

# Can carbon revenues help transform household energy markets?

## Introduction

While 1.3 billion people lack access to electricity, more than double that number – about 3 billion, mainly in South Asia and sub-Saharan Africa – still rely on solid fuels for cooking and heating. Traditional biomass fuels such as firewood, charcoal and dung are typically burned in small, simple stoves or open fires that are inefficient and emit a great deal of smoke. For those who have to collect their own firewood, the task can be hazardous and time-consuming, precluding income-earning activities or school attendance. In scaling-up access to modern energy services, the developing world also faces the challenge of coping with global climate change, which is linked with both energy production and use, and deforestation.

Large-scale adoption of improved cookstoves that use fuel more efficiently, produce less smoke, or both is crucial to addressing these problems. However, although governments and development agencies have been working to achieve this for decades, progress has been limited. It has become clear that in order to make a substantial and long-term impact, cookstove initiatives need to produce a transformation of local stove markets which is self-sustaining and demand-driven. Still, success stories – such as the Ceramic Jiko stove in Kenya or the New Lao stove in Cambodia both of which transformed markets and achieved large fuelwood and charcoal savings – remain the exceptions, not the rule.

The imperative to provide universal access to reliable and clean energy is increasingly well recognized and has led to international commitments such as the UN's Sustainable Energy for All initiative. There is also a growing momentum at both the national and international level to scale-up access to cleaner cookstoves and fuels, as an energy access issue as well as for public health and environmental benefits, witnessed among others by the emergence of the Global Alliance for Clean Cookstoves in 2010, and a number of national household energy programmes as well (e.g. India, Bangladesh), and regional initiatives, such as the West Africa Clean Cooking Alliance under the Economic Community of West African States.

At the same time, a new wave of cookstove initiatives is now being implemented by private-sector actors aiming to develop



**BURN Manufacturing produces and distributes the Jikoko natural-draft charcoal stove in Kenya.**

## Key findings

- In India, a majority of the 43 carbon-financed cookstove projects – 29 – are individual CDM activities; four are CDM Programmes of Activities (PoAs), each with one component project activity (CPA) so far; and 10 Gold Standard projects. In Kenya, the Gold Standard dominates, with 17 projects; in addition, there are five PoAs, with a combined 15 CPAs; one of the PoAs is also registered as a Verified Carbon Standard project.
- In both India and Kenya, businesses make up the majority of project developers – though many are social entrepreneurs with explicit sustainable development objectives; only 22% of projects in India and 10% in Kenya are led by NGOs. Several developers are applying the same business model in multiple locations, through PoAs and as individual projects.
- The affordability of stoves is a major concern for most project developers. Some projects use microfinance, bulk discounts and other mechanisms to help households buy stoves, but high-end price subsidies are the most common approach. This is a common use for carbon finance; others include after-sales support to households, research and development, establishment of distribution networks, and provision of finance to stove buyers.
- Many project developers, especially smaller businesses and NGOs, also face financial barriers, including lack of access to credit for working capital, low profit margins, and high upfront capital costs. A majority of the carbon-financed project developers interviewed were relying solely on carbon revenues to cover project costs.
- Most projects are still in early stages; only 10 out of the 75 have issued credits. Thus, it is too soon to tell whether the use of carbon finance will ultimately help them succeed or create barriers. However, several project developers described the monitoring, reporting and verification (MRV) requirements of carbon finance as beneficial, as they encouraged follow-up with users
- Notably, several larger commercial actors, particularly in Kenya, are pursuing carbon revenues but said they do not consider them necessary to sustain their core business.

commercial ventures by creating demand for higher-quality, often industrially produced stoves. This is promising because the most successful cookstove programmes to date – the ones that achieved the most widespread and sustained use of the stoves – have been to some degree, commercial in nature. All these efforts require funding, and carbon finance is emerging as an attractive option to help scale-up cookstove projects, through the Clean Development Mechanism (CDM) and through voluntary markets, where demand for credits from cookstove projects has been rising rapidly.

Little research has been done on how cookstove projects are using carbon finance. To address this gap, SEI conducted a scoping study in India and Kenya to examine the growing role of carbon finance in cookstove projects, with a focus on how it might support market transformation. This policy brief distils our findings, which are described in detail in SEI Project Report 2014-01, *Can carbon revenues help transform household energy markets? A scoping study with cookstove programmes in India and Kenya*.

We conducted an in-depth review of the project design documents (PDDs) for 75 carbon-financed cookstove projects in India and Kenya. We also interviewed 49 stakeholders along the value chain, including cookstove project implementers (both carbon-financed and not), households, NGOs and cookstove and carbon market experts.

