Clean Cooking RBFs

Key Design Principles

CLEAN COOKING ALLIANCE

MECS Modern Energy Cooking Services

Loughborough University

UKaid from the British people

ESMAP Energy Sector Management Assistance Program

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Cover photo: Pratik Shrestha

Background

The *Clean Cooking RBFs: Key Design Principles* report is a collaboration between the Clean Cooking Alliance (CCA) and Modern Energy Cooking Services (MECS).

This joint report reflects the strategic cooperation between CCA and MECS under the Results-Based Finance Accelerator (RBFA) initiative. It also responds to one of the actions agreed in an ad hoc coordination meeting of key funders and managers of publicly funded results-based finance programs promoting clean cooking, which was organized on the sidelines of the Sustainable Energy for All forum in Kigali, Rwanda, on May 19, 2022. Among the agreed actions are making an inventory of clean cooking interventions including details on RBFs and for CCA to help the clean cooking sector coordinate around early RBF learnings.

The report is an output of the Results-Based Finance Accelerator, a shared industry platform to unlock results-based financing (RBF) in the clean cooking sector. The RBFA is part of CCA's agenda Innovative Finance agenda, which seeks to remove systemic barriers to the flows of public funding and private finance needed to accelerate the growth in markets for fuels and tools that support clean cooking.

The report also presents key research findings of the MECS program obtained between February 2021 and August 2022.[1] It builds on key objectives of the MECS program, which are piloting and promoting impact funding including carbon credits as well as the support of RBF programming to promote modern energy cooking market scaling, especially for Tier 5 technologies.

Report Aim

By compiling a collection of clean cooking RBF case studies, the intention of this report is to:

1. Make it easier for RBF practitioners and other stakeholders to get a more detailed understanding of the landscape of RBFs in the clean cooking sector.
2. Help RBF developers to be made aware of early lessons that have emerged from RBF programs in the clean cooking sector so far, assisting with the design of future clean cooking RBFs.
3. Serve as a basis for a broader stakeholder discussion on how to improve the sustainable impact of future RBFs.

Scope

This report looks at RBFs that partly or wholly include clean cooking. The focus is on publicly funded RBF programs involving multilateral agencies or multi-donor programs such as the World Bank, Energising Development (EnDev), or Nordic Environment Finance Corporation (Nefco), where incentive payments are made to projects for delivering pre-agreed targets.

RBFs that partly or wholly include clean cooking have been included in this report. Other forms of impact funding, such as carbon credits, have largely been omitted from this report with the exception of World Bank's Carbon Initiative for Development (Ci-Dev) program, which has uncovered several lessons that are relevant to this report's intended audience.

1. For a detailed review of the evolution of RBF, see Stritzke S, Sakyi-Nyarko C, Bisaga I, Bricknell M, Leary J, Brown E. Results-Based Financing (RBF) for Modern Energy Cooking Solutions: An Effective Driver for Innovation and Scale? *Energies*. 2021; 14(15):4559 and MECS and Energy 4 Impact: Clean Cooking: Results-Based Financing as a Potential Scale-up Tool for the Sector. 2021.

Glossary

ADALYs Averted disability-adjusted life years: A measure of the number of years that would have been lost due to ill health, disability or early death, due to the inhalation of indoor pollution from cooking on open fires; N.B. Reduced DALYs is not as absolute as ADALYs

AfDB African Development Bank

BGFA Beyond the Grid Fund for Africa

BRD Development Bank of Rwanda

CCA Clean Cooking Alliance

CDM Clean Development Mechanism

CERs Certified emission reductions

CIB Clean Impact Bond

Ci-Dev Carbon Initiative for Development

CQC C-Quest Capital

CO_2e Carbon dioxide equivalent

EAQIP Energy Access and Quality Improvement Project

EDCL Rwandan Energy Development Corporation Ltd.

EPC Electric pressure cooker

EnDev Energising Development

ERPA Emissions Reduction Purchase Agreement

ESMAP Energy Sector Management Assistance Program

ICS Improved cookstove

ISO VPT International Organization for Standardization Voluntary Performance Target

KOSAP Kenya Off-Grid Solar Access Project

LPG Liquefied petroleum gas

MECS Modern Energy Cooking Services, a five-year program funded by UK Aid (FCDO); modern energy cooking services in a household context refers to cooking solutions that have met the standard of Tier 4 or higher across all six measurement attributes of the Multi-Tier Framework

Nefco Nordic Environment Finance Corporation

MTF Multi-Tier Framework, the framework consists of six equal attributes: two technical attributes that have long shaped the definition of "clean" cooking (exposure and efficiency) and four contextual attributes that capture the user's cooking experience (convenience, fuel availability [a proxy for reliability], safety, and affordability); references to "tiers," without specifying which attribute or to "modern energy" are in relation to efficiency

RBF Results-based finance, any financing arrangement that pays for public, social, and environmental goods produced as a positive externality by clean cooking companies, and where payments are made after results are achieved and independently verified for their authenticity; RBFs therefore include (a) publicly funded output based finance programs that primarily focus on, for example, sales and use, (b) privately funded carbon credits that focus on carbon offsets, and (c) publicly and privately funded social outcome credits that focus on a range of socioeconomic outcomes such as health or women's empowerment

REACT Renewable Energy and Climate Technologies

RVO Netherlands Enterprise Agency

SDG Sustainable Development Goals

SHS Solar home systems

Sida Swedish International Development Cooperation Agency

SIPA SDG Impact Purchase Agreement

SNV Netherlands Development Organisation

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Methodology

This report was based on a combination of desktop research and interviews with stakeholders closely affiliated to the design of each RBF program. Each case study was then shared with a contact who is familiar with the RBF program to review the accuracy of the contents and provide feedback.

Introduction

Over the past decade, interest in results-based financing (RBF) programs in clean cooking has increased as clean cooking technologies have developed, company business models have evolved, and greater opportunities have arisen from impact funding such as carbon financing. In the face of these ever-changing market conditions, clean cooking RBF programs have been customized and have often needed to make mid-program adjustments to take account of issues that have surfaced during the course of the program.

In this report, we document some of the high-level experiences from previous and ongoing clean cooking RBF programs to share lessons and knowledge that could help program developers when designing future clean cooking RBF programs.

The report includes some key questions for clean cooking RBF stakeholders to answer that could help improve the impact of future clean cooking RBFs. It aims to serve as a basis for a broader stakeholder discussion on how to improve the sustainable impact of RBF going forward.

The Clean Cooking RBF Landscape

The case studies documented in this report indicate that RBFs in the clean cooking sector are still at a very early stage, relative to other sectors. A small number of RBF programs with clean cooking activities are active, and some future clean cooking-related RBFs are being developed.

Figure 1 gives an indication of how the 12 case studies in this report compare to each other in terms of duration,relative size, and intended outcomes.

Clean Cooking RBF Objectives

It is important to contextualize the lessons learned by considering their objectives: Unsurprisingly, all of the RBFs in this report seek to stimulate demand for clean or more efficient stoves among consumers in developing economies and to do this by supporting clean cooking companies to sell modern, high-technology cooking solutions. There are also objectives, particularly around market formation, that are shared by two or more RBFs, as shown in Figure 2.

Almost half of the case studies in this report have objectives pertaining to stimulating new clean cooking policies in a country or improving the local regulatory environment. One-third of the programs specified that reaching new or underserved markets was a desirable outcome, and the same proportion sought to see new business innovations arising from the program.

Other objectives such as the mobilization of additional types of finance, support for clean cooking companies targeting institutional customers, implementation of new quality standards, and inclusion of carbon finance revenue from clean cooking were incorporated into a smaller number of programs.

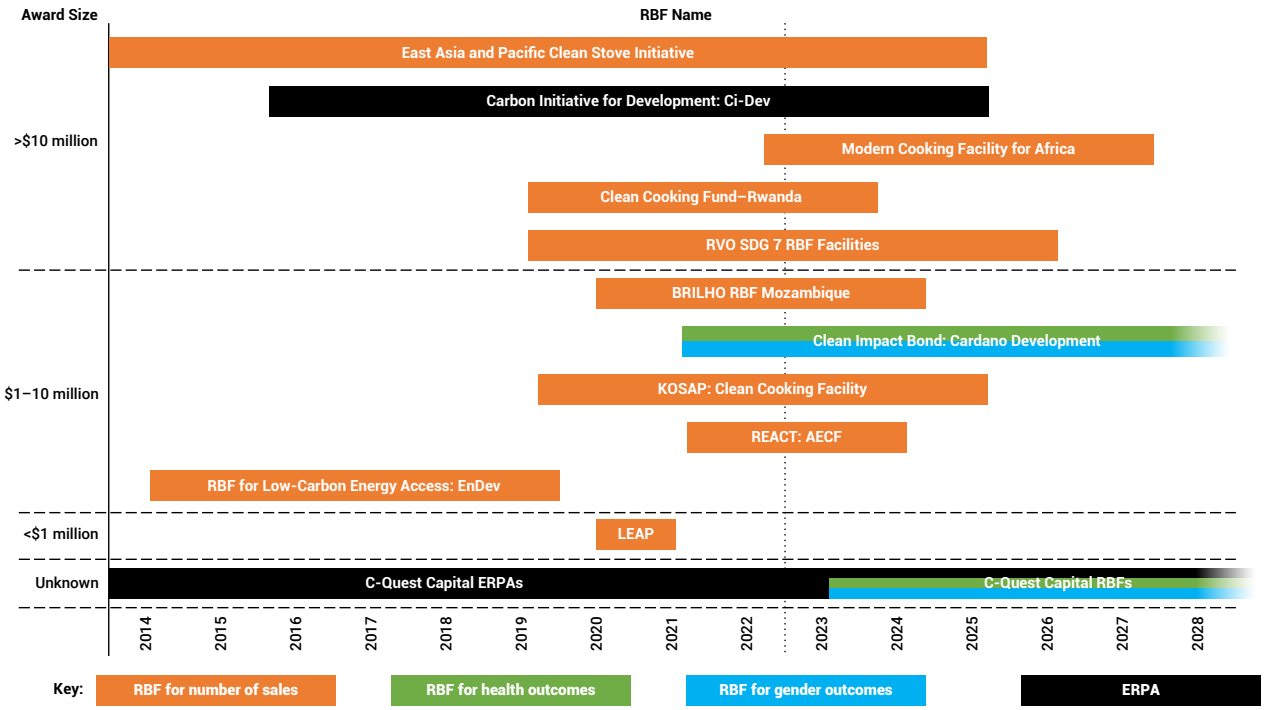

Figure 1. Landscape of clean cooking RBFs[1]

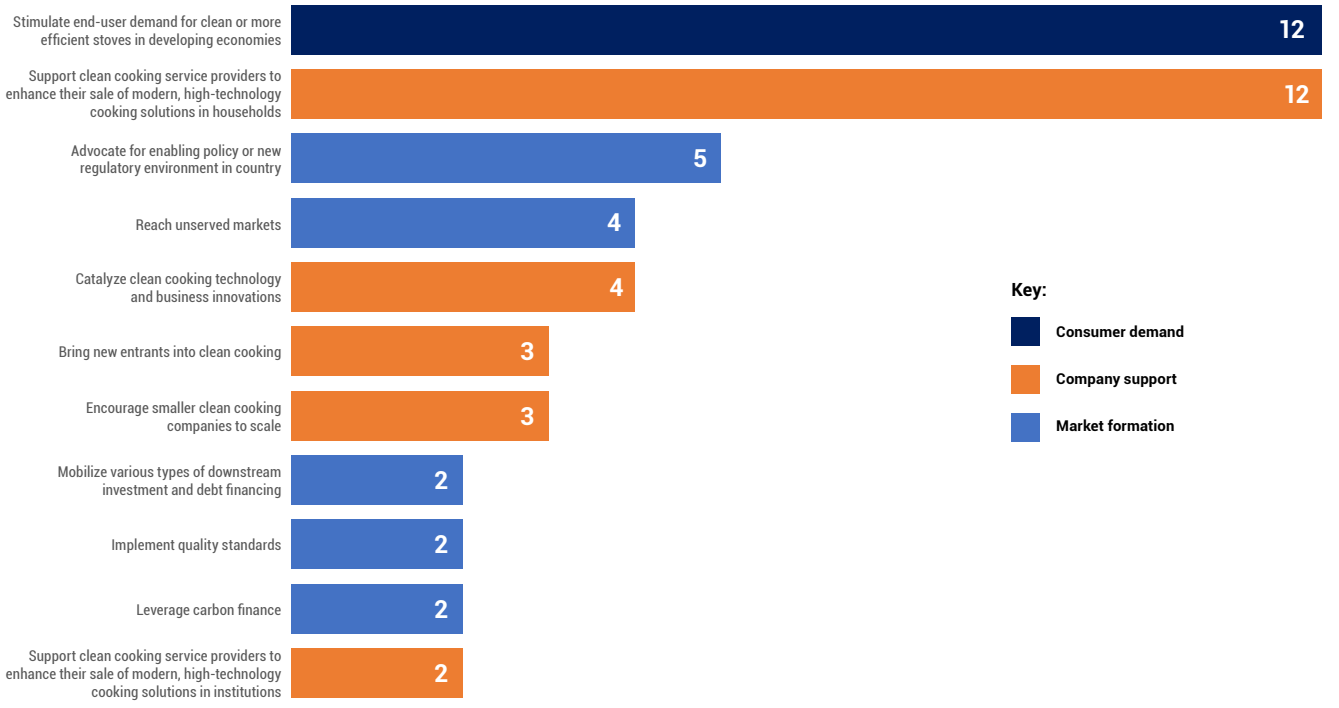

Figure 2. Count of objectives that are common to RBFs profiled in this report

1. The length of the programs shown in Figure 1 is variable because some of the longer running programs are a combination of discrete programs across different countries and markets rather than individual RBF programs, which typically run closer to one to four years. The vertical spacing does show the rank of the size of the respective programs by $US, but the relative spacing between the programs is not representative of associated program size.

