

MAKING CARBON FINANCE WORK FOR CLEAN COOKING

How different carbon credit transaction structures influence access to carbon finance

KEY MESSAGES

Carbon finance can deliver both results-based revenues and unlock upfront financing for capital investments, with the chosen path impacting the carbon price project developers can secure.

How carbon revenues are to be used impacts which transaction partners are best to partner with, including whether to engage with project aggregators, investment funds, brokerage firms or direct end-users of carbon credits.

A trade-off exists between maximising carbon revenues reaching clean cooking technology users, and using carbon financing strategically to overcome barriers to market entry and/or to scale operations.

Carbon finance strategies will be impacted by new market entrants, innovations around higher tier clean cooking technologies, and pioneering business models supported by pay-as-you-go systems.

With carbon prices likely to remain volatile in the future, project developers can use different transaction structures to optimise the value of generated carbon credits.

Project developers' positioning in the carbon market can also evolve over time as funding needs, access to finance conditions, and the carbon market outlook change.

INTRODUCTION

The voluntary carbon market has witnessed remarkable growth over the past several years. Its size has increased six-fold since 2018, surpassing a total value of USD 2 billion for the first time in 2021 due to a combination of increasing transactions and rising carbon credit prices. The average price of carbon credits generated by clean cooking activities¹ has more than doubled as a result of this recent market surge, further cementing the business case for carbon finance.

Since the inception of the voluntary carbon market, clean cooking activities have issued 25 million² carbon credits as of early 2023. This represents one-third of all cooking industry issuances to date, with the remainder being attributed to improved cooking programmes. Based on this historical carbon credit issuance volume and historical pricing data, an estimated USD 150 million in aggregate carbon finance value is estimated to have been generated by clean cooking activities worldwide over the past decade, with annual transactions reaching USD 35 million by 2020.³

Not all of these financial flows are trickling down to activities on the ground. With carbon project developers finding it challenging to gain direct access to end-users of their carbon credits, transactions are often facilitated through intermediaries. These span from middlemen such as brokerage firms and traders that connect buyers with sellers, to more sophisticated project aggregators and specialised investment funds that can offer upfront funding and assist with the entire carbon project development process. Though data is sparse, intermediaries can charge transaction fees for these services, with

margins on transactions typically falling between 10 to 30 percent.

While the fairness of such fees is often challenged⁴, these intermediaries do often bring value as they allow project developers to gain access to buyers that they may not otherwise have had access to and can provide much-needed technical and transactional support. This, in turn, facilitates access to (carbon) finance, a precondition for the scaling of clean cooking ventures. Such transaction fees can be justified where partnerships with intermediaries allow project developers to secure long-term finance flow and gain access to upfront capital investments.

Ultimately, trade-offs exist between the available carbon credit monetisation options, and preferences will be impacted by the strategic considerations of the carbon project developer, who will need to

conduct a balancing act between opportunities and risks. This briefing serves to inform implementers of clean cooking activities that are seeking access to carbon finance (i.e., ventures that will become project developers once their activities are certified by a carbon standard) and their investors on the possible benefits and drawbacks of developing and monetising carbon credits through the various channels of the voluntary carbon market. We first present an overview of the principal uses of carbon financing in the context of clean cooking project development. Next, we categorise the key carbon credit off taker types that project developers can partner with, explaining their motivations and the value they each can offer. We conclude with an overview of carbon credit transaction structures, evaluating their merits in overcoming specific market access barriers and clarifying their impact on the certainty and value of future carbon finance flows.

PRIORITISING NEEDS

At its core, carbon finance is a results-based financing mechanism that links financial payment to achieved emission reductions. This means that revenues from realised climate impacts only start benefitting projects after a carbon project has been approved by a carbon standard and the activity has successfully completed the monitoring and verification of generated emission reductions. It can take several years for clean cooking projects to jump through the different carbon project development hoops until carbon credits are issued. Carbon finance therefore by design offers relief primarily during the operations stage of a business.