Our interviews were used, in part, to verify a number of core elements in the PDDs, including but not limited to stove pricing, use of carbon revenue, financial barrier analysis, distribution model and stove replacement process. We did not, however, systematically replicate the criteria evaluated in the PDD reviews, nor is the sample of interviewees in India and Kenya representative of the PDD data set. Although the scope of the study is too narrow to draw generalizable conclusions, and most of the projects reviewed are in the very early stages, we identified several patterns and emerging trends

### How are cookstove projects in Kenya and India using carbon finance?

The literature on cookstove initiatives and our own prior research suggest that project implementers typically face two key challenges: motivating households to adopt and use the new stoves, and securing adequate resources for project implementation, including startup costs, market research, product development, outreach and promotion, finance for users (e.g. microloans), and after-sales support and monitoring. Our



A stove-maker for Wisdom Stoves, a U.S.-based nonprofit, works in a shop in North Kinangop, Kenya.

Project developer type and market context of cookstove projects reviewed in India and Kenya

	Country	
	India	Kenya
Project developer type	NGO	○ 10%
	Private	● 90%
	Both	○ 0%
	National	● 78%
	International	○ 15%
Market context	Both	● 48%
	Rural	● 55%
	Urban	○ 39%
	<b>Total</b>	● 60%

analysis focused on how carbon finance might help or hinder projects in meeting those challenges, and identified several patterns and emerging trends based on these two individual cases:

#### Project developers

Businesses make up the majority of project developers in both India and Kenya, though many are social entrepreneurs with explicit sustainable development objectives; only 22% of projects in India and 10% in Kenya are being developed by NGOs. Several developers are applying the same business model in multiple locations, through CDM Programmes of Activities (PoAs) and as individual projects.

The affordability of stoves is a major concern for most project developers; 92% of the PDDs reviewed cited household poverty as a barrier to adoption of their stoves, and many developers interviewed also raised the issue. Some projects use microfinance, bulk discounts and other mechanisms to help households buy stoves, but high-end price subsidies are the most common approach.

In the PDD review, 73% of projects in India and 39% in Kenya planned to give away stoves, and 24% in India and 35% in Kenya provided partial price subsidies. Nearly all the projects selling stoves at full price are in urban settings, where households usually buy fuel rather than collect it for free, so they have a financial incentive to buy efficient stoves.

Many project developers, especially smaller businesses and NGOs, also face financial barriers, including lack of access to credit for working capital, low profit margins, and high upfront capital costs. A majority of the carbon-financed project developers we interviewed were relying solely on carbon revenues to cover project costs. Startup and monitoring costs were being covered by loans backed by the credits expected, but not yet generated, from the projects.

#### Monitoring stove use and generating carbon credits

Accessing carbon finance requires tracking stove use and ensuring that the predicted emission reductions actually occur. Project developers cited many challenges in accurately estimating fuel use, with traditional and improved stoves alike. In the PDDs reviewed, 85% of projects assumed some continued usage of the old stoves, and provided for usage monitoring of both the old and new stoves; the others required the removal or



A woman in Gokak, Karnataka state, in southwest India, cooks with an improved cookstove.

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destruction of the traditional stove to attempt to ensure adoption of the new stove technology.

Several project developers described the monitoring, reporting and verification (MRV) requirements of carbon finance as beneficial, as they encouraged follow-up with users. The projects use a variety of methods to register and track users; a majority of interviewees use consultants, known as “validators”, to visit a sample of households, check if the stove is in use, and ask questions about usage rates. A limited number of the project implementers interviewed, and notably the NGOs, do their own monitoring, hiring local staff in the villages.

#### Use of carbon revenue

Several project developers (11 of the 17 interviewed) are using carbon revenue to provide after-sales support to households and repair or replace broken stoves. Other reported uses of carbon finance include research and development, engagement with users to ensure the stoves meet their needs, establishment of distribution networks, promotional schemes, and provision of finance to households that buy the stoves.

A number of larger commercial actors, particularly in Kenya, are pursuing carbon revenues but do not consider them necessary to sustain their core business. They argued that either the business was viable before they sought carbon finance, or that they needed the carbon revenue only for the initial phase of their projects. While this raises concerns about the additionality of the emission reductions achieved from cookstove projects, it also suggests a need for “transitional crediting”, where carbon finance is used for a limited time period only, until a project is self-sustaining.