Key Learning Points from RBF Programs

Three main groups of insights have emerged from the case studies in this report:

1. Partnerships elevate the effectiveness of RBF programs
2. Verification is the Achilles' heel of RBF programs
3. RBF program objectives should be kept simple

1. Partnerships elevate the effectiveness of RBF programs

RBF programs have a better chance of being effective when they involve partnership with providers of capital or technical assistance, with companies ready to scale, and with other partners that can fill roles in clean cooking supply chains not filled by RBF recipients.

Post-deployment, RBF programs will need to form long-term alliances with "off-takers": sources of finance that RBF companies can "graduate" to when the RBF program ends.

During deployment: RBF program designers should ally with providers of capital and technical assistance …

RBFs and concessional debt finance have the potential to be highly complementary. In theory, the clean cooking company participating in the RBF program secures low-interest debt to procure the inventory it needs in order to achieve the required results. The company successfully achieves the RBF sales results and then uses the payout from the RBF program to fully repay the lender and make a profit. This hypothetical arrangement indicates how RBF funding is a potentially important part of the future funding picture in clean cooking, but not in isolation.

Since securing upfront funding is crucial, RBF developers should actively seek out opportunities for more cross-investor communication, so that RBF programs can leverage the support given to RBF applicants by adjacent initiatives, including technical support.

If RBFs are awarded to companies without access to inventory financing, there can be a danger that RBF project outcomes do not get delivered on time as companies struggle to stockpile the necessary inventory or that the company overstretches itself by taking on more expensive debt too soon. This is a particular issue for companies in emerging markets, where it can be difficult to secure debt at low interest rates, due to high perceived risks from foreign investors.

… with companies ready to scale …

RBFs stand the best chance of accelerating the adoption of clean cooking solutions in households when they are designed to help mature companies to scale faster. Mature companies are defined here as having ready access to inventory financing, a robust business model, and established relationships with other actors in the supply chain that help to make their product or services available to consumers. If one or more of these elements is missing, the RBF program needs to look for partnerships that can bring technical assistance, grant funding, investor networking support, or other appropriate supporting instruments.

Because RBF is targeted to scale clean cooking solutions rather than promote pilots, RBF program developers are advised to select companies with stable underlying unit economics. Because of the nature of RBF, program developers should not actively encourage companies to make significant business model pivots to company strategy on market entries or to make changes to the underlying business model, especially when these are outside of the current plans held by the company's executive team.

If RBFs are awarded to companies that need to make significant changes to their underlying business model to better fit the program, there can be a danger that the business model pivot — combined with an incentivization to overly focus on timely sales outputs — can cause a drop in product quality or some other fundamental problem. In such instances, prematurely accelerating scale can exacerbate these underlying issues and fundamentally weaken the company in the long run.

… and with partners that can help fill roles in clean cooking supply chains.

RBFs are more likely to meet their original objectives if they are set up in more mature clean cooking markets with an existing distribution infrastructure, a functioning supply chain and an awareness of modern energy cooking fuels among consumers who are empowered to choose between cooking technologies. However, many RBF program developers are targeting countries at a variety of levels of market

development. This is a promising approach if the interventions are staged with RBF as part of a series of interventions designed to seed and develop those markets. For example, RBF program developers should consider building in extra upfront grant funding when targeting more nascent markets or technologies and to look for support programs (including technical assistance/consumer awareness raising) that can run in parallel with their program. When RBFs are awarded to companies in more challenging markets where limited partnerships are available, RBF program developers will need to manage the aspirations of smaller clean cooking companies for them not to become strained during program delivery.

One successful model for bringing clean cooking solutions into underserved markets while partnering with small-scale local partners has been pioneered by C-Quest Capital, which brings large-scale funding and business model to support its local partnerships. (See the case study on C-Quest Capital for more details.)

Post-deployment, RBF program designers will need to form long-term alliances with appropriate off-takers.

RBF program developers want to design programs that help companies to scale and help clean cooking markets to flourish, but without creating the need for continual or prolonged RBF support. It is not sustainable for an RBF program to exist indefinitely, providing support to companies that would not be there without their support. RBF practitioners should look to form long-term alliances with local financial institutions and organizations that RBF recipients can go on to partner with once the RBF program closes. Ideally, these off-takers would include local financial institutions, a group that is currently almost entirely absent from the clean cooking investment landscape. Other possible off-takers include carbon credit buyers, impact funders, utilities and mini-grid operators (in the case of e-cooking appliances), and supportive government agencies that can help with technical assistance.

2. Verification is the Achilles' heel of RBF programs

Verification is currently, and is likely to remain, the key pain point for stakeholders involved in an RBF program, as there are trade-offs inherent in a process that needs to balance speed, quality, and cost.

From the case studies in this report, it seems that RBFs are taking longer to verify payments, which causes delays in the disbursement of funds and in turn creates problems for the companies involved. Manual verification (e.g., via phone or on-site surveys) is also costly and not 100% accurate as it depends on the (often subjective) end-user feedback. Digital technology can help to streamline timelines for monitoring and results verification. MECS, CCA, and other stakeholders are actively exploring this area, not least with the launch of a new Innovation Challenge (see box for details).

RBF program designers should learn from each other and look out for best practices on shorter, more transparent payment processes to reduce the time, cost, and effort needed to secure financing

Today, slow results verification processes can frustrate companies. Companies interviewed during the research for this report suggested that the time taken for payment of a claim can be anywhere from 30 days to a year. This can be even longer for Emission Reduction Purchase Agreements (ERPAs), with one example taking more than three years to move from program certification to first cash payment. These lengthy payment times can harm companies, particularly smaller ones that are most vulnerable to cash flow shortages.

A key driver of slow payment timelines in RBF programs is the results verification process. It can be difficult for technology-agnostic funds to streamline results verification processes for a multitude of different clean cooking technologies. Certain business models also make verification harder; companies using a business-to-business-to-consumer model, for instance, often find it harder to get the contact details of end users that are needed for audits. Companies that can use digital solutions to track usage monitoring can streamline verification processes and achieve quicker payments.

RBF program developers can learn from each other and look out for best practices on shorter, more transparent payment processes and technological innovation. More visibility of payment cycle performance across RBF practitioners could be a useful step toward forming future industry standards that outline good practices for such areas as typical payment times.

RBF program designers should continue to explore how digital technology can help to streamline monitoring and results verification timelines

Opportunities to improve the reliability of RBF reporting and to decrease costs are now arising from the Internet of Things

(IoT) enablement of some modern energy cooking appliances. The main agencies for certifying carbon emission reductions (the Clean Development Mechanism, or CDM, the Gold Standard, and Verra) have all approved, or are working on, more streamlined approaches for calculating emission reductions for electric and other metered appliances based on recorded energy used. Metrics identified for demonstrating co-benefit Sustainable Development Goals (SDG) impacts can also be integrated into the reporting from the same usage data required to demonstrate CO_2e emission reductions. Both CCA and MECS are actively promoting this agenda along with some other institutions, including the World Bank Group.

However, while digitizing the verification process through the inclusion of IoT-enabled usage sensors creates opportunities for verification processes, the inclusion of additional digital hardware does drive up the cost of the product. This typically results in the need for costly consumer financing to be provided somewhere in the value chain. Many RBF program developers are unwilling to digitize verification for this reason.

3. RBF program objectives should be kept simple

All RBF program designers want to create programs that have "additionality" — creating positiveimpacts that could not have happened without the existence of the program. Difficulties can arise, however, when different objectives pertaining to the target markets, companies, and technologies are brought together under the same program.

RBF program designers should not set multiple program objectives that create conflicting needs regarding the selection of companies, markets, or technologies

Figure 2 indicates that RBF programs can have multiple objectives beyond accelerating adoption of clean cooking solutions in households. As already noted, RBFs stand the best chance of achieving their core objectives when they are designed to help mature companies to scale faster.

Some technologies and markets are predisposed toward helping programs to deliver bigger numbers with lower risks and costs. For instance, it is easier for a program to meet a headline target by focusing on Tier 2 improved cookstoves in served markets. Doing this might work in simple scale terms, but it will not deliver the intended health, social, or environmental benefits. Furthermore, it comes at the opportunity cost of attempting to open up harder-to-reach markets or promoting the cleanest cooking technologies.

Markets work in very different ways for different types of fuels and approaches, so RBF program developers should consider designing their programs to explicitly focus on specific technologies, rather than assuming a default position of fuel neutrality. For example, electric cooking appliances

UNCDF and CCA's Global Partnership to Accelerate Finance: Digital Innovation Challenge Fund

WHO? The Innovation Challenge is a joint collaboration of UN Capital Development Fund (UNCDF) and CCA.

WHAT? The challenge is calling for technology solutions providers that can increase clean cooking companies' access to finance opportunities, including publicly funded output-based finance programs, carbon markets, or commercial credit markets. Facilitating access might be achieved by reducing the barriers associated with accessing these types of finance. Examples of this may include solutions that enable improved baselining and standardization of metrics linked to finance, reduce verification costs and timelines, or align company financial insights to potential investors.

WHY? The long timelines and costs associated with project development, and later verifying project outputs, have a big impact on the time taken for financing to reach companies that have delivered project outputs, as well as the amount of financing they receive. This can affect cash flow stability, causing some companies to pull out of projects, struggle, or even potentially fail.

WHERE? The interventions should be implemented in the top 20 countries with the largest deficit in access to clean cooking fuels and technologies.

could be easily incorporated as part of existing RBF programs rather than as part of clean cooking RBF programs.

Some of the high-level pros and cons of designing an RBF program that specifies Tier 4 or Tier 5 technologies, compared with technology-neutral RBFs, are listed in Table 1.

Table 1. Comparison of pros and cons for designing a technology-specific RBF and a technology-neutral RBF

RBF Focus	Pros	Cons
Higher-Tier Technology-specific RBFs	• Paying out incentives could be done based on fuel consumption, because fuel purchases are a good proxy for validating consumer use • Focuses on higher-tier fuel and tool models: the cleanest cooking solutions that can have the biggest impacts on reducing indoor air pollution and the burden of disease	• Pricing the incentives can be difficult as the availability of fuels can vary within and between markets. • Need for more expensive subsidies per unit sold
Technology-neutral RBFs	• Broad applicability across companies • Generally easier to achieve high-output targets, given the inclusion of cheaper clean cooking technologies	• Comparing end results may be difficult: Is a household that moves from an open fire to a cleaner cookstove counted the same as a household that transitions to a truly clean solution? • Different verification processes might be needed for each of the eligible technologies, potentially adding cost and complexity to the program

RBF and Carbon Financing

RBF funding coexists with carbon and noncarbon outcome financing

Publicly funded RBFs should consider how they fit in alongside other sources of finance coming into the clean cooking sector: Clean cooking projects promote multiple SDG impacts, in particular health improvements, gender impacts, and environmental and livelihood benefits. Until now, these benefits have largely been treated as positive side effects to carbon credits, allowing clean cooking projects to command higher carbon credit prices than other types of carbon projects. Selling health impacts that arise from clean cooking projects is a newer frontier that offers the potential for additional financial returns to clean cooking RBF programs.

Public funders are uneasy about "double dipping"

Carbon credits have historically been an important source of revenue funding for cooking projects, and with the strong global commitment to support climate change initiatives, the voluntary carbon market has seen resurgent carbon prices and a renewed interest in clean cooking projects. The ability of clean cooking projects to attract significant income from carbon credits can, however, create perceived problems for clean cooking RBFs around double counting of monetizable impacts or creating a risk of excessive donor support.

No standard approach to the potential issue of double dipping has been adopted by public funders. There needs to be a better understanding of how different revenue streams can coexist.

Approaches to addressing the "carbon windfall challenge"

Donors are taking various approaches to address the challenge of "double dipping" from different public funding sources. The World Bank's Rwanda Energy Access and Quality Improvement Project (EAQIP) RBF, one of the case studies in this report, aims to increase access to clean cooking solutions for 500,000 households through a partial subsidization of purchases of clean and efficient cooking solutions by eligible households. The RBF program itself is expected to benefit from payments through the purchase of emission reduction credits by the Carbon Initiative for Development (Ci-Dev), also a case study in this report. The Ci-Dev carbon RBF funding will provide additional financing for EAQIP to help more households access clean cooking solutions. Companies would not receive both carbon credits and RBF payments from these two programs.

An alternative approach has been adopted by EnDev, which has tested price-finding mechanisms to set incentive levels. One mechanism requires projects to use market analysis and stakeholder consultation to estimate the "viability gap" — i.e., the additional funding needed to allow a company to enter and build a sustainable business operation. This approach requires the implementing agency to undertake data collection on market prices and product costs.

Another approach involves market-driven mechanisms, such as auctions or reverse auctions, to determine incentive levels. Yet another approach to avoiding overpayment is to look at "clawback" mechanisms where payments could be withheld or claimed back in cases where carbon credit prices rise beyond specified levels.

There are also schemes that have been active in using carbon credits to promote clean cooking programs. Organizations such as Commonland, FairClimateFund, and Atmosfair can make carbon credits directly payable to the end consumer and their community, rather than to the clean cooking company. Some programs have also used carbon credits to subsidize the cost of appliances. This is often critical for making programs viable for populations that are poor or hard to reach.

RBF and the Integration of e-cooking

Nine of the 12 case studies in this report include improved biomass cookstoves as an eligible solution. E-cooking is emerging as a cost-effective and highly attractive clean cooking solution in many contexts, and some RBF programs are starting to include clean cooking components alongside solar home systems and mini-grids. Notable examples presented in this report are the Kenya Off-Grid Solar Access Project (KOSAP), the BRILHO Program in Mozambique and the Modern Cooking Facility for Africa.

