



# ILLUMINATING MARKET SYSTEMS DEVELOPMENT IN FRAGILE ENVIRONMENTS

a case study of the alternative energy market in Timor Leste



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## EXECUTIVE SUMMARY



This learning study provides a detailed analysis of Mercy Corps' European Commission funded Energy for All (E4A) program in Timor-Leste. The E4A program was a market development program that sought to improve the reach and quality of distribution networks for clean energy products (solar appliances and clean cookstoves). This study was conducted alongside the formal program evaluation, as a way of delving deeper into complex elements and drawing out key lessons.



Market systems development (MSD) is an approach that seeks to change the way markets work, to create large scale, lasting benefits for poor people. MSD programs hinge on facilitation, rather than direct implementation, and as such represent a radical shift in how development actors design and implement programs. Although the theoretical frameworks for this approach are well developed, there is a comparative lack of detailed analysis regarding application. Significant questions remain about how to apply market-development frameworks to fragile settings that are transitioning from relief to development. Programs are testing how to tailor intervention tactics when market actors are weak, distribution systems fragile and unreliable, and supporting services non-existent.



Access to energy represents a great opportunity to test market development in high risk, low capacity environments. Advances in technology for markets at the base of the pyramid have resulted in a wide range of appropriate products suitable for households at all levels of income. At the same time, energy is a service that even the poorest households pay for, even when that service is low quality, harmful, and expensive. In these environments, market systems already exist and can be strengthened to catalyze access to cleaner, more reliable, and more affordable products.

Cover: Timor-Leste – Miguel Samper for Mercy Corps  
All other photos: Nick Brubaker for Mercy Corps

The E4A program is an early example of an application of this approach in a transitional relief to development context. The program was developed to alleviate energy poverty in peri-urban and rural communities of Timor-Leste. Mercy Corps designed and facilitated the program, which stimulated existing actors to build a sustainable market for alternative energy products. The program's goal was to improve energy services, as well as reduce the household cost of energy (financial and social) through access to solar energy products and clean cookstoves. The E4A program targeted **two main problems** that were hampering the emergence of a sustainable energy market: **poor availability of quality alternative energy products** and **limited demand for alternative energy products and services**.

This study analyzes the approach taken by the program, including its impacts and challenges, and then summarizes the key lessons that may be applied to other market development programming in similar settings.

### Headline lessons include:

**Rigorous analysis of informal rules improves intervention design and tactics.** Trust and social capital between market actors shape outcomes for MSD programs. Market facilitators should identify areas where trust needs to develop, as well as potential points of vulnerability that could cause a breakdown of trust, and devise explicit strategies to build and strengthen trust.

**Market Development Programs require longer or more flexible intervention time frames, particularly those in high-risk settings.** It is difficult to predict the timeframe needed to facilitate sustainable market growth. Programs with short time frames may be forced to intervene directly in order to accelerate the process and ensure linear program targets are reached on deadline. These actions may be counter-productive to the long-term health of the system.

**Implementing ‘hybrid’ market development programs that combine pure facilitation with more traditional activities must be done strategically.** Donor interests or demands plus the realities and capacities encountered on the ground mean that most programs will have to include some service delivery or subsidy. It is important to develop a strategy that allows the program to do this without undermining the overall approach.

**Upfront and regular engagement with government and donors is vital to minimize disruptions to programming.** To ensure the project approach and philosophy is supported, and that government subsidized activities will not impact the target areas, consultation with government and third party actors is critical during both program design and program implementation.

**Market development programs would benefit from a package of core tools and guidance.** At present there are no accessible, ready-to-use guidelines to lead a new program manager through program startup, recruitment, design, and implementation – and specifically designed for market development programs. This means such programs rely on the creativity and vision of managers who often end up reinventing tools and processes.



## Introduction

*Energy for All (E4A)* was a three year market development program funded by the European Commission. Mercy Corps designed and facilitated the program to stimulate existing actors to build a sustainable market for alternative energy products. The program had two distinct purposes: to improve energy services, and to reduce the high household expenditure on energy services. This was done by improving access to high quality solar energy products, and to more efficient cookstoves.

This learning study describes the market context and constraints, intervention strategy, challenges, and lessons learned during the creation of an alternative energy market.