As interest in the voluntary carbon market grows and new players enter the market, carbon certification is opening new doors for clean cooking ventures to strategically use carbon financing to achieve financial viability and kick-start implementation. The specific technical and financial needs that clean cooking ventures face when entering carbon markets will thus guide their engagement strategy in the carbon market. These, in turn, impact the types of partners or intermediaries clean cooking ventures can collaborate with to best benefit from carbon finance to drive increased access to clean cooking technologies and fuels.

The following three technical and financial needs are commonly observed in the market:

Carbon project development support

For organisations and businesses that have secured capital investment and working capital in anticipation of securing carbon revenues, the priority may lie in securing a partnership with an experienced carbon market player that has the expertise to guide the clean cooking enterprise through the carbon project development process. Developing a new carbon project can take several years and is both a costly and technically complex undertaking. Where clean cooking ventures do not want to take on the associated carbon project development risk, opportunities exist for these specialised service providers to cover the upfront costs associated with the certification process. This includes implementation of baseline surveys, organisation of stakeholder consultations, drafting of project design documentation, calculating emission reductions, monitoring of performance results, and coverage of validation and verification audit fees. In doing so, the risk associated with the entire carbon project development process can be transferred to a party that is well-placed to manage this process, freeing the clean cooking organisation/business from considerable upfront costs incurred during the certification process.⁵

Guaranteed operating revenues

Customer affordability and access to credit are key barriers to scaling demand for clean cooking solutions. Clean cooking ventures that have secured upfront funding for both the carbon project development process and their own business development may instead prioritise financial strategies that allow their business model to be subsidised to a level where marketed clean cooking technologies are affordable to target users. The provision of such buy-down grants is often essential to allow ventures to scale. In such a scenario, the traditional role of carbon finance may fit well, whereby results-based payments are used by the clean cooking venture to reduce the retail price of stoves to consumers. The prospect of future revenues mobilised through the carbon market may also assist clean cooking ventures in accessing more affordable working capital from lenders.

Raising upfront financing

New entrants to the clean cooking market often struggle to gain access to upfront financing that is essential to cover capital expenditures associated with research and development and stove design,

manufacturing, distribution, and marketing efforts (among others). With start-up costs amounting to anywhere between several hundred thousand USD to several million USD for venture stage enterprises, substantial external capital is needed to allow new businesses to flourish. Clean cooking ventures can choose to lock in a portion of future carbon revenues with carbon credit buyers at an early stage to offer additional security to investors. In absence of such a guarantee, investors may struggle to secure sufficient collateral, generating a level of risk that is too high to accept.

Such comfort may also be welcomed by more established clean cooking ventures that have a track-record in clean technology distribution and operate growth stage enterprises. Their priority may instead be to scale existing operations by entering new markets, either nationally or internationally. By incorporating secure carbon finance flows for future years, clean cooking ventures can improve their prospects to leverage additional debt or equity funds from investors to scale manufacturing, distribution, and sales efforts.

FINDING THE RIGHT PARTNER

Depending on the priorities for engaging with the voluntary carbon market, clean cooking ventures will have a choice of partners. These different market participants offer unique value propositions when it comes to (pre-)financing conditions, project development support, or transactional support. With the rapid growth of the carbon market, segmenting this complex landscape of market players can help clean cooking ventures to understand where the best fit may be (Figure 1).

End-users of carbon credits

End-users of carbon credits represent corporate clients that look to secure carbon credit offtake agreements with projects directly. From a project developers' perspective, forming a long-term sale agreement directly with an end-user that intends to retire credits to offset emissions may not only

offer revenue security over time, but may also help maximise the value of carbon financing that reaches the project. By directly transacting with a buyer, project developers avoid transacting through intermediaries that charge fees for bringing buyers and sellers together.

Typically, buyers that source carbon credits directly from developers are large multinational corporations who have the capacity to search for and assess projects and the experience to price carbon credits and negotiate delivery conditions. Some corporate buyers may be simply interested in sourcing already issued carbon credits, implying direct payment to project developers upon delivery of the agreed volume to the buyer's account. Others may engage in long-term, forward offtake agreements, offering longer-term financial security to the seller. Finally, there may also be parties that seek greater involvement in the project design, and may offer advance payments for credits to cover capital expenditures.