RBF program developers should consider the requirements for successful implementation and scaling of e-cooking in both on-grid and off-grid contexts when designing future RBF programs.

Considerations with on-grid e-cooking for RBF developers

RBF programs aiming to promote the use of electric cooking solutions are best suited to target urban and periurban on-grid clients, where energy tariffs are often subsidized and affordable, income levels are higher, and the availability of free firewood is low. The combination of these factors usually makes e-cooking the most cost-effective alternative to biomass cooking. E-cooking is also a big opportunity for utilities that have customers newly connected to the grid, because cooking is an extra source of demand for electricity and can help improve the economics of the new connections made.

An RBF program can improve its impact by addressing uptake barriers such as the lack of availability of good-quality products, limited consumer awareness of electric appliances, and erroneous perceptions around the cost of e-cooking. RBF program developers can also look to complement payments to companies with technical assistance for local distributors, innovation funding, or the establishment of multipartner programs involving government and nongovernment stakeholders in commercial campaigns.

Considerations with off-grid e-cooking for RBF developers

For RBF programs looking to scale electric cooking solutions in the off-grid energy market, program developers need to be aware of local seasonal income levels, the availability of free firewood, the existing degree of access to clean cooking technologies, and higher consumer outreach costs. Introducing clean and modern energy cooking solutions is still challenging for rural and periurban areas that are not connected to the electricity grid, but rapid technological change and decreasing appliance costs — as well as lower mini-grid system costs — are increasingly enhancing the viability of e-cooking in these settings.

Some mini-grid operators have already introduced e-cooking appliances to their customers, and possibilities are emerging for cooking on solar home systems that cost under US$300. The cost per unit of electricity on mini-grids is, however, much higher than for grid-connected customers. If consumption can be increased via the introduction of e-cooking, the cost per unit can be lower. MECS recently launched a Challenge Fund designed to encourage mini-grid operators to explore how they could integrate e-cooking into the design of their business models.

RBF programs could consider subsidizing the energy used by customers for electric cooking in off-grid areas, such as an e-cooking tariff subsidy. By incentivizing uptake and actual usage rather than financing the appliance, the RBF program would be encouraging use of the appliance instead of just its purchase. The subsidy could be directly linked to existing mini-grid tariff bands to make it easier to target lower-income customers. The subsidy could also be applied during certain times of the day to incentivize daytime cooking and help balance energy demands on the mini-grid.

Future Questions and Outlook

This report notes the following six prompting questions to consider when designing the next wave of RBFs for clean cooking.

	Situation	Complication	Key Question
1	Verification processes cause delays in payments to companies. The time between a company filing a claim for payment and receiving payment can range from 30 days to a year.	There are trade-offs inherent in a verification process that needs to be quick yet rigorous, cheap yet trusted.	What can be done to create faster, cheaper feedback and repayment loops without compromising on quality? (For example, could forming industry standards on minimum acceptable business processes be helpful to clean cooking RBF stakeholders?)
2	RBF programs want to be "additive" and achieve positive results that could not have happened without the program.	Achieving additive results can be distortive to a company's existing business plans.	What can be done to create RBFs that are ambitious in terms of impact, yet do not risk damaging companies by making them stray too far from their original business plans?
3	RBFs are just one part of the clean cooking financing ecosystem, and there is the potential for closer collaborations among RBF programs and other stakeholders working with the same companies.	There are cases where companies may be able to claim carbon credits in addition to RBF payments. In such instances, the risk of excessive donor support can arise.	What opportunities are there to collaborate with non-RBF stakeholders that enhance RBF projects or improve their scalability or replicability?
4	Most case studies in this report have met, or are on track to meet, their stated objectives.	Three-quarters of clean cooking RBFs include lower-tier clean cooking solutions.	What can be done to document and share how final objectives are set for RBF programs? (For example, if a donor is driven by energy access targets, does this predispose RBF developers to include incentives for low-tier solutions?)

	Situation	Complication	Key Question
5	Electrification strategies for developing economies often target mini-grid viability and electrification impacts.	Electrification strategies do not tend to include clean cooking as part of the challenge to be solved.	What can be done to better incorporate clean cooking RBF programming into electrification strategies?
6	All RBF programs have an underlying Theory of Change that informs program design, but they, and the assumptions that underly them, are not always openly available.	It is hard for RBF program developers to get visibility on what predecessor programs were trying to achieve.	What can be done to share underlying Theories of Change for RBF programs, so that learnings can be picked up on the underlying RBF frameworks used to design RBF programs?

RBF Case Studies

East Asia and Pacific (EAP) Clean Stove Initiative (CSI)

RBF Name	**East Asia and Pacific (EAP) Clean Stove Initiative (CSI)**		
Total Funding	US$137 million		
Start Date	2012	**End Date**	2025
Location	China, Indonesia, Lao PDR, Mongolia		
Technology	Improved biomass cookstoves, biogas, pellets, LPG, e-cooking		

Background

The East Asia and the Pacific (EAP) Clean Stove Initiative (CSI) is a regional initiative that was launched in 2012 and aims to increase access to clean cooking and heating solutions beyond 2030, especially for disadvantaged rural communities that are still dependent on solid fuels.

Funding for the multicountry initiative is provided by Australian Aid (formerly AusAID), the World Bank's Asia Sustainable and Alternative Energy Program (ASTAE), and the Energy Sector Management Assistance Program (ESMAP).

The clean cooking RBF is part of an initiative that follows a phased approach that entails national implementation, knowledge-sharing across countries and regions, and innovation in four individual country programs (China, Indonesia, Lao PDR, and Mongolia), as well as a cross-cutting regional program.

The CSI implementation strategy has three core elements: establishment of an enabling policy and regulatory environment for scaled-up access to advanced stoves, with a strengthening of institutional capacity; support for the supply-side market and business development; and stimulation of end-user demand for clean and efficient stoves.

The initiative adopts a four-phase approach in each country, which involves an initial stocktaking and development of the implementation strategy; institutional strengthening, capacity building, and piloting of the strategy; scaled-up program implementation; and an evaluation and dissemination of lessons learned.

The EAP CSI is one of the first programs applying results-based financing in the clean cooking sphere. The RBF framework includes clean cooking and heating, and the RBF component acknowledges the different country contexts between, for example, China and Mongolia. The RBF is especially focusing on sustainability and the adjustment of subsidy levels due to the existence of government subsidies while technical assistance and capacity-building efforts are primarily directed toward the private sector in Indonesia and Lao PDR, as private-sector capacity is especially low in these countries.

The EAP CSI has given particular attention to leveraging experiences and knowledge across sectors and countries, as well as promoting cross-country and cross-regional collaboration and partnerships pertaining to the clean cooking agenda.

These sectors included:

- **Health:** The EAP CSI team has developed two four-page engagement notes with key stakeholders on indoor air pollution health impacts (China and Indonesia). As part of the Lao PDR project, the team worked closely with the project's health team on health impact RBF feasibility studies, as well as supporting the inclusion of clean cooking as part of the Health Governance and Nutrition Project. Additionally, the CSI team contributed to the development of the Health, Nutrition and Population (HNP) Global Practice's multisectoral approach.
- **Carbon finance:** In the EAP CSI team, a carbon finance specialist has contributed to the exploration of carbon financing options. In addition to reviewing proposals for carbon finance cookstove projects, the CSI team participated in the Ci-Dev proposal review committee.

- **Social impact:** To design and promote clean stoves in Indonesia, the Indonesia CSI has worked closely with the social/gender team.
- **Environment:** To estimate the full benefits of achieving universal access to clean cooking in rural China, the China CSI team collaborated with the environment team on a clean cookstoves case study.
- **Rural development:** In collaboration with the Hebei Rural Renewable Energy Development, the China CSI provided technical assistance for the project preparation and inclusion of a target to provide clean cooking to 96,100 households.

Stated Objectives

The RBF aims to enable the distribution and sustainable use of improved cooking solutions to 24.5 million households in the region.

Eligibility

RBF design and eligibility criteria were designed based on the local contexts found in each country. To ensure the adequacy of quality standards, CSI country delegations have worked on designing performance metrics that were complemented by a collaboration with the social/gender team of the World Bank's EAP region. A positive result is the establishment of an innovative stove-testing method in Indonesia that incorporates local cooking practices and social and cultural preferences, which has also made significant contributions to ongoing International Organization for Standardization (ISO) discussions.

In China, the selected eligible stoves were required to meet published industrial standards that were ensured through the submission of certified testing reports by the municipal bureau for product quality and inspection. The results-based incentives were mainly determined by the technical performance levels. Stove suppliers also had to prove their track records, which were complemented by site checks of suppliers' capacity and networks performed by the Rural Energy and Environment Agency.

Bidding Mechanism

Fixed incentives based on performance levels.

Incentives

Variable, depending on the technology and market status. Incentives should not exceed 50% of supply costs.

Payment Triggers

The RBF framework was applied differently in China and Indonesia.

In China, there was a two-stage process involving a pilot design and fund disbursal. The pilot design covered the development of selection criteria for stove technologies, suppliers, incentive levels, disbursement conditions and schedules, a third-party monitoring and verification system, consumer training and awareness raising, and implementation. Disbursement of funds occurred after the independent verification of number of sales, quality, and after-sales service care.

In Indonesia, the disbursement process was linked to the third-party verification of sales and usage. After this verification of stove sales was obtained, 70% of the total incentives were disbursed. The remaining 30% was paid after a few months upon confirmation from the verification team that sampled households listed in the sales report were still using the certified stoves.

Verification

The monitoring and verification system varied in each country.

Observations

Successes: What worked well?

1. Recognition of innovative approaches

EAP CSI's use of results-based financing pilots, and incorporation of stove standards, testing, and certification protocols was innovative when the program was established. The World Bank's Energy and Extractives Global Practice awarded EAP CSI the KNOWbel Innovate Prize[1] (runner-up for "Explore") for these innovations.

2. Large scale-up in China, based on pilot learnings

RBF pilots were completed in China in two villages, resulting in 480 stoves being sold. In the pilots, key stakeholders appreciated the emphasis on results verification. As a result, the Chinese government developed a plan using an RBF

1. KNOWbel is a WBG-wide recognition program celebrating teams and individuals who leverage knowledge for better business results and embody knowledge sharing behavior.

approach to disseminate 40 million clean cookstoves by 2020 under the Hebei Air Pollution Prevention P4R Project. According to the monitoring and verification results, the majority of sampled respondents reported better indoor air quality and more convenience. Changing stoves resulted in significant fuel savings, and the payback period was less than a year. The verification results indicated that all RBF-eligible incentives had been disbursed.

3. Market entry and scale-up in Indonesia

Two open calls for stove technologies and market aggregators were issued in Indonesia. More than 20 businesses submitted applications, and implementation agreements for the RBF incentives were signed with more than 10 market aggregators. The RBF pilot is ongoing and is showing scale-up potential. A national clean cookstove program is being developed that will incorporate the knowledge gained from the RBF pilot project. In the test locations, the 10 market aggregators facilitated deployment of about 10,000 qualified clean cookstoves. Because there is not currently a commercial market for clean cookstoves in Indonesia, the market price is yet to be discovered.

4. Evidence of positive impacts from clean cookstoves on Lao's burden of disease

Results of household air pollution assessments in poor rural households in Lao PDR confirmed the cost-effectiveness of using modern clean cookstove technology to reduce the country's burden of disease. The next step is to develop an RBF mechanism to mobilize private sector and bilateral donor resources to realize health and climate benefits.

5. Development of a national plan for clean cooking in Mongolia

Mongolia developed a national program that oversaw the lowering of existing subsidies, the switching of existing stove models, and the sharing of general consumer awareness campaigns. The program supports an RBF approach as part of the existing stove switching program of the Ulaanbaatar Clean Air Project: 36,533 low-emission heating stoves were disseminated as of mid-2022, covering more than four-fifths of the potential household market and exceeding the goal of installing heating appliances in more than 80% of targeted households.

Learnings: Opportunities for improvement?[2]

1. Substantial national support is key for program adoption and implementation

There is generally a strong need for country-specific road maps, substantial national support, well-targeted subsidies, and integration of local conditions and international best practices into developing stove standards and testing protocols. Although there are common barriers to widespread adoption of clean cookstoves, the best solutions will vary by location owing to differences in social behavior, culture, resources, institutions, and market conditions. Thus, action plans should take country conditions into account. Prior to scaling up implementation, it may be appropriate to take a phased approach by developing a road map, then building capacities and piloting before scaling implementation.

2. Connecting with other partners in the ecosystem helps achieve scale

Clean cooking and heating programs should involve stakeholders across many sectors (public, private, civil society) at all levels (local, provincial, national, international). But there is no substitute for high-level political, technical, and financial support from national leaders and agencies. To build and maintain this level of support requires time and engagement.

RBFs can be a suitable approach for incorporating various instruments to incentivize clean cooking markets. As part of the EAP CSI, an RBF framework was developed to attract public funding to achieve broad public benefits (such as improved health, improved gender equality, jobs creation, and mitigation of climate change).

3. Subsidies for the achievement of energy access goals must be well targeted

To scale up access to clean cooking for the poor, subsidies will be necessary. Using market mechanisms and forces to promote the development, marketing, and sale of modern cooking stoves is an effective way to ensure a sustainable supply of clean cooking stoves. In less developed and remote areas, access will be limited mainly by affordability and other constraints, as market forces alone will not be able to provide affordable services. To scale up access to clean cookstoves, government policies must be designed and implemented to maintain effective subsidy levels and encourage sustained private sector participation.