## Background

### Energy in Timor-Leste

When the Energy for All (E4A) Program was designed, 38% of the 1.2 million people in Timor-Leste had access to electricity, and were located almost entirely in urban areas<sup>1</sup>. In rural areas, only 10% of households were on the grid, while 90% relied on kerosene for lighting. Kerosene has various disadvantages: it is subject to price fluctuations and supply shortages; provides low quality lighting; creates fire danger, and produces unhealthy emissions. Furthermore, kerosene is expensive, and households were spending as much as 20% of their income to meet energy needs.

Traditional cooking with wood-fueled open fires was practiced by 100% of rural households and 91% of peri-urban households, and was generally done in poorly ventilated huts next to the home. Such inefficient use of wood contributes to deforestation and land degradation, while high levels of smoke and particulates have negative health effects, especially for women and children, who are often responsible for cooking. It is also labor intensive; only 13% of households in rural areas were purchasing firewood, and on average, more than six hours per week were spent collecting wood.

### Intervention Rationale

The energy poverty situation in Timor-Leste had negative economic, environmental, social, and health implications. It limited households' livelihood activities, reduced household income, inhibited children from doing schoolwork, created unhealthy and unsafe environments for families, and negatively affected the environment. In the past, however, government and donor-funded programs aimed at providing off-grid electricity in Timor-Leste had also proved inefficient and unsustainable, with the most common approach being free distribution of household solar photovoltaic (PV) systems, based on political affiliation. Additionally, those that received products did not know who the supplier was, or how to access follow up services. As such, products that needed disrepairs were simply discarded. Very few improved cookstove projects had been implemented, and those that had relied on expensive technologies and/or fuel switching; strategies with a history of challenges, and mixed success rates.

Given these factors, Mercy Corps recognized that an effective market system for alternative energy products would enable poor households to sustainably improve their energy services and reduce energy expenditures.

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<sup>1</sup> The statistic in this section reference the E4A Program Baseline Study, available at: [http://mercycorps.org/sites/default/files/mercy\\_corps\\_e4a\\_baseline\\_assessment\\_report.pdf](http://mercycorps.org/sites/default/files/mercy_corps_e4a_baseline_assessment_report.pdf)

## Timor-Leste's Energy Market

At the time of the E4A Program design, there was no viable market for alternative energy products in rural Timor-Leste, and there were no private sector actors willing or able to invest the time, resources, and effort required to establish such a market. A description of the pre-intervention market follows:

**Supply:** Solar energy products were low quality and generally available only in the capital city, Dili. Businesses in Dili were importing some solar PV products, but their large system size, high price, and poor quality made them inappropriate for rural households. There were no improved cookstoves available in rural communities, and only a handful of poor quality stoves were sold in Dili.

**Demand:** An extreme lack of awareness of alternative energy products, which stifled demand. Only 9% of households in the target areas owned solar energy products, and 65% did not know what solar energy was. Given this low level of awareness, businesses selling solar energy products in Dili did not see an opportunity to expand to rural areas. In Dili, 6% of households used improved firewood stoves, and 3% used kerosene, LPG or electric stoves, with the remaining 91% using traditional open fires.

**Financial Services:** While energy expenditure was high – an average of \$14 out of a \$100 per month income – energy purchases were made incrementally, so households were often spending just a few dollars at a time to meet immediate needs. Purchasing alternative energy products would require a larger one-off expenditure to yield savings in the long term. Two microfinance institutions and one national bank were operational in rural areas of Timor-Leste, but loans were not available for energy products.

**Information:** None of the businesses surveyed at the outset had ever heard of the new brands of durable and affordable household solar products that were successful in other countries, or about fuel-efficient clean cookstoves.

**Linkages:** Businesses supplying energy products in Dili had almost no connections to small businesses in other parts of the country. The exception was food wholesalers – who had no interest in introducing solar technologies.



**Infrastructure:** The high cost of transportation, poor road infrastructure, and geographic dispersion of communities created challenges of scale, where significant investment would be required to reach enough potential consumers to create worthwhile returns on investment.