Figure 1: Overview of transaction partners in the carbon market and the areas of technical and financial support they can assist with.

PARTNER	TYPE OF SUPPORT			
	Upfront financing	Assistance with carbon project development	Long term offtake agreement	Quick transaction support
Direct end-users of carbon credits	●		●	
Carbon project aggregators	●	●	●	
Investment funds	●		●	
Brokerage firms and traders				●
Carbon exchanges				●

While carbon credits from clean cooking activities are popular with corporate buyers, finding a suitable buyer might be challenging for individual project developers. This is due to project developers lacking a network of potential corporate partners, or not being in the position to satisfy large volume deliveries from smaller projects. With only a share of total credits being transacted through this direct offtake channel, this option will not be viable for many project developers, and the help of intermediaries will be required to make sales happen.

Carbon project aggregators

Carbon project aggregators manage a portfolio of carbon projects and specialise in marketing carbon credits to corporate clients or investors. These entities often also act as project developers, investing capital in their bespoke projects while also managing the carbon project development and monetisation process on behalf of other organisations. As such, aggregators will actively engage with clean cooking ventures throughout the entire carbon project cycle, providing technical expertise and often shouldering the associated certification costs. These parties are often well positioned to secure end-users for the carbon credits given their specialised role in generating and marketing carbon credits.

In return for these benefits, project developers must accept sharing future carbon revenues with aggregators, the specific sharing arrangement being determined on a case-by-case basis. In some cases, aggregators may agree on a share of generated

carbon revenues in the future. Aggregators may also act as the direct offtaker for a portion of the generated carbon credits until a certain point in time (Box 1), generally expecting a discount on the pricing as well as options for extending the offtake arrangement in future years.

Box 1. How carbon project aggregators offer long-term offtake agreements to project developers

French carbon project developer Aera Group partnered with Swiss aggregator MyClimate to secure a carbon finance deal valued at EUR 9 million. Under the agreement announced in late 2021, the project developer commits to selling carbon credits from a cooking programme in Burundi over a period of five years. As part of the transaction, the aggregator has offered an upfront payment to Aera Group to allow the developer to scale its operations in the country.⁶

Investment funds

Investment funds represent an investment vehicle through which investors gain exposure to carbon credit assets overseen by specialised asset managers. Investment funds pool financial resources from investors with the aim of either generating returns, or offering their clients direct access to procured carbon credits. By pooling capital from numerous entities, funds are effective at managing investment risks associated with individual carbon projects. This diversification is attractive for buyers, as it de-risks future credit deliveries.

The value proposition of investment funds can be comparable to what some aggregators may offer. Given their capitalisation received from investor contributions, funds can offer clean cooking ventures start-up financing, covering both capital expenditures and working capital needs (Box 2). One important difference is that besides being able to offer financial support in exchange for future carbon credits, investment funds may also seek broader exposure in the underlying business by offering equity investments and taking partial ownership over the ventures they support. Project developers may not know the end-users of their carbon credits, unless the investors in the funds are the end-users and are openly disclosed. However, conditions around delivery schedules and pricing are negotiated between project developers (as the primary sellers) and the fund, without involvement of the end-users of the carbon credits.

Box 2. How investment funds support clean cooking ventures

Spark+ Africa Fund is a USD 70 million impact investment fund financing companies that offer next-generation, distributed cooking energy solutions to the mass market in sub-Saharan Africa. The fund invests debt and equity capital in leading companies throughout the value chains of various clean cooking solutions. One of the ventures that has benefitted from the fund's resources is BURN Manufacturing, a Kenyan manufacturing company that specialises in the design and manufacture of biomass, electric, and LPG cookstoves and operates several carbon projects. The venture has received a USD 6 million equity investment to help with capital investments in Kenya and expansion in West Africa.⁷

Brokerage firms and traders

Brokerage firms and trading houses specialise in matching buyers with sellers, often being able to swiftly arrange for offtake agreements given their extensive client network. By maintaining relationships with numerous project developers, brokers and traders are often in a position to present a diverse offer of carbon credits across project types, geographies, and standards, making these actors attractive partners for corporate clients looking to seek exposure to different grades of carbon credits as part of their procurement strategy.