2. Sources: World Bank (2016): East Asia and Pacific Clean Stove Initiative, Summary Report (Report No. AUS6083); ESMAP (2016): Toward Universal Access to Clean Cooking and Heating: Early Lessons from the East Asia and Pacific Clean Stove initiative.

Carbon Initiative for Development (Ci-Dev)

RBF Name	Carbon Initiative for Development (Ci-Dev)		
Total Funding	US$47.4 million (excluding original budgets for Kenya, Rwanda)		
Start Date	2016	End Date	2025
Location	Burkina Faso, Ethiopia, Kenya, Lao PDR, Madagascar, Rwanda		
Technology	Biogas, improved biomass cookstoves, ethanol		

Background

Carbon Initiative for Development (Ci-Dev) is a World Bank-administered trust fund that makes payments based on the amount of greenhouse gas emissions that has been avoided. Ci-Dev has signed Emissions Reduction Purchase Agreements (ERPAs) with 13 programs. The programs cover energy access, including solar energy, small-scale hydropower, and power network extensions, as well as clean cooking.

The clean cooking programs cover efficient cooking appliances, biogas, and ethanol, and are based in Burkina Faso, Ethiopia, Lao PDR, and Madagascar. The clean cooking ERPA signed with companies working in Kenya, and two ERPAs in Rwanda, were terminated.

Stated Objectives

Active Projects

1. **Burkina Faso:** In December 2016, Ci-Dev signed an ERPA with the SNV Netherlands Development Organisation to purchase about 540,000 certified emission reductions (CERs), to be generated by biogas digesters installed in rural households through 2024. The project is expected to reduce greenhouse gas emissions by 540,000 tons of CO_2e by 2025.
2. **Ethiopia:** Ci-Dev is purchasing carbon credits generated by 42,000 biogas digesters installed between 2009 and 2022. Ci-Dev's funds will allow for a subsidy that reduces the sale price for consumers and supports a performance-based maintenance incentive. Also, through a credit line under the Development Bank of Ethiopia, microfinance institutions will have additional resources to assist households in purchasing biogas digesters. The program seeks to reduce emissions by up to 1.5 million tonnes of CO_2e by subsidizing the construction of 42,000 3- to 6-cubic-meter domed masonry biogas units for rural households.
3. **Lao PDR:** Ci-Dev will make payments for emission reductions of approximately 200,000 tons of CO_2e. Carbon revenue from Ci-Dev will be used to make cookstoves more affordable to customers, support awareness raising campaigns to grow the local market, and monitor the daily impact on women who use improved cookstoves. Ci-Dev will measure reduced expenditure on fuel, cooking time, and health issues related to household air pollution.
4. **Madagascar:** CiDev seeks to facilitate distribution of 35,000 ethanol stoves and the continued use of sustainably produced ethanol. CiDev will make payments for emission reductions of approximately 850,000 tons of CO_2e. The intended impact of the resulting carbon revenue will reduce deforestation, subsidize ethanol stove prices, and help train local partners to establish micro-distilleries so they can produce and sell ethanol locally.

Terminated Projects

1. **Kenya:** Ci-Dev signed its first Emission Reduction Purchase Agreement in January 2016 with SimGas BV, a Dutch social enterprise and manufacturer of small-scale biogas systems made of recycled plastic. Ci-Dev intended to achieve emission reductions of approximately 3.3 million tonnes of CO_2e over 10 years, but SimGas BV went bankrupt in 2018 and is no longer in operation. No payments for CERs were ever completed. No additional partners were considered or identified.
2. **Rwanda:** Two projects were piloted with two private companies, Inyenyeri and DelAgua Health Rwanda Ltd.,

but no disbursement was made to either company, as no emission reductions had been verified, certified, or delivered. Ci-Dev purchased emissions reductions to help incentivize DelAgua's transition into a retail business. Only sales made through DelAgua's retail model were eligible for payment, but little progress was made after the ERPA signing, with only 1,200 stoves sold. DelAgua now considers the retail business model unfeasible and has discontinued this approach. The company is continuing with free distribution of cookstoves and plans to give improved stoves to more than 450,000 households between 2017 and 2024.

Eligibility

Domestic biogas plants that generate biogas for cooking and lighting, ethanol stoves for cooking, or improved cookstoves fueled by nonrenewable biomass.

Bidding Mechanism

An open call for proposals was done for all Ci-Dev clean cooking programs.

Incentives

In the Ethiopian biogas program, biogas operators are rewarded with a US$10 bonus for each reliably functioning biogas unit.

Payment Triggers

N/A

Verification

Validation was performed as per typical Clean Development Mechanism (CDM) auditing requirements, so that Ci-Dev can be assured that it is buying CDM-accredited assets.

Observations

Successes: What worked well?

1. A nonuniform approach increased overall program resilience

By going for a mixture of countries, technologies, and public/private partners, the overall program was able to learn more than if it had a singular focus on a particular market, technology, or partnership model.

Learnings: Opportunities for improvement?

1. Three projects were closed without generating any emission reduction payments

Ci-Dev signed five ERPAs with the private sector, but only two have survived. Partnerships with Inyenyeri in Rwanda and SimGas in Kenya ended when the companies went bankrupt. Reliable and timely cash flow is crucial to the survival of small and medium-sized private sector companies.

The ERPA with DelAgua in Rwanda was terminated when the company concluded that it could not meet the program's conditions for selling improved cookstoves. In this case, the RBF was attempting to induce a change in the company's business model.

2. Delays in the issuance of the CERs harm field partners

Methodological observations have caused delayed payments to field partners, and this has impeded their ability to maintain the planned installation rates. The CDM has a nine-month process timeline, but it was not uncommon for some of Ci-Dev's field partners to wait for a year after the activity had been completed, due to monitoring and verification requirements. This timescale is too long for private companies and can impair program delivery. Amid surging demand for carbon credits, the carbon community should consider how to make the verification process shorter and simpler.

3. For nascent companies in challenging markets, flexibility is key

When funding nascent players in an immature market, more flexibility and milestone-based payments will be better suited than a rigid RBF program.

4. Financiers need to interact more

Complementary financing sources should synchronize around a particular technology, country, or company. Currently there is no good way to pull together the resources, such as bridge financiers, despite often needing their services.

Modern Cooking Facility for Africa

RBF Name	**Modern Cooking Facility for Africa (MCFA)**		
Total Funding	US$31.6 million (€30.8 million)[1]		
Start Date	2022	**End Date**	2027
Location	Democratic Republic of the Congo, Kenya, Mozambique, Tanzania, Zambia, Zimbabwe		
Technology	Improved cookstoves, ethanol, pellets, biogas		

Background

The Modern Cooking Facility for Africa (MCFA) is a sister instrument to the Beyond the Grid Fund for Africa (BGFA), an established financing program supporting scale-up of clean cooking solutions in six sub-Saharan African countries managed by Nefco.[2] BGFA aims to build markets for off-grid energy and bring access to clean, affordable off-grid energy to 6 million people in Burkina Faso, Liberia, Mozambique, Uganda, and Zambia by 2025. As of July 2022, BGFA had contracted 10 projects, supporting the establishment of over 580,000 off-grid energy connections. BGFA was built on the success of the Beyond the Grid Fund for Zambia pilot (BGFZ), which has connected more than 1 million beneficiaries since 2017.

The MCFA program was developed by Nefco and Swedish International Development Cooperation Agency (Sida) based on substantial market research in 2020-2021 provided by Open Capital Advisors, a management consulting and financial advisory firm, and MECS. The program combines various support mechanisms for clean cooking companies. These include access to technical assistance and an RBF component.

The first prequalification stage closed in June 2022, and the final qualification call is scheduled to launch in September 2022.

The MCFA approach combines direct results-based financing with upfront, nonreimbursable catalytic grant financing to clean cooking companies to unlock early structural challenges in the market, build business and investor confidence, and proactively mobilize various types of downstream investment and debt financing. MCFA financing is complemented by selective technical assistance to support clean cooking companies in developing key aspects of their business.

Industry standards are to serve as guidelines and goals for clean cooking companies. Such standards could serve to simplify the investment process, as companies can demonstrate performance relative to objective standards while investors can use industry benchmarks as a tool to evaluate potential investees. Carbon finance may require specific indicators to be in line with the relevant methodologies.

Stated Objectives

The main goal of the first round is to support clean cooking service providers to enhance their sale of modern, high-technology cooking solutions in urban and periurban areas. The solutions include commercial and institutional clean cooking applications (e.g., for schools; medical applications for sterilization and clean drinking water).

MCFA aims to bridge a critical gap between early-stage support, which is traditionally offered by challenge funds and (impact) equity, and concessional/commercial debt needed to transition to modern, clean cooking at scale in sub-Saharan Africa.

A technical assistance component aims to enable clean cooking companies to overcome market barriers, increase confidence of investors, and mobilize various types of downstream investment as well as debt financing. The program also aims to support companies in developing and applying carbon financing methodologies.

MCFA plans to enable the distribution of at least 420,000 Tier 3+ improved cookstoves, including electric, biogas, bioethanol and solar thermal cookstoves and associated

1. €30.8 million is available to private sector incentives. The total program size is estimated at €45 million, including €12.5 million subject to a future European Union funding agreement. Available to clean cooking companies. The program aims are 70% of the budget going to financial incentives.
2. With support from project implementation partners NIRAS and the Renewable Energy and Energy Efficiency Partnership (REEEP). See Nefco.

fuels in the six project countries and provide access to clean cooking for up to 2 million consumers. This is based on ex-ante research.

Eligibility

The MCFA program can support high-tier cooking solutions for urban and periurban customers. Eligible technologies include electric, solid biofuels, biogas, bioethanol and solar thermal stoves that meet Tier 4-5 performance standards as well as Tier 3+ stoves using sustainable briquettes and pellets.

Stoves using liquefied petroleum gas (LPG) and traditional biomass are excluded from the MCFA1 funding round.

Bidding Mechanism

The MCFA originates projects through an open, two-stage Call for Proposals procedure.

Incentives

Financing will be disbursed flexibly including up to 30% upfront as a nonreimbursable catalytic grant component and the rest as results-based finance. Upfront catalytic payments are intended to be used by clean cooking companies to support their market entry or market-scaling activities, the launch of new products eligible within the program (Tier 4-5 or Tier 3+ products) or the implementation of a pay-as-you-go (PAYGO) business model.

MCFA1 will also specifically incentivize projects deploying PAYGO business models and stove-use monitoring through a multiplier added to the core incentives.

Payment Triggers

RBF payments will be issued in arrears and against proven numbers of sales and sustaining of cookstoves as well as the establishment of an agreed minimum number of predefined services and targets as milestones in a possible contract with end customers starting no more than 12 to 18 months after the contract signing.

The catalytic grant component can be used for a variety of purposes including as working capital. Catalytic payments typically include meeting eligibility criteria and policies, such as gender or environment.

Verification

Disbursements of results-based financing are made in return for clean cooking companies implementing their proposed project and selling and sustaining the offered number of eligible cooking products to end customers. Results-based finance payments will be made in arrears and against clean cooking companies' proven sales and the establishment of an agreed minimum number of clean cookstove sales with end customers starting 12 to 18 months from the contract signing at the latest. Verification will be undertaken by an independent verification agent.

Observations

Successes: What worked well?

Please note: Observations under successes and learnings for this case study apply only to the preparation and initial screening and shortlisting process, due to the timing of this report coinciding with the RBFs stage.

1. Strong interest in the first call for proposals

MCFA received a good overall market response to the first call for proposals, with 44 eligible applications across the six project countries. There were 17 applications from Kenya, nine from Tanzania, seven from Zambia, five from Zimbabwe, and three each from the Democratic Republic of the Congo and Mozambique. A broad set of technologies was represented, with strong demand shown for electric cooking and all types of biofuels. Solid biofuels, including briquettes or pellets, made up one-quarter of the applications, as did electric cooking.

2. Bringing in an external learning partner

Nefco is running an evaluation with an external consultant to judge the success of BGFA. Part of the evaluation involves interviewing companies that were not selected for the RBF.

3. Different leveraging requirements for clean cooking

BGFA assessed readiness to scale in several ways, including by requiring co-financing. With the BGFA, the amount of co-financing required rises over the course of the contract and is taken as a good demonstration of BGFA's leveraging effect. Relative to the BGFA, the MCFA will require smaller leveraging ratios of 1-to-1 (rather than 4-to-1).

Learnings: Opportunities for improvement?

Timeline crunch

During the preparation and implementation of the pre-qualification stage it became clear that engaging external evaluators, conducting an external Q&A round, and running a two-stage process make for a lengthy process. Adequate time for the whole process needs to be factored in during the overall planning stage of the program.

Clean Cooking Fund Rwanda

RBF Name	**Clean Cooking Fund Rwanda (CCF): Rwanda Energy Access and Quality Improvement Project (EAQIP)**		
Total Funding	US$17 million (RBF) + US$3 million grant		
Start Date	2019	**End Date**	2023
Location	Rwanda		
Technology	Improved biomass cookstoves		

Background[1]

The Clean Cooking Fund (CCF) was established by the World Bank's Energy Sector Management Assistance Program (ESMAP) in 2019 to accelerate progress toward universal access to clean cooking by 2030. The CCF has three main objectives: leverage finance of the World Bank and other multilateral development banks and attract private sector investments; catalyze technology and business innovations by providing incentives to players across clean cooking value chains; and link incentive payments with verified results.

The first CCF program, the Rwanda Energy Access and Quality Improvement Project (EAQIP), was approved in September 2020. The clean cooking RBF is embedded in the US$150 million EAQIP, which aims to improve electricity access by providing funding for the country's ongoing program of expanding grid connections and improving the efficiency of electricity services, as well as by supporting an RBF for off-grid solar connections to reach low-income and remote households and providing grants to reduce the costs of off-grid solar home systems.