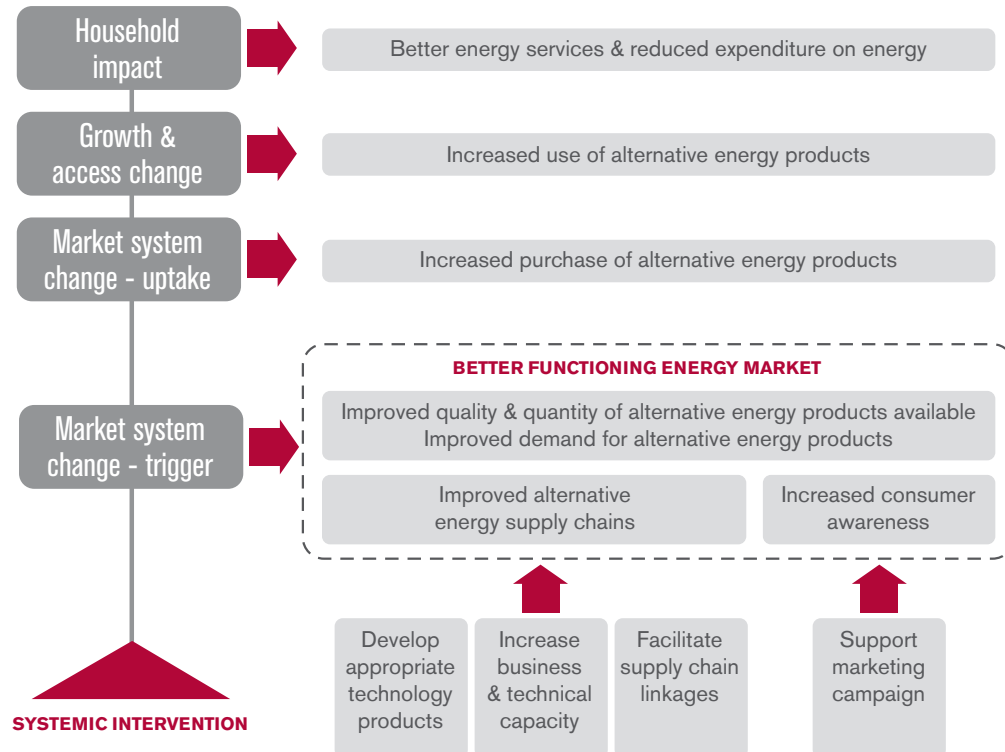
## A Vision for a More Sustainable Future

Based on the two main challenges E4A had identified regarding the emergence of a sustainable energy market – poor availability of quality alternative energy products, and limited demand for alternative energy products and services – the program planned to address four immediate causes of system underperformance: 1) lack of information about appropriate technology products, 2) weak business and technical capacity, 3) weak supply chain linkages, and 4) lack of consumer awareness.

The program sought to improve the core energy market (business operations, technical and business management capacities of lead and local firms, and linkages between the two) and supporting functions (particularly information, marketing and financial services) of the alternative energy market. This was to be done by facilitating the following: 1) improvements in the supply chain, 2) increased customer awareness, and 3) improved availability of financial products. By addressing these areas, E4A envisioned that a sustainable market for alternative energy products would emerge, and that this market would improve households' energy services and reduce energy costs.

## Intervention Design

Rather than directly entering the market or taking on market functions, the program facilitated change via existing actors. Following a market systems development approach, the program was designed iteratively, recognizing that interventions and partnerships must adapt to market changes.