Brokers do not typically take ownership of credits, and transact back-to-back whereby the brokerage firm only acts as a custodian until both the buyer and the seller have completed their contractual obligations. Traders may take on more risk by purchasing credits without yet having secured an off taker, and some brokers do this too. As typical market intermediaries, these entities generally do not disclose the end-user of transacted carbon credits. They are also generally not in the position to offer upfront funding for carbon project development or capital investments.

Carbon exchanges

Carbon exchanges are digital platforms which facilitate the meeting of carbon credit buyers and sellers. These digital platforms offer various products, including spot deliveries and forward contracts. They may also offer standardised contracts representing certain project categories, certified by selected carbon standards, and limited to certain credit vintages (production years) (Box 3). Exchanges are often suitable for large volumes of carbon credits, whereby buyers do not look for closer engagement with the project offering the carbon credits. In case of standardised contracts, buyers may not even know from which project purchased credits originate from.

The fee structure of exchanges offers developers relatively low-cost access to a potentially large and liquid market. However, given their standardised offer, this route does not grant project developers of clean cooking projects access to buyers that are willing to offer premium pricing. Furthermore, exchanges cannot help project developers in accessing offtake arrangements tailored to their financing needs.

Box 3. How carbon exchanges connected sellers and buyers of clean cooking credits

Xpansiv, a global carbon credit exchange offering standardised carbon contracts, in December 2022 launched the 'SD-GEO' contract that allows for delivery of clean or improved cooking projects with at least five Sustainable Development Goals from the Verra or Gold Standard registries. On the first day of trading, over 200,000 eligible carbon credits from cooking activities were transacted on the exchange, with aggregators, investors and end-buyers participating in the trading. Xpansiv lists eligible cooking projects on its website.⁸

TRANSACTION STRUCTURES

There are three principal types of contracting terms on the basis of which buyers can source carbon credits from sellers in the voluntary carbon market. Each presents distinct benefits and drawbacks, and the applicability of these transaction structures to project developers of clean cooking activities will relate to the strategic use of carbon finance within a cooking venture's business model.

The presented transaction structures differ in terms of their delivery conditions, whereby guaranteed deliveries of existing carbon credits offer the highest degree of certainty to buyers (spot sales), while future unguaranteed deliveries present the highest form of risk (forward sales) (Figure 2). From the project developers' perspective, the factors influencing the decision of what contract terms to offer in turn include the developer's need for liquidity and their propensity to bear risk.

Spot sales: guaranteed delivery of existing credits

Clean cooking projects that are registered under a carbon standard and have successfully completed the verification of generated emission reductions can offer buyers immediate delivery of issued carbon credits. Assuming that relevant issuance fees to the governing carbon standard are settled and the verified volume of carbon credits is available on the seller's registry account, transaction of carbon credits is virtually risk-free and can be completed on the spot. This ability to promptly deliver issued carbon credits offers security to buyers, generally translating into higher pricing than for future, unguaranteed deliveries.⁹

Spot sales are the purest form of results-based finance, whereby clean cooking project developers monetise the generated climate impacts only once they have been verified. Project developers may transact spot carbon credits directly to end-users. Intermediaries can also support spot sales, including brokerage firms, traders, and exchanges. While selling spot may help the negotiation power of the

seller, not all project developers will have the luxury to be able to wait several years before seeing the benefits of carbon finance. Furthermore, waiting carries risk: project developers must shoulder market risk associated with volatile pricing of the voluntary carbon market.