The RBF grant volume is US$17 million, supplemented with a US$3 million budget for technical assistance.[2] The project is co-financed by the CCF. Applications are accepted on a rolling basis from both local and international companies with registered operations in Rwanda. To participate in this program, companies are not allowed to claim the carbon credits associated with their activities.

Component 1: RBF and concessionary loan, including a focus on affordable and sustainable adoption

Companies are required to specify their product and marketing strategies in the application and the impact of the RBF incentives on product offerings and pricing. Technical assistance and training will be provided to local producers to improve the local product design and quality of production.

Component 2: Technical assistance, institutional capacity building, and implementation support

As part of awareness raising and behavioral change campaigns as well as capacity building, the program will work with health practitioners, women's groups, and educators on the issue of household air pollution and clean cooking options. Gender-targeted messages will be developed, and influential champions (for example, clean cooking ambassadors) will be identified. Mass media and social media, as well as other innovative marketing approaches, will be used to raise awareness of and demand for improved and modern cooking solutions. These activities will be designed and implemented in close coordination with development partners to ensure synergies with other related cooking programs.

The program will hire a market facilitator to reach out to promising and interested cooking companies on opportunities and provide targeted business development training for cooking companies participating in the RBF operation. It will also provide technical assistance to review related policies and regulations and to identify areas for improvement to support market development.

Technical assistance and capacity building will be provided to increase stove-testing laboratories' testing and evaluation capacity, improve the design and quality of local

1. See: MECS/Energy 4 Impact and Rwanda Energy Access And Quality Improvement Project
2. See: ESMAP Multi-Donor Trust Fund Grant Agreement

producers' stoves (with a special focus on incorporating women's needs as users), establish links with international suppliers, partners, and financiers to assist technology development or transfer, and to improve the RSB's testing protocol and relevant national standards to incorporate local cooking culture and practices.

The program will offer an innovation grant through a competitive process to support innovative cooking technologies, modern materials, technology transfer, and business and financing approaches, giving preferential support to female entrepreneurs.

The program will continue to coordinate and collaborate with key stakeholders, such as the European Union, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)/EnDev, SNV, Enabel, Tony Blair Institute for Global Change, CCA, Global LPG Partnership, AfDB, and MECS, as well as relevant global practices of the World Bank to align efforts in ongoing and potential programs in the cooking sector. The RBF is managed by the Development Bank of Rwanda (BRD), which is also managing the other energy access financial support program (the Renewable Energy Fund). The World Bank covers the management and operating costs of BRD. The Rwandan Energy Development Corporation Ltd. (EDCL) and Rwanda Energy Group are responsible for technology approval, and the Rwanda Standards Board is responsible for certification of cooking products, standards setting, and development of a testing laboratory.

Stated Objectives

The project aims to provide new or improved access to clean cooking solutions to 500,000 households by 2026.

Impacts are anticipated for averted disability-adjusted life years (ADALYs), improved gender equality, and reductions in black carbon and carbon emissions.

Eligibility

The RBF is using both the International Organization for Standardization Voluntary Performance Target (ISO VPT) and the Multi-Tier Framework as the key reference documents for determining eligible cooking technologies.

In Rwanda, the CC-RBF will support technologies that are at least Tier 2 during the initial phase while providing technical assistance to local producers to improve their products' performance level. Once sufficient cooking technologies and products are affordable and available at Tier 3 and higher, the minimum requirement will be lifted to Tier 3.

Electric cooking is included, and the subsidy for electric cooking stoves and appliances is available to all.

The performance of eligible cooking technologies must be demonstrated through laboratory testing or field-based data. The Rwanda Standards Board has set up a stove-testing laboratory, with funding from the World Bank. The lab is responsible for testing, evaluating, and certifying stoves ready for application to the RBF. Safety and durability are evaluated as part of the eligibility criteria.

Bidding Mechanism

Fixed incentives.

Incentives

Output is determined by the number of stoves sold, with outcomes and impacts calculated from these sales.

The total amount of eligible RBF incentive is linked to the ISO performance tier and customer income categories (Ubudehe categories 1, 2, and 3). Subsidy levels per Ubudehe[3] and tier range between US$10 and US$100.

Payment Triggers

Payment triggers will be linked to the verified results in terms of inventory, sales, and adoption.

The Clean Cooking Monitoring Information System platform is used to check the eligibility of payments. A minimum of 500 households is needed to make a claim. An independent verification agent (a private firm, to be onboarded soon) oversees verification. EDCL checks the preregistration and then checks the sales status.

It takes up to 30 days for the verification process to be completed and for payment to be made, with 25 of the days for EDCL to verify the claim and the remaining five days for BRD to process payment. Verification is done by checking a random 10% of the claim; half of the checks are done through a phone call, the other half through an in-person visit. Before processing the payment, BRD also must seek a no-objection from the World Bank, which takes up to three days.

The sales or business model dictates how disbursements are made. For cash-based sales, there are two milestones:

3. Ubudehe is a social stratification program that assigns households to a different Ubudehe (or group) depending on income. Ubudehe 1 represents the lowest-income households, and Ubudehe 5 is the highest-income households.

20% of the subsidy is paid after verification of the sale, and the remaining 80% is paid after the first year, pending validation that the product is still in use. For pay-as-you-go (PAYGO) businesses, there are three milestones for disbursements: the first payment is 50% of the subsidy; the second is 40%, which happens upon positive verification and after three months; and the final 10% is after a positive verification event one year after the original verification.

Verification

Verification of the number of clean stoves sold and how much they are used will be done through on-site sampling. Based on these outputs, a framework will calculate assumed outcomes and impacts in three areas: health benefits, gender equality,

and climate. Measuring outputs and projecting outcomes could potentially lead to misleading figures for outcome achievements due to stove or fuel stacking.

Health impacts will be quantified in terms of reduced exposure to particulate matter and averted disability-adjusted life years, or ADALYs. Gender equality will be quantified in terms of reduced drudgery and time poverty for women and girls. Climate impacts will be quantified in terms of reduced black carbon, climate pollutants, and carbon equivalent emissions.

The verification methodologies include the Multi-Tier Framework, the CDM, the Gold Standard and Verified Carbon Standard methodologies, ADALYs, Gold Standard Gender Equality Guidelines (2017), and time savings methodology.

Observations

Successes: What worked well?

It is too early to give definitive statements, given that the RBF is just starting with the first few companies. As of July 2022, four companies signed the grant agreement. Other companies are attempting to secure the necessary lines of credit from banks to finance stock, and other companies are in the testing stage with the Rwanda Standards Board.

The market facilitator is carrying out market research; a report on the findings is scheduled to be available in the third quarter of 2022 and will be based on feedback from suppliers and consumers. This internal report will further inform any changes to the scheme, particularly on the customer affordability front.

Learnings: Opportunities for improvement

It is too early to give definitive statements, given that the RBF is just starting with the first few companies. Despite being at an early stage, some learnings can be shared:

1. Carbon credit "recycling"

The RBF's carbon credit component aims to extend the program and its reach as the Ci-Dev carbon funding from the rollout will be processed as additional financing for EAQIP (i.e., the generated carbon credits will be reinvested into the program). This has been disappointing for some companies as the carbon credit benefits are effectively taken away while the responsibilities remain for related monitoring and reporting.

2. Initial cost barriers prevented startup company applications

To be eligible to receive a disbursement of 50 million Rwandan francs (US$50,000), Rwandan companies initially needed to present audited financial reports for the previous three years. This created a barrier, particularly for startup companies and companies led by women or youths. This requirement has since been changed; now new founders can register their company, show their cookstove model, and enter into the scheme. Unfortunately, the program does still not receive many applications from women-led companies.

3. Currency fluctuations affecting the approved subsidy levels

The first version of the subsidy levels for the products was made in 2021, but the levels needed to be revised in March 2022 due to changing market conditions and currency fluctuation between the U.S. dollar and Rwandan franc. They were finally approved in April 2022.

4. No LPG subsidy for distributors serving poor urban households

Companies looking to engage customers in Ubudehes 1 and 2, particularly those in urban and periurban areas with existing liquefied petroleum gas supply chains cannot benefit from the LPG subsidy. It is likely that an assessment of the Ubudehe 1 and 2 households' willingness and capacity to pay will be conducted before determining whether and how the LPG subsidy will be extended to these households.

Table 2. Eligibility criteria for clean cooking technology[4]

Stove Type	General Testing & Evaluation Requirements	Other Considerations
Stoves and accessories using biomass fuels that require no additional processing	Meeting thermal efficiency and PM 2.5 and carbon monoxide (CO) emissions. Tier 2 requirements, according to ISO VPTs.[5]	Evaluate for safety and durability; expected lifetime to be at least 3 years and the manufacturer's warranty at least 1 year.
Stoves and accessories using biomass fuels that may require additional processing (for example, charcoal, wood, briquettes/pellets) and/or ventilation (for example, chimney)	Meeting thermal efficiency and PM 2.5 and CO emissions. Tier 3 requirements, according to ISO VPTs; vented stoves will be assessed for fugitive emissions and efficiency.	
Stoves and accessories using modern fuels/ energy, which may include LPG, biogas, ethanol, electricity (including electric rice cooker and electric pressure cooker), solar energy, pellets, or other biomass fuels	Meeting thermal efficiency and PM 2.5 and CO emissions. Tier 4 or 5 requirements, according to ISO VPTs.	

Table 3. Subsidy/Incentive levels per tier and Ubudehe[6]

Tier Rating	Stove cost (in US$)[7]	Ubudehe Category	Maximum Cost Coverage (%)	Maximum RBF amount (in US$)
Tier 5	49.84–99.69	1	90	44.86
		2	70	34.89
		3	45	29.91
Tier 4	39.88–69.78	1	90	39.88
		2	70	29.91
		3	45	24.92
Tier 3	19.94–39.88	1	90	29.91
		2	70	19.94
Tier 2	9.97–19.94	1	90	14.94
		2	70	9.97

4. See: MECS/Energy 4 Impact.
5. Tier 2 cooking technologies are considered transitional technology and may be eligible for project support and promotion only for the first two years
6. Source: Adapted from the Rwanda Energy Access and Quality Improvement Project Operation Manual (2021):
7. Prevailing exchange rate as of Aug. 5, 2022: 1 RWF = US$0.00096

Table 4. Subsidy disbursement schedule for PAYGO/credit sales[8]

Disbursement	Condition	Ubudehe I	Ubudehe II	Ubudehe III
1st Installment	Upon successful verification of Clean Cooking Companies' sales/claim report with user contact information	50%	50%	50%
2nd Installment	Upon independent verification of stove usages and customer contribution, 3 months after the installation	40%	40%	40%
3rd Installment	Upon verified adequate customer service for 1 year and 100% customer contribution	10%	10%	10%
Total subsidy		**100%**	**100%**	**100%**

Table 5. Subsidy disbursement schedule for cash sales[9]

Disbursement	Condition	Ubudehe I	Ubudehe II	Ubudehe III
1st Installment	Upon successful verification of Clean Cooking Companies' sales, including a claim report with user contact information	80%	80%	80%
2nd Installment	Upon verified adequate customer after 1 year	20%	20%	20%
Total subsidy		**100%**	**100%**	**100%**

8. Source: Rwanda Energy Access And Quality Improvement Project
9. Source: Rwanda Energy Access And Quality Improvement Project

Netherlands Enterprise Agency (RVO) SDG7 RBF Facilities

RBF Name	**Netherlands Enterprise Agency (RVO) SDG7 RBF Facilities**		
Total Funding	US$13.8 million (€13.5 million) is the clean cooking component. The wider funding pool is US$23 million (€22.5 million)		
Start Date	2019	**End Date**	2026
Location	Bangladesh, Burkina Faso, Chad, Ethiopia, Gambia, India, Kenya, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, South Sudan, Sudan, Tanzania, Uganda		
Technology	Improved biomass cookstoves, ethanol, and biogas		

Background

Netherlands Enterprise Agency (RVO) SDG7 RBF Facilities ("SDG7 Results") aims to give 2 million people in developing economies access to clean electricity and cooking. This program contributes to the Dutch government's overarching goal of reaching 100 million people by 2030.

Two tenders have been held, in 2019 and in 2021. As of the end of August 2022, the portfolio consists of 25 projects, 12 of which are clean cooking. In terms of associated funding, clean cooking projects account for 60% (US$13.8 million) of the total allocated funding.

Stated Objectives

The clean cooking component has the objective of reaching 1 million clean cooking connections by 2026.

Eligibility

There are 17 eligible countries across Africa and Asia in which selected companies must have been serving in the region for at least two years, and operating for at least three years.

Eligible companies must be able to demonstrate that they can pre-finance the necessary investments and working capital needed for the duration of the project.

In terms of technology, ISO Tier 2 and above (with an exception for charcoal stoves with carbon monoxide emissions, which must meet Tier 1 emission levels). LPG is excluded from the program.

Bidding Mechanism

A tender for proposals from companies is taken, and eligible applications are ranked according to several criteria, including impact and bid price. Impact is determined by the biggest "tier jump" between the existing baseline in that market and the company's product, and the expected effect of the project on market development in the project area.

Incentives

N/A

Payment Triggers

The payment process is initiated by companies submitting a claim that meets the minimum number of sales required to request a verification claim, within the project's pre-approved geographic bounds.

Verification

The timeline from the claim being made by the company to a successful claim being paid is 12 weeks. External verification is done by KPMG using field, phone-based, or technology-based methods to assess a representative sample of customers. Audit tables with deviation rates are used to advise on the recommend proportion of payouts.

The verification system is adaptive, for example, through risk assessments and previous verification results informing the depth of verification needed for a given claimant.

Observations

Successes: What worked well?

1. Verification design and robustness of the system

The verification process considers external auditing benchmarks, risk assessments and each company's prior history of verification claims. The risk assessments vary by

the revenue model (e.g., over-the-counter sales and pay-as-you-go, as well as by geography).