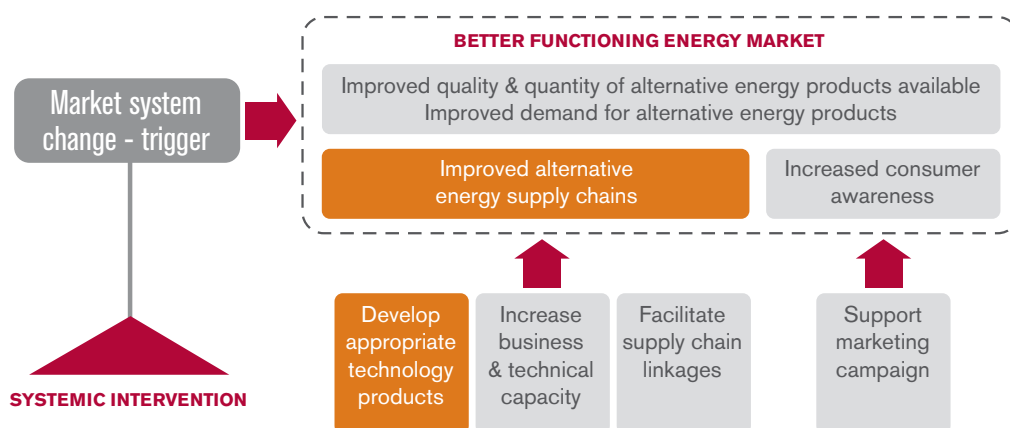


At the project outset, strategic decisions about where to focus initial interventions were based on areas where market viability and potential impact overlapped. In the solar market, rural communities offered greater market potential due to the high cost of kerosene. Lack of any grid electricity service in the majority of rural communities also meant there was high potential for impact – unlike urban Dili, which was served by the (albeit often unreliable) grid. For cookstoves, while expected impact was similar for both settings, the urban market provided the most logical starting point, as a higher percentage of Dili households purchased firewood than in rural communities, offering a stronger economic incentive for urban households to purchase improved cookstoves.

A discussion of key intervention objectives and strategies follows:

## 1) IMPROVE ALTERNATIVE ENERGY SUPPLY CHAINS

### Introduce appropriate technology products



**Solar:** In the absence of an existing market to provide data on consumer preferences<sup>2</sup>, a one-off intervention was designed to understand consumer demands for initial technology selection, with Mercy Corps field-testing dozens of solar energy products to assess suitability for the Timor-Leste market. Field tests and community consultations measuring durability, usability, affordability and customer satisfaction led Mercy Corps to select models produced by two brands: d.light Design and Barefoot Power. Another important factor in this section was a one-year warranty for each brand, which helped build credibility throughout the supply chain.

Mercy Corps selected two 'lead firms' (Startec Enterprises and Loja Lidwi) to act as importers and distributors to rural businesses. Key factors in the selection decision were: 1) willingness and ability to invest the firm's own capital in the market, 2) business experience and skills, 3) previous experience with energy technologies, 4) ability to understand the concept of a market system for energy products, and 5) a commitment to participate. Selection was made via interviews with 12 businesses in Dili. Of all the businesses interviewed, only two were deemed appropriate partners; given the relatively small size of the potential market in Timor-Leste, this number was ideal. More would have reduced each importer's chance to reach scale and sustainability, thus diluting the market. Selecting only one would have eliminated competition, and could have potentially stalled the program if that business dropped out.

<sup>2</sup> By the Program's end, sales data and retailer feedback helped to inform importer's technology selections.

Mercy Corps built relationships between international suppliers and lead firms, who introduced products from the selected brands. In the course of the program, lead firms added upgraded products and new product lines from d.light Design and Barefoot Power; they were discouraged from adding new brands without consulting Mercy Corps, as having sub-standard products on the market could undermine consumers' trust in solar technologies in general.

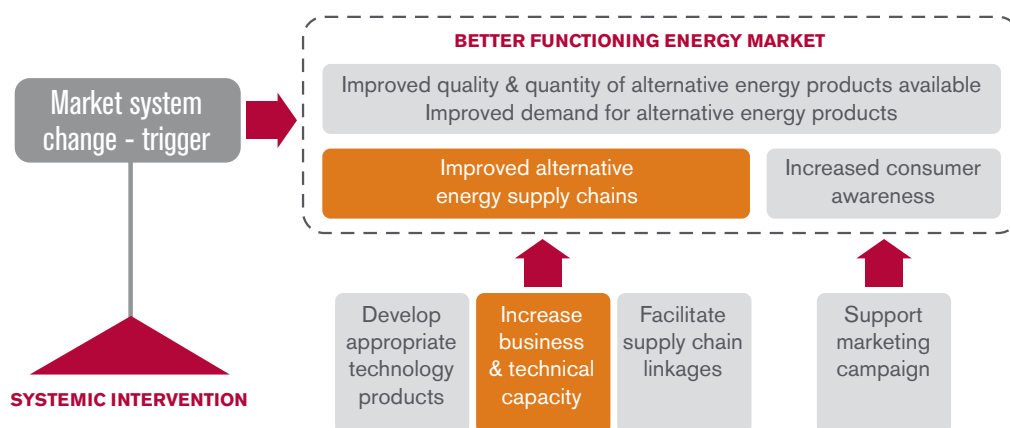
Mercy Corps also understood the market system would be more effective and resilient in the future if the lead firms had access to information about other brands and products; however, this proved beyond the scope of the three year program.