#### Benefits and risks of using carbon finance

Our study suggests that the use of carbon finance can benefit – and sometimes even strengthen – the business model for improved cookstove interventions, in three key ways:

- 1) The extra money from carbon revenues can strengthen the business on multiple levels, including leveraging external funds and providing finance options for end users; this can be particularly valuable if projects can team up with local microfinance institutions.
- 2) The monitoring and reporting requirements of carbon finance encourage greater follow-up by the projects, which helps them ensure long-term uptake of the stoves, monitor performance, and draw lessons to improve the business models.
- 3) Carbon finance can be valuable to support further dissemination of improved cookstoves, help build an increasingly vital market for improved cookstoves, attract international actors and technologies, help establish standards for monitoring stoves, and facilitate better follow-up and support to end users.

Nevertheless, pursuing carbon finance for cookstove projects also carries risks, not least of which is a potential mismatch between the efficiency needs of a carbon project and the complexities and cultural sensitivities required for a successful



A modified shipping container serves as a store in Laikipia, Kenya.

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## Policy considerations

- Our study suggests that relying solely on carbon revenues to fund project implementation may be overly risky, and that project developers are better off (more safe) with a business model that is sustainable on its own, including access to a “safety net” of supplementary fund to cover start-up and unforeseen costs. However, carbon finance is intended to support activities that would not have happened without the offset revenue, so the emission reductions are truly additional. Thus, applying carbon finance when the existing business model is sustainable on its own could challenge these additionality criteria.
- Seen in this light, our research suggests that carbon revenues can be particularly useful early on in the business development cycle, as a source of enterprise funding that can be used to leverage additional streams of revenue, or to provide end user subsidies to stimulate demand early on. There would thus appear to be a strong argument for “transitional” crediting, whereby carbon finance is designed to phase out relatively quickly where market transformation can be stimulated.
- The ambition of global climate policies, and governments’ and businesses’ willingness to use carbon credits to meet mitigation targets, will determine the future of carbon-financed cookstove projects. If cookstove project implementers are to make the effort to pursue carbon finance, they need to ensure that there is a market for the credits they produce, and prospective demand for carbon credits depends on those two factors. Corporate demand for credits is inherently uncertain and difficult to predict in the long term, so national governments may play the decisive role in creating long-term demand. This requires setting more ambitious mitigation targets – nationally and internationally – and allowing international carbon credits to be used to meet those goals.
- This study has only begun to scratch the surface in terms of understanding the consequences of using carbon finance in business models for improved cookstoves. There is a clear need to better understand the advantages of introducing a new cookstove “the carbon way”. In particular, further work is needed to understand whether a programme of monitoring, maintenance and repairs, which is often stipulated in carbon finance interventions, will actually increase end-user uptake of the new technology. We also recommend follow-up studies in India and Kenya as the projects there gain more experience. For the best insights on the effects on market transformation, future studies should also compare carbon-financed projects with a control group not using carbon revenues.

improved cookstove intervention. Carbon finance assumes both a stove design and a usage rate that minimize emissions. However, in practice, there is seldom a perfect fit with users’ behaviour and preferences, which are deeply rooted in societal and cultural contexts and not steered by principles of efficiency. As a consequence, project implementers struggle to make reliable predictions about user uptake, leading to unexpected deviations in credit generation. Some implementers also underestimate the time and effort that is required to generate carbon credits; this has consequences for the timing of delivery of credits.

### Will there be enough demand for carbon offsets?

The single biggest threat to the implementation of carbon projects – not just those distributing cookstoves – is that the demand for carbon credits is currently minimal. This is particularly risky for projects that rely on carbon finance as their only source of funding. Currently, demand for CDM credits is closely pegged on economic performance and political decisions within the European Union, by far the biggest carbon market in the world. While other carbon markets exist (for instance, in California and New Zealand) and are emerging (for instance, in China and South Korea), there is no indication yet that those markets will make a real impact on demand for CDM credits, if they are even eligible for compliance.

This policy brief is based on SEI Project Report 2014-01, *Can carbon revenues help transform household energy markets? A scoping study with cookstove programmes in India and Kenya*, by Fiona Lambe, Marie Jürisoo, Carrie M. Lee and Oliver Johnson, available at: <http://www.sei-international.org/publications?pid=2522>.

In the voluntary market, meanwhile, while our study shows that there is continued interest from buyers – notably large companies buying for corporate social responsibility purposes – in cookstove and other small-scale projects, corporate demand is often cyclical and sensitive to trends in CSR investments. While interest in climate change mitigation is still quite strong, it could shift, and while corporations are increasingly becoming development actors, the extent of their involvement ultimately depends on financial conditions.

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