2. Delivering the desired results

With a couple of years still to run, it seems clear that the end target numbers will be hit. In the clean cooking space, two companies have made a sizable contribution toward the goal.

3. Entrust delivery to the companies

SDG7 results does not have a local presence, so trusting the selected companies with delivery is paramount, given their experience and knowledge behind what is needed to get products moving.

Learnings: Opportunities for improvement?

1. Striking a balance between catalyzing new markets and achieving program numbers

There is an inherent friction between a program's need to enable high-tier access and achieving timely results. Some technologies, such as improved cookstoves, are easier than biogas digesters to scale quickly, but they do not have the same climate or health impacts. It is not just technology where a balance needs to be struck between demonstrating results and creating additionality; geographically, there was a lack of applications from more difficult markets in Chad and Sudan. Companies working outside of Sudan did not see the rewards as justifying the associated risk for entering that market.

2. Limitations inherent with a tendering process

The intention behind a tendering process is to take a snapshot of applications and have a level playing field, where all the applications are assessed in the same way. The downside of this is that no consultation with the applicants is allowed while the application window is open. This approach precludes conversations from happening that could result in a marginal application becoming a successful one.

3. High verification costs are unsustainable for smaller claims

The verification process has been relatively expensive. Claims from companies selling a small number of units have prohibitively high unit verification costs relative to companies achieving bigger sales numbers. There is a balance to be struck in respecting the confidence levels needed for accurate verification, and the total costs to the program of doing so.

BRILHO RBF Mozambique

RBF Name	**BRILHO RBF Mozambique**		
Total Funding	US$8.8 million		
Start Date	2020	**End Date**	2024
Location	Mozambique		
Technology	Improved biomass cookstoves, biogas, ethanol, LPG, electric cookstoves		

Background

The program is led by SNV Netherlands Development Organisation and implemented by Practical Action Consulting, with Greenlight and Catalyst as service providers.

It aims to achieve its intended objectives by blending catalytic grants, RBF grants, and technical assistance for electricity access and improved cookstoves, as well as through information sharing, the implementation of quality standards, and advocacy on policy and regulations.

Stated Objectives

Enhance distribution of clean cooking technologies in underserved areas.

Eligibility

ISO Tier 2 and above, including improved biomass cookstoves, biogas, ethanol, LPG, electric stoves.

Bidding Mechanism

Reverse auction bidding system and a multitier incentive structure.

Incentives

Payment is conditional on the sale of a pre-agreed number of units intended to benefit 750,000 people with incentives up to 200% depending on the level of development and extent of the remoteness of communities served.

The disbursement of funds is linked to independently verified sales and other qualitative measures such as employment of key personnel and completion of a market assessment report.

In addition to the RBF component, the BRILHO program is providing an ex-ante milestone-based payment, a form of a catalytic grant to de-risk market entry, and product development activities. The maximum available catalytic grant per company is US$900,000 (£750,000) and is contingent on 100% match funding of the amount, either cash or in kind.

The program also includes a technical assistance component, specifically with market entry strategies.

Payment Triggers

Not disclosed.

Verification

Not disclosed

Observations

Successes: What worked well?

Encouraging new company entry to Mozambique

One of the participating companies of the BRILHO RBF program, which was originally operating in the electricity access sectors, describes the program as a game changer for scaling up the distribution of clean cooking technologies in underserved areas. The program's technical assistance component of the RBF facilitated market entry of the respondent into the Mozambiquan clean cookstove market. According to the company, the bonus incentive component of the program also incentivized it to serve more marginalized segments of the population.

Learnings: Opportunities for improvement?

High cost to companies of having eligible data collection systems

One company that is focusing on solar home systems (SHS), mini-grids, and improved cookstoves confirmed that the initial cost of digitalizing the monitoring and tracking

systems for its SHS and mini-grids prior to receipt of the BRILHO RBF was fairly high. The company notes that with the BRILHO RBF, it is now able to bring down that initial cost, enabling the scaling up of its digitalized SHS and mini-grids, which it says is yielding significant cost savings relative to the costs of phone and field visits for monitoring and tracking processes. The company is planning to introduce PAYGO-enabled clean cookstoves.

With the emergence of digitalized clean cooking products, e.g., ATEC* (biogas), Koko Networks (ethanol), Burn Manufacturing (improved biomass cookstoves), African Clean Energy (improved biomass cookstoves), there is a big opportunity for output-based RBF programs in the clean cooking sector to thrive, as PAYGO technologies improve access to finance for off-grid customers while also ensuring better repayment rates. Using smart technologies alongside clean cookstove products with the support of RBF programs could help to streamline monitoring and verification processes and ultimately attract additional donor funding in the form of RBF into the sector. Future RBF programs could be based on digitally verified outcomes, with concomitant cost savings in the monitoring and verification process.

Clean Impact Bond: Cardano Development

RBF Name	**Clean Impact Bond (CIB)**		
Total Funding	US$8 million		
Start Date	2021	**End Date**	No fixed term
Location	Kenya		
Technology	Biogas		

Background

The CIB is a blended finance instrument involving 12 parties. Sistema.bio is the cooking enterprise at the core of CIB, and Osprey Foundation is the impact buyer, with the loan provided by BIX Capital. The Gold Standard for the Global Goals is used for certification. The impact certification program is managed by Cardano Development and South Pole. The instrument is supported by the International Finance Corporation (through the Ministry of Finance of Japan), Shell Foundation, and MECS. Data is gathered by Berkeley Air Monitoring Group. Baker McKenzie is the legal counsel for the key contracts of the instrument.

Cardano Development is the initiator of the CIB. An impact buying facility could be a follow-on phase from the CIB, but this may happen only after the CIB has concluded and relevant lessons have been distilled.

Sistema.bio secured a US$500,000 SDG Impact Purchase Agreement (SIPA) for health and gender impacts. The SIPA was used as collateral for Sistema.bio to receive a loan from BIX Capital, an investor.

Stated Objectives

In terms of the health and gender impacts, the program seeks to achieve 50,000 operational stove years, with 2,000 ADALYs, 25 million productive hours freed up for women, 125,000 tonnes of CO_2e abated, and 190,000 tonnes of wood left uncut.

The CIB seeks to provide financial support to existing clean cooking technology and fuel distribution systems by measuring and certifying improvements in health, gender equality, environmental preservation, energy poverty, and employment. The CIB is looking to test five hypotheses:

1. Do people adopt the clean cooking technology used for the CIB?
2. When customers adopt it, are there health and gender impacts?
3. Where there are health or gender impacts, are they measurable and certifiable?
4. Are measurable and certifiable health and gender impacts monetizable?
5. Can monetizable health and gender impacts be pre-financed?

Eligibility

Sistema.bio was selected because it operates in the Kenyan market with a functioning business model and a proven uptake rate among its customers. The CIB did not want to prove the company's business model, but rather seek out one where the risk of low customer adoption is low.

Bidding Mechanism

N/A

Incentives

N/A

Payment Triggers

The health impacts that CIB sells are expressed in ADALYs, each of which is assigned a serial number on the Gold Standard registry and is tradable.

For gender, the CIB pioneered an Empowerment Index, which sells Gold Standard-certified impact statements on the basis of quality hours added to women's time instead of time spent gathering wood and tending to an open fire.

Verification

An independent auditor verifies impact on health, gender, clean energy, decent work, and the climate under the Gold Standard for the Global Goals.

Volume expectations for the Empowerment Index were estimated by the Berkeley Air Monitoring Group.

Observations

Successes: What worked well?

Investor interest is there

Many parties were interested in investing in the CIB. The bigger challenge is to find buyers for the end impacts, because there is no market yet.

Learnings: Opportunities for improvement?

1. Validating health impacts is possible, but the transaction costs are too high for easy scaling

Taking air quality measurements to prove impact requires a sample of cooks to wear a monitoring device for a 48-hour period. While getting these measurements—and proving significant positive impact—is possible, the methods are relatively intrusive and the costs are prohibitive for future programs.

2. The baseline was less dirty than was anticipated

Baseline studies showed that in rural Kenya, many of the customers who could afford biogas were already using a mixture of charcoal and LPG to cook.

Kenya Off-Grid Solar Access Project (KOSAP) RBF and Debt Facility

RBF Name	**Kenya Off-Grid Solar Access Project (KOSAP) RBF and Debt Facility**		
Total Funding	US$5 million (overall program US$150 million)		
Start Date	2019	**End Date**	2025
Location	Kenya (selected counties)		
Technology	Improved biomass cookstoves, LPG, electric cooking appliances, ethanol cookstoves, biodigesters		

Background

The KOSAP Clean Cooking Solutions Challenge Facility is an RBF targeted at clean cooking in underserved counties of Kenya. The US$5 million KOSAP Clean Cooking Solutions Challenge Facility is part of the US$150 million Kenya Off-Grid Solar Access Project (KOSAP) and complements the three other KOSAP components, which are mini-grids for community facilities, enterprises, and households; stand-alone solar systems and solar water pumps for community facilities; and implementation support and capacity building. The off-grid power RBF is a US$12 million facility. SNV Netherlands Development Organisation is managing the RBF facilities on behalf of Kenya's Ministry of Energy.

KOSAP is an initiative of the Ministry of Energy, financed by the World Bank, and is aimed at scaling up clean cooking and modern energy access in 14 underserved counties in the country. It is due for completion by May 2025.

The first call for proposals (Lot 1) of the RBF was issued in 2019, covering five counties and mainly focused on biomass improved cookstoves (charcoal and firewood) with a minimum of Tier 2 for thermal efficiency. Its implementation has been ongoing since June 2020 and included 10 clean cooking companies during that first round.

The Lot 2 call for proposals was launched in November 2021 and closed in January 2022. It is targeting a wider array of technologies, including biomass, LPG, ethanol stoves, and electric cooking appliances.

Stated Objectives

The KOSAP Clean Cooking Solutions Challenge Facility aims to enable the sale of 60,000 clean cooking technologies over four years in 14 Kenyan counties.

Eligibility

In 2017 the Kenyan Ministry of Energy invited clean cooking companies to submit their products for field testing to be eligible for Round 1 of the RBF. A total of 11 applications were accepted; they were all improved wood and charcoal stoves due to the nature of the call. The stoves ranged in price from US$25 to US$150.

The clean cooking technologies eligible for the CCS RBF Round 2 are biomass-based technologies, LPG, electric cooking appliances, ethanol cookstoves, and biodigesters. The Ministry of Energy has selected a number of specific models for each technology.

To be eligible to participate, companies must be registered in Kenya as a company or be a Kenyan subsidiary of a multinational company, or they must be part of a cookstove supply chain of an eligible high-tier cookstove model and be committed to selling eligible products in the targeted counties.

Bidding Mechanism

Unlike the KOSAP Solar Solutions Provider RBF, KOSAP CCS did not adopt a reverse bidding mechanism but fixed the RBF incentive as a proportion of the product selling price.

Incentives

The RBF incentive is structured to offer payments that cover the incremental costs of market entry and sales in remote, vulnerable counties. It is implemented as follows:

1. A 50% ex-ante disbursement to cover market entry, and supply chain development. This includes market awareness campaigns, sales and marketing activities, training, operating expenses, and a market entry inventory component.

2. A 50% ex-post-payment, pending successful verification.

Payment Triggers

Market entry component: Funding is provided in advance, linked to pre-agreed milestones. This is particularly important due to the remote nature of the underserved counties.

Results-based component: Disbursements happen "ex-post" based on pre-agreed and independent verification of sales targets.

Verification

For the ex-post-RBF, verification of sales is being done by an independent verification agent contracted by the Ministry of Energy. The verification process involves a combination of desk work, phone calls, and field visits.

Observations

Successes: What worked well?

While it is too early to generate many specific learning lessons from the overall program, the following observations have emerged:

1. Flexibility in responding to the COVID-19 crises

During the pandemic, companies were faced with the challenge of restrictions on in-person marketing. The Ministry of Energy was flexible in allowing reallocation of budgets to alternative marketing methods, such as radio.

2. Access to consumer credit

Companies leveraging on KOSAP funds have been able to provide credit using their own resources, which has enhanced sales.

3. Clear government support

The Ministry of Energy in Kenya has positioned itself in a leading position to promote clean energy access and specifically clean cooking in the country. The KOSAP program is working in challenging contexts that generate difficulties for the implementation, especially because the KOSAP is specifically targeting remote areas.

Learnings: Opportunities for improvement?

1. Market awareness raising needs to happen early in the process

Due to the low level of awareness on clean cooking solutions, intensive awareness is a key part of the process to begin before the start of a program.

Renewable Energy and Climate Technologies (REACT) RBF Program

RBF Name	**Renewable Energy and Climate Technologies (REACT) RBF Program**		
Total Funding	US$4 million		
Start Date	2021	**End Date**	2024
Location	Kenya		
Technology	Improved biomass cookstoves, pellets, briquettes, ethanol, LPG		

Background

The Renewable Energy and Climate Technologies (REACT) program is managed by the Africa Enterprise Challenge Fund and is part of the larger REACT sub-Saharan Africa (REACT SSA) program. The program is funded by the Swedish International Development Cooperation Agency (Sida) to support renewable and clean energy in eight countries in sub-Saharan Africa.

The allocated funds will support transformational business models that accelerate access to cleaner fuels, cookstoves, grid power alternatives, and other clean energy innovations.

Stated Objectives

The program aims to reach 87,000 Kenyan households with cleaner fuels, cookstoves, and alternatives to grid power by supporting commercially viable companies. Based on current committed targets, the final number is likely to surpass 200,000 Kenyan households.

The program seeks to share lessons on how increased access to clean energy can deliver positive impact for the rural poor, especially women, and contribute to an improved policy, legal, and regulatory environment for clean energy businesses within the target countries.