Forward sales: non-guaranteed delivery of future credits

To hedge future exposure to price uncertainty, project developers can opt to lock in a price for (a share) of future carbon credits. For the same reason, buyers may be looking for contract future deliveries at a known price, allowing them to manage long-term compensation budgets. A forward sale constitutes a transaction whereby the project developers commit to delivering a volume of future carbon credits by a pre-defined time. Where this future volume is non-guaranteed, project developers commit to deliver up to an agreed volume to the buyer, with the buyer taking on any under-delivery risk. Provided the under delivery risk is transferred to the buyer, a price discount on such forward sales is applied. Pricing may be fixed and held constant over a period of time, be indexed to inflation, or track the price development of a publicly traded standardised carbon contract on a recognised exchange.

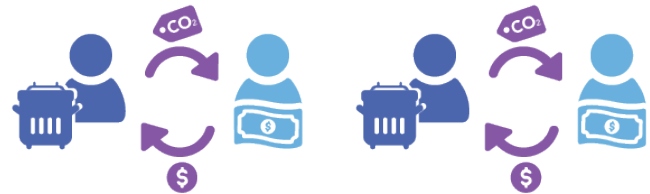
Forward contracts can be signed directly with end-users of carbon credits, if project developers have direct access to such buyers. Otherwise, they can be supported by both aggregators and investment funds, as well as brokerage firms or even some exchanges. Some parties may be willing to offer partial prepayments to project developers in exchange for attractive terms of forward contracts, allowing project developers to mobilise upfront financing to fund operations. Generally, the earlier on a project is in its carbon credit development cycle, the higher the discount will be on offered forward deliveries given uncertainties around project registration and the carbon credit certification process.

Figure 2: Two principal carbon credit transaction structures.

SPOT SALES



FORWARD SALES



Future deliveries: guaranteed delivery of future credits

Project developers can also consider offering a guaranteed future delivery of carbon credits to buyers, committing themselves to a combination of both a firm delivery schedule and delivery volume. As such guarantee offers value to buyers, pricing of such guaranteed future deliveries will exceed that of non-guaranteed forward sales. At the same time, sellers need to be careful when committing to such transaction conditions, as any under deliveries will have financial implications (such as the need for project developers to source the shortfall from

another, similar project at their own expense). As such, guaranteed future deliveries are generally only offered by established project developers with a diversified portfolio of projects, with commitments only relating to a portion of expected future issuances.

When the general market expects future carbon prices to rise over time, future prices will exceed the valuation of spot prices offered in the market today. This condition of an upward sloping curve offers project developers incentives to capture that optimism by locking in higher prices, offering security on future cashflows. Such securities, in turn, can assist project developers in gaining access to working capital loans or other forms of finance that is needed to allow clean cooking ventures to scale.