**Cookstoves:** Mercy Corps' first step was to identify a cookstove technology with market viability. The only cookstove made and sold locally was relatively cheap (\$8-\$12), but its emissions-reduction was minimal and it was built poorly, tending to break down after 3 – 6 months of use. This clay stove would also have been difficult to scale (one household could only produce 2 or 3 per day) and to transport (each fragile stove weighed 35kg). There were also a range of high quality and attractive cookstoves available from international suppliers, but these would retail for an estimated \$50, and were considered prohibitively expensive for the Timor-Leste market.

Instead, Mercy Corps decided to innovate by developing a hybrid stove that was affordable, high quality, and efficient. The final product was developed in partnership with Aprovecho Research Center (ARC) and Dili Institute of Technology, and combined highly engineered technology components from international producers with local materials.

As there was little cookstove expertise in country, Mercy Corps directly intervened to identify a supplier of high quality biomass cookstove components (combustion chamber, top plate, and fuel grate). Startec Enterprises was selected as the importer and distributor of cookstove components, based on previous success in developing solar market chains. Working with Startec, Mercy Corps established a simple step-by-step production process suitable for local skillsets and tools, and trained Startec staff to give them the capacity and confidence to become trainers of other smaller micro-manufacturers that were purchasing the cookstove parts wholesale from Startec.

### Increase business and technical capacity



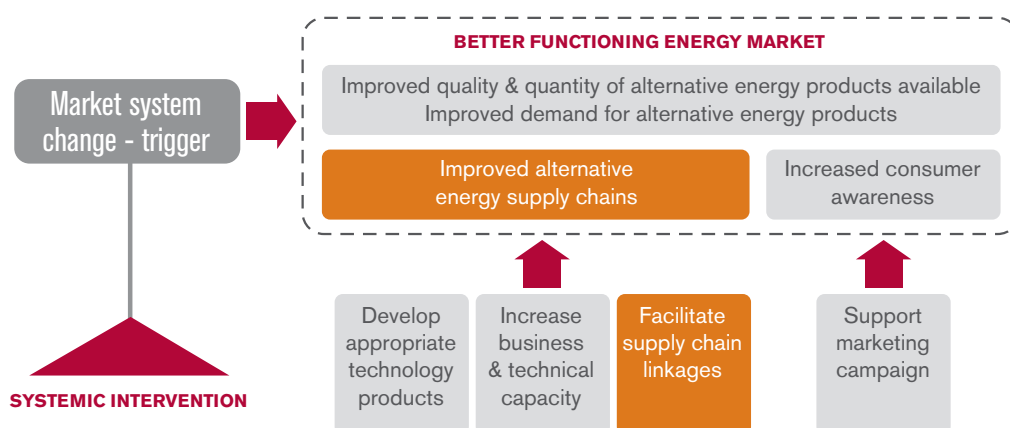
**Solar:** Rural businesses were selected to act as point-of-sale alternative energy centers (called Loja Enerjia Alternativas, or LEAs). Five pilot LEAs were identified and selected by Mercy Corps, in consultation with the lead firms. In each target town, businesses were invited to apply and Mercy Corps interviewed all applicants before final selection. The LEAs were selected based on: 1) strength of business, 2) knowledge of solar products or electronics, 3) linkages with Dili businesses, 4) willingness to invest time and resources, and 5) business reputation. The original vision for scale-up of the market system was for lead firms in Dili to identify additional downstream retailers. In practice, lead firms did identify one business each, but the owners struggled to find the additional time needed to invest in this process. Given the tight timeframe of the program and the urgency to scale-up and create a viable market system, Mercy Corps directly selected the other 21 LEAs.