Eligibility

Seven clean cooking companies have been contracted, based on one or more of the following criteria:

- Renewable energy products or services that provide access to clean or efficient cooking.
- Cookstoves that meet or exceed Tier 2 fuel use efficiency for wood and Tier 3 fuel use efficiency for charcoal.
- Cookstoves and fuel solutions that meet the Tier 4 threshold for indoor emissions, e.g., pellets, briquettes, ethanol, and LPG.
- Activities that help increase electricity consumption on existing mini-grids (e.g., increasing access to suitable appliances for mini-grid customers).

In addition to one of the above, the company must be a private sector company legally registered and physically established in Kenya.

Bidding Mechanism/Application Process/ Company Selection

There is a two-step application process, involving a qualification stage, where an application form is used to determine eligible companies, and an award stage, based on a business plan and financial model covering RBF sales targets, projected cost of sales, operational costs, and co-financing.

To be selected, companies must demonstrate that the RBF incentive will be used to establish new markets by reaching an unserved or underserved area and that this activity is not something the company would have done on its own in the absence of the RBF. The company must be able to explicitly distinguish sales achieved under the RBF project from business as usual sales and be able to continue serving the area post-RBF.

To ensure value for money, the amount of RBF that can be accessed through the program is capped at 30% of the retail price of the product being sold to a household, limited up to the value of US$45. Other measures of value include the number of households reached, the net benefit per household, jobs created, and the co-finance provided.

Incentives

To encourage applicants to design, develop and implement business models that increase access to clean energy for poor households, a 20% pro-poor bonus, in addition to an incentive per verified sale, will be paid to companies if at least 25% of verified RBF sales are to poor households.

Payment Triggers

Companies will be awarded funding of up to US$500,000 at contracting, with a flexible reallocation system to allow companies that exceed their milestone targets to increase their funding cap to US$1 million.

For payments, 90% of sales incentive will be disbursed upon verification of stove sale (output). The remaining 10% of the payment per stove will be contingent on verified stove functionality in 2023.

Pro-poor bonuses are additional payments and not considered as part of the cap.

Verification

Two verifications are undertaken: an RBF sales verification to confirm the sales and a pro-poor verification to determine whether at least 25% of verified sales were to poor households, based on Kenya's Poverty Probability Index.

A third-party verification agent is used to independently contact a sample of customers by call center. The verification process is continuous, with data for verification submitted monthly. The intention is to minimize the duration between completion of sales milestones and disbursement of RBF.

Observations

Successes: What worked well?

1. Selecting a mature market for the program

The total size of the US$4 million fund is relatively small, so Kenya was selected given its relatively advanced clean energy market and wider availability of working capital than other countries in sub-Saharan Africa. By working in a mature market where there is upfront working capital, companies are better able to execute the work and then use the RBF funding to pay off their working capital loans.

2. Providing more transparency in the payment process

The time elapsing between a company claiming and receiving a disbursement can be several months. Speed to deployment is important, especially for small companies with cash flow constraints.

3. Collecting monthly data leads to shorter disbursement windows

The team at the African Enterprise Challenge Fund (AECF) has been able to use this principle to shorten the claim period to eight weeks. By receiving monthly sales data from companies, verification agents in call centers can review the data on a rolling basis. The verification system was built by AECF and gives all parties visibility of all claims.

4. Looking to support existing company strategies, rather than rewriting them

AECF did not prescribe to each company where it should be going. Instead, the team worked with companies to understand the activities that the company was already interested in pursuing but was at the time unable to do so. This helped to build a sense of trust between parties.

Learnings: Opportunities for improvement?

1. A two-stage RBF call for proposals

When designing a technology agnostic RBF, thought should be given to doing two windows. The first call should target companies that are larger and already have, or are well positioned to raise, the upfront working capital needed to deliver against a program of activities. A second call, with a smaller pot of associated funding, could target smaller companies to give them some pre-financing for their program of activities. Adding this upfront grant to the RBF structure could encourage small businesses to grow and help with their initial implementation of activities. Those without sufficient working capital tend to be smaller, locally owned companies.

2. Verifying the end user can be harder for some business models

Some manufacturers of improved cookstoves can reach many customers with their business-to-business-to-consumer (B2B2C) model. For these companies, it is harder to get timely, consistent data to verify an end user. More flexibility may be needed for B2B2C businesses when it comes to monthly data reporting requirements, because the data collection from distributors takes longer, or might not even be possible. There is also a higher customer anomaly rate to consider.

It is worth checking with B2B2C companies if their distributors have the mandate to report the data needed, and it is advisable to select companies with sound data collection systems that can demonstrate the ability to effectively track sales, and collect and store basic customer data. Embedding

this criteria into the selection process during due diligence is an important learning.

3. Results verification of fuel consumption is trickier for a technology agnostic fund

It is relatively straightforward to validate product sales, but validating fuel consumption is trickier, as it needs more sophisticated data reporting. The companies that are selling Tier 4 stoves under the REACT program collect, and can report on, customer data for fuel consumption because selling fuel is a key part of their business model.

While the impacts of Tier 4 fuels are potentially very interesting to RBFs, they are highly nuanced and each fuel type and business model has subtle variances that make validation more complicated — too much so for a technology-agnostic RBF, which would need to build out customized data reporting methodologies.

Energising Development (EnDeV) RBF for Low-Carbon Energy Access

RBF Name	**The Kenya Clean Cookstove Market Acceleration Project (as part of the Energising Development [EnDeV] Results-Based Financing [RBF] for low-carbon energy access)**[1]		
Total Funding	US$1.64 million (€1.6 million)[2]		
Start Date	2014	**End Date**	2019
Location	Kenya		
Technology	Higher-tier cookstoves		

Background

The Energising Development (EnDev) program is a strategic, multi-donor partnership, promoting sustainable access to modern energy for households, social institutions, and micro, small, and medium-sized enterprises in more than 20 countries across Africa, Asia, and Latin America. The driving force behind EnDev is the partnership of Germany, the Netherlands, Norway, and Switzerland — donors that are committed to accelerating energy access and socioeconomic development. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the Netherlands Enterprise Agency (RVO) act as the principal agencies for program coordination.

With funding provided by UK Aid through the Foreign, Commonwealth and Development Office (FCDO, formerly DFID), EnDev's RBF Facility piloted 17 projects across 14 countries in Africa, Asia, and Latin America from 2013 to 2020. Projects covered a wide range of modern energy technologies to enhance energy access markets. EnDev's RBF Facility aimed to increase access to modern energy in low-income countries by providing financial incentives to private businesses active in the delivery of energy products and services. The key objective of the facility was to overcome the market failures and barriers that constrain private sector companies from delivering modern renewable energy services to poor communities.

As part of the RBF Facility, the Clean Cookstove Market Acceleration Project was initiated in 2014 and became one of the first clean cooking RBF projects in Africa. Between 2014 and 2019, more than 110,000 stoves were sold, surpassing the initial project target of 80,000. More than 550,000 people now benefit from the improved cooking solutions and the better air quality and living standards. The cookstoves also contributed significantly to a better environment and climate: 195,000 tonnes of CO_2e will be avoided over the duration of the program.

Stated Objectives

As part of the RBF family, three RBF projects were implemented in Kenya starting in 2014. Besides the RBF project to accelerate the cookstove market, access to finances was boosted through RBF for small solar photovoltaic systems, and the approach was used to support companies to build solar-powered mini-grids in rural areas.

The rationale for choosing an RBF approach for higher-tier cooking was to overcome barriers for the scaled sectoral commercialization in an emerging market, facilitate affordability, and enhance the uptake of higher-tier cooking solutions especially in periurban and urban areas. Introducing the RBF approach to the cookstove sector meant that companies selling modern, high-quality cookstoves entered new markets and expanded their businesses.

Eligibility

The project supported a wide range of clean cookstoves, including charcoal, wood, ethanol, LPG, and gasifier

1. Mainly derived from Stritzke S, Sakyi-Nyarko C, Bisaga I, Bricknell M, Leary J, Brown E. Results-Based Financing (RBF) for Modern Energy Cooking Solutions: An Effective Driver for Innovation and Scale? *Energies*. 2021; 14(15):4559.
2. This is the budget of the Kenya ICS RBF only. The program was also rolled out in Ethiopia, Malawi, Mozambique, Nepal, Peru, and Vietnam.

cookstoves of performance Tier 2 and above that were tested at the Kenya Industrial Research and Development Institute and were required to achieve fuel savings of at least 40%.

Bidding Mechanism

Fixed incentives, regularly reviewed.

Incentives

Incentives for the sale of higher-tier stoves were initially based on the county development index rate. This rate is based on the market development status and socioeconomic dynamics such as poverty rate, population density, development index, and proportion of rural and urban population within a county. The low initial uptake of beneficiaries and sales made and the pressing timeline triggered the adjustment of the incentive design during the project implementation. An incentive based on the cookstove tiers aimed to boost sales of higher-tier stoves and ranged from US$8 (€8) for stoves below Tier 2 up to US$10 (€10) for Tier 2 and US$13 (€13) for stoves at or above Tier 3. As a result, approximately 70% of the incentives was disbursed for Tier 2 and around 30% of the incentives was disbursed for high-tier stoves.

The incentives were regularly revised to enhance distribution in underserved counties and account for a fluctuating currency exchange rate. Incentives were capped at US$100,000 (€100,000) biannually and limited to a total of US$500,000 (€500,000) per company.

Payment Triggers

RBF incentives were paid upon verification that the technology was sold to the end user. These results were the number of cookstoves sold above a baseline value, which was determined through historical sales performance.

Verification

An independent verification agent was contracted to verify submitted results claims. Verification typically involved paper trail checks, and phone and field verification.

Observations

Successes: What worked well?

1. Program target numbers surpassed

The final evaluation revealed that the project was highly successful in terms of units delivered as it exceeded its target of incentivized cookstoves supplied to Kenyan households by roughly 30,000.

2. Collaboration across participants was strong

EnDev partnered with 25 RBF participants, including producers, distributors, financial institutions (banks and microfinance institutions), and nongovernmental organizations, and brought them together to cooperate with each other.

3. Flexibility of fund use

The companies were allowed to use the funds flexibly. Some invested in different modes of transportation to distribute their products farther, while others enhanced their customer care and after-sales support by opening service centers and branch offices. The result was a growth of sales and more awareness about performance-based practices. Customers learned about improved cooking technologies, and when they were not able to pay for the stoves right away, they could buy the products on credit or in installments.

Almost half of the incentives were received by stove distributors, mainly selling charcoal stoves. This allowed companies to recruit and train staff members, sales agents, and promoters. Almost 1,000 new jobs were created along the stoves supply chain, of which almost 50% were for women.

Learnings: Opportunities for improvement?

1. Many financial institutions did not see the returns they were looking for

The project initially targeted financial institutions as the main drivers of improved cookstoves uptake in the country. Over time, financial institutions realized that the gains from promoting these technologies were too low to warrant investing their time. They refocused on their core business, which had higher returns. As a result, only 20% of sales within the project were achieved through financial institutions.

By the end of the project, distributors and manufacturers contributed 80% of the total sales. After the inclusion of distributors and manufacturers in the project, annual incentivized sales grew by 90% from 2017 to 2019.

2. Eligibility requirements caused early frustration

In the early phase of the project, sales numbers were low because of the very limited types of stoves available in the market and the requirement to comply with the set quality standards. This caused frustration on both sides: private companies whose stove models were excluded from RBF support and a project team that was concerned about the progress and success of the project. However, the frustration eased over time with the introduction of new stove types.

Communicating realistic eligibility criteria transparently from the beginning helps to manage expectations and avoid

frustration on all levels. These criteria may refer to product quality as described above but could as well be linked to customer groups or targeted geographic areas, among others. Thorough market analysis and identification of market barriers are key at the beginning of the project to manage expectations and give the private sector adequate time if new products need to be introduced to the market

3. The incentive structure design can help smaller companies to be eligible to participate in the RBF

It is more challenging for smaller companies, which generally lack access to capital, to achieve the same sales milestones as bigger companies, which typically have access to working capital and good networks. When aiming for sustainable market development, it is not advisable to subject all business categories to the same competition.

RBF incentives should be designed to motivate business growth for organizations at different levels. It is advisable to categorize beneficiaries by organizational capacity and design different RBF incentives and approaches for each category type. For example, smaller players could operate in the "easier" markets, while larger players are incentivized to target more remote, less attractive, and potentially high-investment markets.

It is advisable to consider paying an upfront grant to smaller players facing challenges with access to finance to ensure that specific milestones can be achieved before the verification process triggers the release of the first incentive. To ensure sustainability and avoid dependence, initial incentive rates can be higher and be reduced proportionately over time.

Global Lighting and Energy Access Partnership

RBF Name	**Global Lighting and Energy Access Partnership (LEAP) Electric Pressure Cooker (EPC) RBF**[1]		
Total Funding	US$170,000		
Start Date	2020	**End Date**	2021
Location	Kenya		
Technology	Electric Pressure Cookers		

Background

The Global Lighting and Energy Access Partnership (LEAP) Awards is an international competition to accelerate innovation and market development by identifying the most energy-efficient appliances and equipment intended for use in energy-constrained settings. Together with MECS, in 2020, the first competition for e-cooking appliances was launched, focusing on electric pressure cookers (EPCs). Various research on the opportunity for electric cooking as a complement and viable alternative to biomass has identified EPCs as the primary technology with potential to drive the shift to e-cooking. The winners and finalist EPC products were named in the 2020 Buyer's Guide for Electric Pressure Cookers, a catalog of the world's best off-grid appliances. All products named in the catalog are eligible for future RBFs.