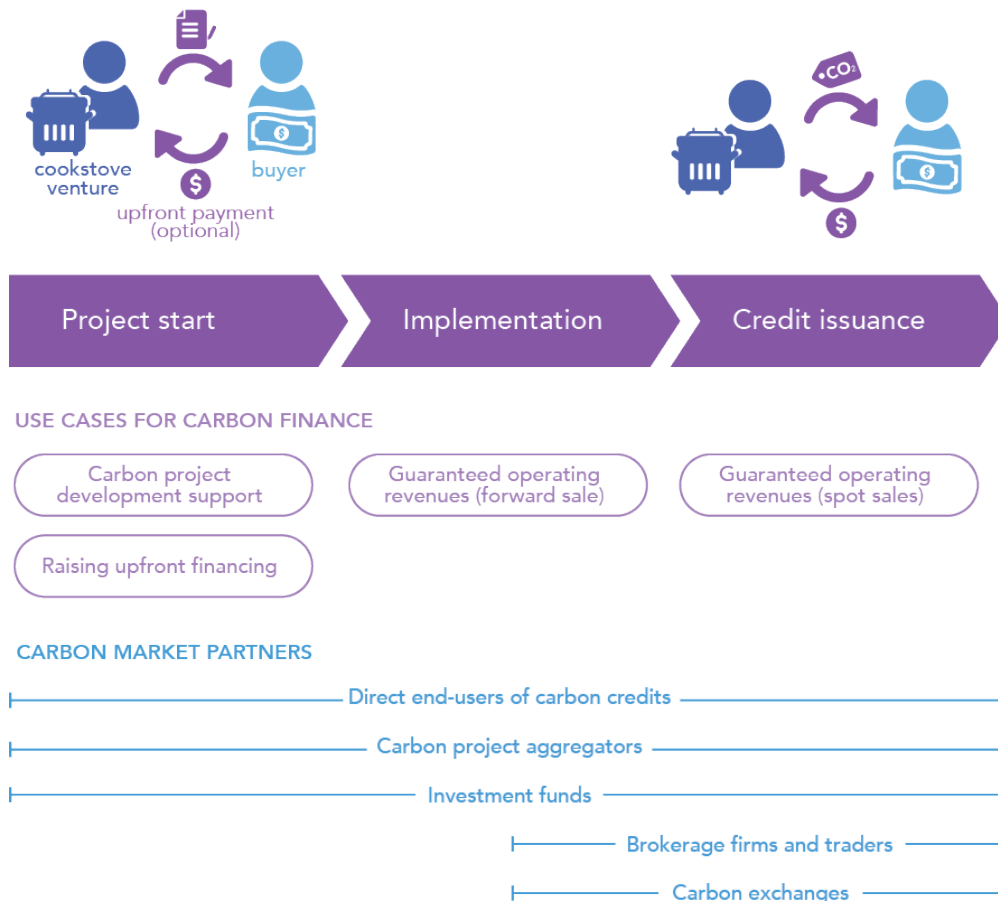
RECOMMENDATIONS

The availability of the various market engagement options and sales strategies carbon project developers have at their disposal in today's carbon market points towards a trade-off that exists between maximising carbon revenues versus using carbon financing strategically to overcome barriers to market entry or scaling. The 'use case' for carbon financing, in turn, guides the identification of partners, which may range from short-term interactions around one-off sales transactions, to long-term collaborations where partners bring technical or managerial expertise alongside upfront financing to help clean cooking ventures scale (Figure 3).

The decision for when and under what conditions to sell carbon credits will therefore be driven by project developers' needs. Experienced carbon project developers may have the financial resources and technical capacity to pursue new carbon project

development opportunities independently, and prioritise offering already issued carbon credits to buyers or guarantee future deliveries based on past carbon credit issuance performance. This will allow for the maximisation of the price received per generated carbon credit, given that the project development and carbon credit issuance risk is fully taken on by the developer. For less established project developers with limited access to upfront financing it may be more meaningful to pursue a strategy of partnering with specialised intermediaries that are familiar with the carbon market and can help developers with both the carbon project development process and access to upfront finance. This latter engagement strategy typically translates into a lower price per carbon credit, considering that the carbon asset development process and carbon credit delivery risk is (in part) transferred to the partner organisation.

Figure 3: Different use cases for carbon finance will impact partner choices.



The type of trade-offs that project developers face will also evolve over time. As cookstove implementation scales and project developers are able to show successful carbon credit issuance track-records, the perceived risk associated with follow-up investments will decline. This will create new opportunities for negotiating future carbon finance transactions, and change the role that carbon financing can play in leveraging investor funding. Another element that is not a constant is the price of carbon. With carbon credit prices likely to remain volatile in the years to come – despite long-term prospects for further price appreciation as absolute demand for carbon credits grows – project developers need to consider the pros and cons of available transaction structures. In times of strong market prices, offering accumulated issued carbon credits through spot transactions may help maximise carbon revenues. When prices weaken, reserving a share of carbon credits for better market conditions or negotiating forward sales that offer long-term price certainty may help to hedge the exposure to the carbon price risk.

For project developers that are not receiving active support from intermediaries there may also be

opportunities to ‘band together’ to open new sales channels. The benefits of such pooling of the supply side can be two-fold. First, the combination of larger volumes with a diversified stream of clean cooking carbon credits can open doors to new buyers. Second, partnering with other project developers can improve the negotiating power of sellers when transacting with one or several buyers.

