund outreach, training, and maintenance activities, the carbon credit revenues may have an even higher impact in overcoming the barriers.

Another possible scenario, however, is that the projects would, without carbon credit revenues, have been implemented differently, selling fewer stoves at retail rates, leveraging microfinance options, and possibly targeting a different geographic location. Many manufacturers may also receive grant support. On the other hand, they may target those markets with the fewest barriers, such as higher-income urban residents using purchased charcoal for fuel (Lambe et al. 2015). Projects in these markets are more likely to leverage microfinancing to sell stoves at retail prices. By contrast, a significant number of CDM projects have targeted rural households for whom cookstoves are unaffordable and where financing options are unavailable, or ineffective at enabling uptake (Lambe et al. 2015).

This raises the question how carbon crediting affects the market uptake. Across all projects, it seems unlikely that the targeted households would not at all use efficient cookstoves. A more realistic scenario is that the carbon credits help accelerate the uptake of efficient cookstoves. This is not accounted for in the underlying quantification methodologies which assume that no efficient cookstoves would be used in the baseline scenario.

Conclusion

Overall, the available information suggests that important barriers exist for the establishment of programs or business ventures that would distribute or sell efficient cookstoves – especially in rural areas – and that carbon credits can be an important vehicle to overcome these barriers. In practice, it seems likely that the sale and use of efficient cookstoves is accelerated through these kinds of programs or business ventures, but not that efficient cookstoves would not at all be used by the targeted households. In general, existing market penetration of efficient cookstoves is comparatively higher in urban areas, providing less potential in urban settings for additional mitigation associated with these kinds of projects.

For this project type, the score for this criterion depends on whether a project is implemented to serve urban or rural households in developing countries:

- If implemented in rural areas of developing countries, a score of 4 may be warranted, since here non-financial barriers would seem to be very likely, with a strong likelihood that carbon revenues could overcome those barriers (to support both subsidized distribution and outreach, training, and follow-up to ensure uptake).
- If implemented in urban areas, a score of 1 may be warranted. It is in these areas where “business as usual” purchase of efficient cookstoves is most prevalent, and the primary barrier to greater adoption is typically access to microfinance (as opposed to non-financial barriers like lack of knowledge or familiarity). Carbon revenues could in principle serve to

further increase adoption rates, but the case for additionality would be less clear, and not directly related to non-financial barriers.