The two international suppliers (d.light and Barefoot Power) funded and provided technical and marketing training for the lead firms and initial six rural businesses. All LEAs received business and financial management training from a local business support service provider<sup>3</sup>. Mercy Corps and the lead firms provided technical training for LEAs as the market system expanded, but despite these efforts, lead firms failed to take sole responsibility for this training as the program evolved.

As there was no proven demand for these new products, local businesses were understandably unwilling to risk investing in stock. To reduce risk felt by point of sale micro businesses, Mercy Corps provided co-financing for an initial solar product inventory. The first five LEAs were paid 100% for their initial stock, which dropped to a 50% match in financing for the initial inventory of the following 21 LEAs. The high initial financing was in part an attempt to spend down an over-inflated budget line allocated to this activity; this is now recognised as a mistake, because scale-up proved that retail businesses' willingness to invest was the most reliable indicator of commitment. Subsequently, the donor approved a budget modification, and start-up support was limited to match financing for all other LEAs.

**Cookstoves:** Mercy Corps developed a simple six-step production process and training plan, and delivered a training-of-trainers to staff at Startec, who in turn delivered training to microenterprise cookstove producers/retailers. The cookstove producers also received business and financial management training from the local service provider<sup>4</sup>.

### Facilitate supply chain linkages

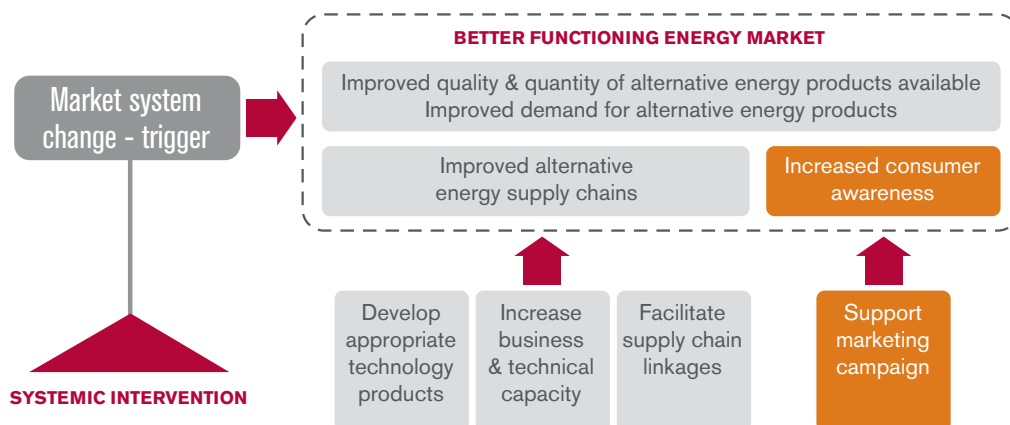


<sup>3&4</sup> The training was provided for free, by a government institution, supported by the United Nations International Labour Organisation

A critical role for Mercy Corps was facilitating strong relationships between the LEAs, cookstove microenterprises, and lead firms to establish trust throughout the supply chain. Mercy Corps also helped form an LEA business association that met regularly with the lead firms to discuss products and sales strategy. Lastly, Mercy Corps forged links between cookstove producers and LEAs, to increase market reach.

## 2) INCREASE CONSUMER AWARENESS

### Support marketing campaign



In the target areas, 65% of households did not know what solar energy was and no rural households were using improved cookstoves. For households that had used or heard about solar the level of trust was very low, due to the extremely poor quality of non-brand products and negative experiences with government distributed products. To stimulate market demand, Mercy Corps sought to raise household awareness of the benefits of alternative energy technologies.

Recognizing that marketing was key to this awareness, and would allow rural businesses to increase their sales, Mercy Corps trained all businesses in marketing and sales techniques. Mercy Corps also promoted peer-to-peer learning via quarterly meetings of all energy businesses, where the most successful businesses presented their sales strategies to fellow business owners.

In addition, Mercy Corps developed and funded several strategic large-scale marketing campaigns. This one-off investment was designed to increase awareness and stimulate demand in remote communities, while generating materials to support the marketing efforts of private sector actors. The campaigns consisted of: 1) billboards/banners/posters, 2) logos for energy businesses, 3) radio adverts, and 4) television adverts. While such high profile campaigns would not directly result in sales, it was anticipated that they would dramatically increase the profile and credibility of new products, making it easier for rural businesses to sell them. The campaign strategies and designs were developed in partnership with a European design agency ('We Are Good Friends'). In partnership with the LEAs, Mercy Corps also organized roadshow events to display products and generate enthusiasm.