As the voluntary carbon market evolves, so will the opportunities to access carbon finance for the development of clean cooking activities. Market entrants with pioneering financing solutions will find new ways to leverage the value future carbon credit streams from clean cooking programmes can offer. Innovations around higher-tier cooking technologies and stove use metering are set to unlock new market segments for project developers. And new business models supported by pay-as-you-go systems and last mile distribution solutions will open new geographic markets. These developments will all contribute to shaping the carbon market’s future role in scaling the implementation of clean cooking activities globally, and the strategies project developers will have at their disposal to get the most out of their participation in the carbon market.

ACKNOWLEDGEMENTS

This work was generously funded by Loughborough University and Modern Energy Cooking Services. It was also informed by a series of interviews with clean cooking investors, carbon credit retailers, project developers and health researchers; whose generous insights have enabled the reflections outlined herein.

Modern Energy Cooking Services (MECS) is a seven-year programme funded by UK aid (FCDO) which aims to accelerate the transition in cooking away from biomass to modern energy. By integrating modern energy cooking services into energy planning, MECS hopes to leverage investment in clean electricity access, both grid and off-grid, to address the clean cooking challenge. Modern energy cooking is tier 5 clean cooking, and therefore MECS also supports new innovations in other relevant cooking fuels such as biogas, LPG (bio) and ethanol, though the evidence points to the viability, cost effectiveness, and user satisfaction that energy efficient electric cooking devices provide. The intended outcome is a market-ready range of innovations (technology and business models) which lead to improved choices of affordable, reliable and sustainable modern energy cooking services for consumers. We seek to have the MECS principles adopted in the SDG 7 global tracking framework, including integrating access (7.1), renewables (7.2) and energy efficiency (7.3) and promote an informed integrated approach.

For more information, visit www.meecs.org.uk

Authors

Szymon Mikolajczyk, Malachy Tierney, Adriaan Korthuis, and Hilda Galt

Design

Elisa Perpignan

Citation

Citation: Mikolajczyk, S.; Tierney, M.; Korthuis, A. and Galt, H. (2023). *Making Carbon Finance Work for Clean Cooking. Climate Focus and Modern Energy Cooking Services*



This material has been funded by UKAid from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

ENDNOTES

- 1 Clean cooking technologies include solar, electric, liquefied petroleum gas (LPG), biogas, ethanol, and some processed biomass/ pellet stoves.
- 2 This briefing covers the leading voluntary carbon standards certifying emission reductions in the cooking sector, including the Gold Standard, Verra's Verified Carbon Standard, and Climate Forward. For more details, please visit the Climate Focus Voluntary Carbon Market Dashboard at <https://climatefocus.com/initiatives/voluntary-carbon-market-dashboard/>
- 3 Galt, H.; Mikolajczyk, S.; Long, I.; Della Maggiore, M. and Bravo, F. (2023) The Role of Voluntary Carbon Markets in Clean Cooking. Climate Focus and Modern Energy Cooking Services
- 4 According to research, only about 10 percent of market intermediaries (e.g., aggregators, brokers, exchanges) are transparent about the commissions they charge. This makes it challenging to understand how much money actually flows to project developers. See: Carbon Market Watch (2023) Climate profiteering: Are intermediaries exploiting carbon markets for their own ends? Available at <https://carbonmarketwatch.org/2023/02/02/climate-profiteering-are-intermediaries-exploiting-carbon-markets-for-their-own-ends/>
- 5 Typical carbon project development costs can amount to USD 100 thousand for the registration of entirely new programmes under one of the established carbon standards.
- 6 Carbon Pulse (2021) Developer Aera strikes EUR 9 mln deal to supply African cookstove offsets. Available at <https://carbon-pulse.com/138217/>
- 7 Spark+ Africa (2022) BURN Manufacturing. Available at <https://www.sparkafricafund.com/burn>
- 8 Xpansiv (2023) Eligible Project List. Available at <https://pub.lucidpress.com/SD-GEOEligibleProducts/#jixcoVK9kQK>
- 9 The relationship between the spot price and a forward price will depend on market expectations on the price development. In case the market expects structural undersupply in the future, forward pricing for guaranteed deliveries can exceed spot prices.