The Global LEAP+RBF for EPC mechanism was the first-ever pilot solely focused on electric cooking in a developing economy. The project was part of EnDev's RBF Facility and funded by UK Aid. The program was implemented by CLASP, an international appliance energy-efficiency nonprofit group.

MECS research has indicated the compatibility of cooking practices in Kenya and the use of EPCs. This was a key driver for the selection of Kenya as a pilot country for e-cooking RBFs. E-cooking is still very much in its infancy in Kenya, with less than 3% of the population owning an electric cooking appliance. Several Kenyan suppliers had started selling EPCs, with promising results. However, the availability of these new appliances was still very low.

The mechanism did not set a baseline or distinguish incentive levels for a certain regional distribution, unlike the rest of EnDev's Kenya Clean Cookstove Market Acceleration Project. Instead, the suppliers and distributors were encouraged to determine their regional and customer outreach strategy. The logic behind this was to give suppliers the maximum freedom to develop their sales strategy in a market that is of greater nascency than the improved cookstove (ICS) market in Kenya. Consequently, suppliers mainly focused on urban and periurban customers who were connected to the grid and who belonged to slightly higher income groups, although household spending levels were not recorded during the sales process, which could have been a valuable insight for participating companies.

Stated Objectives

The overall target of the Global LEAP+RBF is to accelerate the global appliance market for nascent technologies by providing incentives to appliance suppliers and distributors to disseminate large quantities of quality-verified products.[2]

The specific target of the RBF was to sell 4,800 EPCs by the end of October 2020. The program volume was set at US$165,000 and followed an ambitious timeline allocating five months for the program launch plus five months for implementation until March 2021.

Eligibility

EPC models eligible for the RBF were originally intended to be those appearing in the EPC Global LEAP Buyer's Guide.

1. Synopsis of Stritzke S, Sakyi-Nyarko C, Bisaga I, Bricknell M, Leary J, Brown E. Results-Based Financing (RBF) for Modern Energy Cooking Solutions: An Effective Driver for Innovation and Scale? *Energies*. 2021; 14(15):4559.
2. CLASP (2020).

However, the timeline of the competition and the RBF did not align, so eligibility was decided based on certification via established quality standards (e.g., Conformite Europeenne, or CE, for importing into the European Union) or safety and performance testing carried out by the MECS program at the Centre for Renewable Energy Systems Technology (CREST) at Loughborough University.

Bidding Mechanism

The selection of eligible participants, including suppliers and distributors (financiers were eligible, but none was selected), was based on a reverse auction. The applicants' bids comprised the incentive funds requested based on the percentage of the EPC retail price and the anticipated volume of EPCs to be distributed. The selection process also included a strategic component in which bidders had to outline how the incentives would enable them to scale up their business beyond business as usual.

Incentives

EPCs distributed through the program had a price range of US$70 to US$120, with the RBF covering 30% to 50% of the unit costs.

Payment Triggers

The incentives were originally to be disbursed within three tranches: 20% at the time of purchase, another 20% at the time of shipment, and 60% upon verification of sales of the product. Because of the difficulties of conducting business in the COVID-19 climate, EnDev significantly changed the incentive disbursement structure to 35% at the time of purchase, 35% at the time of shipment, and 30% upon verification of sales of the product.

Verification

60 Decibels was appointed to verify sales results and to evaluate end-consumer behavior and adaptation after three months of the sale, through a random sample of phone calls to the customers.

Observations[3]

Successes: What worked well?

1) Target achievement

The successful applicants came from across the value chain. As of September 2020, the RBF had funded about 500 EPCs in sales and 3,400 as inventory. The creation of market awareness through MECS consumer research data was a major factor in the rising adoption of EPCs. The RBF incentives are said to have aided distributors in developing and implementing customer engagement and sales strategies.

2) Strong consumer uptake and satisfaction

A survey by 60 Decibels revealed that 90% of the EPC customers are first-time EPC users and 97% of the users had not previously cooked with electricity despite having grid connection. A total of 85% of respondents stated that there are no easy alternatives to EPCs, which indicates limited availability of alternative products nearby. The survey reported overall high satisfaction by EPC customers; among the positive impacts they reported in their quality of life were reduced expenses, increased time savings, and overall efficiency gains. Some EPC customers reported challenges in EPC use, including poor product quality, which could affect usage and potentially sales through word-of-mouth in a nascent market.

3) Market mover

The RBF was largely successful in drawing together various actors from the electricity access and clean cooking sectors, which would previously have participated in separate RBFs. It enabled mini-grid developers to explore adding e-cooking to the array of energy services they offer to their customers while simultaneously allowing cookstove manufacturers to venture into the world of electric appliances. One program participant reported that his business would probably not have moved into the EPC space without the RBF program; another participant confirmed that the RBF significantly supported the uptake of EPCs among consumers. Consequently, both companies reported that as a result of the program, EPCs became a central future business component, although both respondents could not confirm that they secured additional investment to finance a further expansion strategy at the time the research was conducted.

3. See also: Energy 4 Impact (E4I) and Modern Energy Cooking Services (MECS) (2020): Results-based financing for modern energy cooking appliances: Analysis of RBF as a scale-up tool and potential interventions by MECS.

Overall, it must be stated that although the RBF targeted a rather nascent market, it significantly enhanced the uptake of EPCs, demonstrated high interest of certain consumer groups in these high-tier cooking devices, and triggered established cooking companies to move into modern energy cooking solutions. The total product procurement supported by Global LEAP+RBF represents a 203% increase in the amount of EPCs that had previously been sold by participating companies. Hence, the RBF successfully demonstrated the market potential for EPCs in Kenya despite the challenges reported.

Learnings: Opportunities for improvement?

1. Market nascency

The EPC market in Kenya was challenging to work in because it was an emerging market rather than a mature one. This was, of course, implicitly recognized in the small-scale trial nature of the program, which, as suggested above, was the first of its kind and very different in its scale to other RBFs. The underdeveloped nature of the market (in comparison with other technologies) imposed a few challenges. It was difficult to source EPCs due to the lack of units available in Kenya. Also, the COVID-19 pandemic exacerbated this supply chain challenge. CLASP, with the support of MECS, had to actively identify potential distributors and manufacturers of EPCs for the RBF, i.e., it was donor-led rather than market-driven, with little market awareness of EPCs as a viable cooking technology, so distributors needed to invest heavily on customer demonstration and acquisition.

2. Tight timeline

The timetable for award and implementation was too short, but for internal reasons on the part of the program developer it could not be extended. Companies awarded the RBF had only 10 months to sell EPCs, which was further pressured by the pandemic. As a result, the sales targets could not fully be achieved within the period of the program itself and a significant share of the RBF grant was used for inventory rather than sales.

3. The need for upfront funding for smaller companies

Smaller businesses had difficulty obtaining upfront bridge funding due to high local interest rates of around 20%. Mini-grid developers and cookstove manufacturers were better able to explore adding e-cooking to the array of energy services they offer to their customers.

To make the RBF inclusive, technical assistance is needed for potential applicants, particularly smaller companies that have fewer staff and less experience in grant applications. It is also important to keep the application and implementation process as simple as possible.

4. Supply chain disruptions

In the first months after the program launched, demand for EPCs was increasing due to strict local lockdown measures and rising charcoal prices. Consequently, some of the participating companies experienced higher demand that exceeded supplier capacity. Supplier capacity could not be easily increased due to pandemic-related supply chain constraints. In reaction to these issues, the incentive disbursement was changed from 40% subsidy upon sale to 70% subsidy upon order. The remaining part of the incentive, which was initially planned to be issued three months after a verified sales, was then distributed immediately upon the verification of sales.

5. High costs for verification

Usage tracking systems remain a challenge in the EPC sector in terms of cost and availability. One participating company estimated that a usage tracking system would cost US$450 per month, while phone tracking and verification was costing about US$110 per month.

The monitoring and verification agent can generate unique data insights on product usage and customer feedback. The Global LEAP Appliance RBF is the first to focus on data analysis as well as verification of results, which have been published by 60 Decibels and provided important insights on consumer profiles and EPC uptake.

C-Quest Capital LLC

RBF Name	**C-Quest's Health and Gender RBFs**		
Total Funding	Unknown		
Start Date	2012	**End Date**	Ongoing
Location	Angola, Burundi, Cambodia, The Gambia, Guatemala, India, Kenya, Lao PDR, Malawi, Mexico, Mozambique, Rwanda, South Africa, South Sudan, Tanzania, Thailand, Uganda, Vietnam, Zambia, Zimbabwe		
Technology	Improved biomass cookstoves		

Background

C-Quest Capital (CQC) was founded in 2008 and has initiated carbon projects in 20 countries across sub-Saharan Africa, Central America, and South and Southeast Asia. CQC's clean cooking-based carbon finance programs are supported by BP, Shell, Macquarie Group, Ecoeye, Temasek, and Korea Zinc, with debt financing by FMO and BIX Capital, among others.

In addition to its ongoing carbon program, CQC is developing two new impact methodologies. One is to quantify time savings for users, measured in years, and the other is on health outcomes, measured in the form of averted disability-adjusted life years (ADALYs), arising from interventions that achieve cleaner household air. Both methods will enable social impacts to be sold forward under contracts with buyers and paid for on delivery.

CQC intends to improve the health and well-being of women and children by reducing exposure to toxic gases and particulate matter in smoke from traditional biomass fuels, and to reduce drudgery for women and girls by reducing the need for gathering firewood.

The impacts from increased time savings and better health will yield more opportunities for economic betterment of households. The avoidance of carbon dioxide, nitrous oxides, methane, and black and brown carbon emissions is expected to yield up to 3 tonnes of CO_2e savings per stove per year.

Stated Objectives

CQC expects to reach over 100 million people with its carbon projects, which are projected to distribute 30 million improved cookstoves and generate more than 500 million tonnes of CO_2e reductions by the end of 2030.

CQC intends to design and launch a development impact bond valued at several hundred million dollars to distribute clean cooking technologies with a thermal efficiency of Tier 4 or Tier 5 to more than 1 million rural households in at least three countries. These stoves will come with solar panels and batteries sufficient to power cellphones, a radio, and LED lights. The solar panels are being made in Ener-G-Africa's Cape Town factories.

By simplifying and standardizing the measurement of health and well-being benefits, and by establishing the market mechanisms to sell them forward under a pay-for-performance basis, CQC is enhancing the financial viability of its improved cookstove projects. Potential buyers for these health and well-being impacts include OECD sovereigns, philanthropic foundations, corporations with social responsibility commitments, and wealthy individuals.

Eligibility

Biomass fuel stoves designed with a thermal efficiency at, or above, 25% as determined by Water Boiling Test. The retrofitting of cookstoves is also eligible, when the action will improve the baseline cookstove's efficiency to 25% or above. CQC provides two stoves per rural household as standard practice.

The CQC stove provided in sub-Saharan African countries is a rocket stove with a thermal efficiency of up to 34.5%. CQC's stoves in Africa are made in Ener-G-Africa's factories in Malawi and South Africa. CQC is piloting a rural stove with thermal efficiencies of 45%.

In the Southeast Asia region, the main stove provided to households is a natural draft rocket stove that generates over 50% thermal efficiency. The second stove is a locally

produced clay stove with metal furnishings that generates over 30% thermal efficiency. The design is tailored for each country's specific cooking needs to aid adoption.

Bidding Mechanism

An auction process will be used for carbon emissions reductions, to improve cost-effectiveness. In the early market, trades may be few, over the counter, and highly customized, but this bidding mechanism could still be a useful test of market depth and means of price discovery.

The revenue gap between carbon credit sales and the higher cost of the Tier 4 and Tier 5 clean cooking solutions compared with Tier 2 and Tier 3 solutions (cookstoves and ventilation requirements) will be met by RBF payments for time saved by cookstove users and household ADALYs.

Incentives

N/A

Payment Triggers

Specific payment triggers for user time savings and health outcomes have not yet been determined.

Verification

CQC's projects are assessed against Verra's SD VISta (Sustainable Development Verified Impact Standard) program framework. Projects must demonstrate that they meet the SD VISta program's rules and requirements to the satisfaction of a third-party assessor.

Observations

Successes: What worked well?

1. Selling health impacts to outcome buyers is more stable than selling climate impacts, which are vulnerable to fluctuating carbon prices

With the collapse of the compliance carbon market, the value of the voluntary carbon market suffered drastically and in 2013 the price of carbon was worth only cents per tonne. At those prices, carbon credit-backed projects were no longer able to profitably distribute discounted stoves and cover necessary monitoring and verification requirements. Monetizing the health and productivity benefits for women and children that come from using efficient cookstoves is another way to improve the financial viability of cookstove projects and increase the level of investment in the sector. Even modest improvements in user health could have a significant impact on the economic viability of improved cookstove projects.

2. Double stove setup ensures that meaningful impacts are realized

CQC now provides a double cookstove so households can cook food simultaneously, mitigating the need to use an open fire in parallel. This ensures that the health benefits and time savings of eliminating open fire can be fully realized.

3. Rigorous engagement with local communities

CQC utilizes a "stove champion" program that trains and employs local community members to support the rollout and adoption of stoves. Having a local connection creates a dual benefit with ongoing community engagement to ensure uptake and support as well as ongoing monitoring of usage.

Learnings: Opportunities for improvement?

There is a need to standardize factors women's time savings

Time use data for cookstove users is expensive and difficult to collect, so it is not surprising that such data is unavailable for several low-income countries. To date, most project developers reference qualitative impacts that clean cooking has on time savings for women as a positive side effect and do not usually attempt to quantify these impacts.

CQC has commissioned Duke University to conduct an independent meta-analysis using evidence from six developing economies to quantify the impact of improved cookstoves on time saved and improved gender outcomes. The scientific paper will create a set of referenceable default factors for drudgery reduction that can be used as a public good.

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