Large-scale solar PV systems were installed in 59 community buildings, including schools, community centers, chapels and health facilities. This was primarily to address an unmet need, but such high-profile projects were also believed to raise awareness about the general benefits of solar lighting, and increase sales.

# Impact

## MEASUREMENT STRATEGY

Donor-required indicators were supplemented with indicators that aimed to capture system change as the program evolved. An intervention level results chain was also developed later in the program<sup>5</sup>.

## MEASURING RESULTS

For nearly every donor indicator, the E4A program exceeded its targets. The project goal was to establish<sup>6</sup> alternative energy businesses; by project close, 26 were operational – and more than 10,000 alternative energy products had been sold or provided. The program goal was to provide access to 4,500 households; it is estimated that 36,000 households now have access to alternative energy products<sup>6</sup>.

Household purchases of alternative energy products have also been tied to social, economic, and environmental benefits. Of the households that purchased solar products, 70% no longer use any kerosene, while those households that continue to use kerosene reduced consumption by 53%. Households that purchased solar energy products have also nearly doubled the number of hours of access to light, and now spend more time using mobile phones, doing schoolwork, engaging in livelihood activities, visiting with friends and family, and reading. 96% of households stated that their energy situation has improved since purchasing a solar energy product. Households that purchased a clean cookstove reduced firewood expenditure by 50% and reduced firewood collection time by 38%.

## EVIDENCE OF SYSTEMIC CHANGE

### Solar

Positive signs of systemic change in the solar market system include:

- Sales of solar energy products began slowly, but grew stronger with the rollout of the marketing campaign and the expansion in number of retailers. By the project's end, at least 5,498<sup>7</sup> solar products had been purchased via this system.
- Of the 26 solar retailers purchasing initial stock from the lead firms, 25 went on to reinvest capital and make more purchases.
- By the end of the program the lead firms in Dili had each imported at least three shipments of products, indicating some degree of sustainability.
- Awareness of solar products in rural areas had increased substantially by the end of the program, with 57% of a randomly selected sample reporting awareness of solar energy products.
- The warranty system was functioning to some extent; 43% of purchasers said they were aware there was a warranty and would use it if the product stopped working. Only one LEA reported using the warranty to replace a product.
- New solar products have been introduced to the market system and are being used by households.

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<sup>5</sup> This results chain was developed after the manager attended the Springfield Centre 'Making Markets Work for the Poor' training; while it was a useful process, it was not actively used in management or measurement.

<sup>6</sup> 'Access' to alternative energy products is defined as at least one household member aware of the product and knows where to purchase it

<sup>7</sup> Total sales figures are considered very conservative because some data was excluded due to issues with record keeping with some retailers

Signs that systemic change in the solar market system is not complete include:

- There has been very little 'crowding in' of new businesses selling the program approved products (i.e. businesses not identified by Mercy Corps entering the solar market). The project team was aware of five additional small businesses that had purchased products from the lead firms to sell to customers. There was strong anecdotal evidence from retailers that many businesses had started selling other, lower-cost solar products, although the number and quality of the products was not investigated.
- There is evidence that several of the solar retailers have dropped out of the market system altogether and are no longer purchasing and selling solar products.
- The warranty system is functioning quite poorly for Barefoot Products. (The d.light product warranty it is functioning well).
- Sales of solar products began stagnating from February 2014 onwards, due partly to stock issues.

## **Cookstoves**

Positive signs of systemic change in the cookstove market system include:

- Sales of cookstoves were initially low, but about six months after reaching the market, sales increased substantially, to around 70 per month; they then increased to 150-250 per month during the peak months of June 2013 – March 2014. Cookstove sales expanded to several other towns outside Dili during this time. By the end of the program, 2,822 cookstoves had been sold.
- 17 of the 18 cookstove manufacturers that purchased initial stock had reinvested capital and purchased more parts from Startec Enterprises to continue production. By the end of the program, these 17 cookstove manufacturers were still active.
- By the end of the program, the lead firm in Dili had reinvested capital and imported multiple shipments of products.
- Five of the LEAs were repeatedly purchasing cookstoves to sell them in their towns. Six others LEAs asked Startec to provide training, and have begun to produce the cookstoves themselves rather than purchasing from a producer, in order to reduce the cost to the consumer.
- Consumer awareness of cookstoves is extremely high, which is largely a result of the television adverts. Recognizing that using cookstoves is in the interest of all citizens, the Government of Timor-Leste allocated a budget to continue releasing the adverts after the end of the program.
- One cookstove manufacturer has begun producing the 'key components' themselves: the cookstove 'top', a clay combustion chamber, and a metal fuel-shelf.

Signs that systemic change in the cookstove market system is not complete include:

- The lead firm has long periods without stock of cookstove components due in part to government activity. In 2014 there were five months in which businesses were unable to manufacture any stoves. When parts were in stock, Mercy Corps encouraged all businesses to restart production, but it is unclear whether this will happen following the end of the program.

- The locally made combustion chamber lacks durability; because the final product is indistinguishable from the cookstove with an imported combustion chamber, it threatens to undermine trust in improved cookstoves in Timor-Leste.
- The cookstove market did not spread to rural areas. Several rural LEAs tried to sell improved cookstoves but failed as the stoves were too large and heavy to be transported on motorbikes.

## Challenges

### Supply Chain

The most significant threat to the success and sustainability of the energy market system was the unreliability of product supply. Throughout the program, the lead firms in Dili periodically sold out of solar products and cookstove components, which in turn meant rural solar retailers and cookstove manufacturers halted production and sales. This resulted in missed opportunities for sales; without such supply chain issues, the number of households purchasing products would have been higher. This also has a damaging effect on market linkages and sustainability: to purchase stock, rural business people travelled long distances and at significant expense, and would only do so a few times before lack of supply caused them to lose faith and give up. This happened to several solar energy retailers, undermining the trust that had begun to develop between market actors.

A number of factors were responsible for the issues with supply, all of which are common within product supply chains in Timor-Leste:

- The remoteness of Timor-Leste and complicated shipping routes made it difficult for lead firms to maintain stock levels. And on at least one occasion a shipment of cookstove components had to be returned, as a large number were broken on arrival.
- Bulk purchases of solar products and cookstoves by NGOs and government (cookstoves only) abruptly depleted lead firm inventories and ruined their sales forecasting and planning.
- Cash flow issues for one lead firm repeatedly led to delays in payments and therefore shipments.
- Lead firms were ineffectual when it came to stock management and ordering practices in the lead firms were ineffective, despite training and mentoring.

### Business Approach of Retailers

Rural retailers achieved variable levels of success with alternative energy products, which can be partly attributed to a different culture of doing business. Mercy Corps' efforts to strengthen business performance met with mixed success depending on this somewhat intangible underlying factor. Almost all the program partners had basic existing businesses (mainly selling household goods, food, and hardware), with established purchasing channels and experience managing stock and cash; however, few had plans for growth and reinvestment in their business. In particular, no business had experience proactively marketing new products to customers.

The E4A program aimed to help businesses become more ambitious, and to shift to new sales practices. While this had a certain amount of success (peer-to-peer training and workshops proved one of the most effective techniques), the majority of businesses were unable – or unwilling – to make this transition, for various reasons:

- Limited trust and/or understanding that investing time/effort could increase sales and raise income
- Poor financial management: In several cases (particularly with cookstoves), business owners gradually built up capital and were able to increase their stock purchases and sales. However, they subsequently spent that capital on cultural ceremonies or made non-business purchases, which meant they had to once more reduce their purchases and sales.
- A cultural reluctance to use proactive sales techniques: Business owners easily generated sales in their home and surrounding villages, where they could explain product benefits informally. But most businesses were reluctant to expand to other villages or parts of Dili, where they might appear to be 'pushing' products.

### **Performance of Lead Firm Partners**

At the start of the program, it was assumed that lead firms would perform the following functions: identify and select new retailers; contact retailers when stock becomes available; provide informal business mentoring (e.g. discuss sales performance and marketing techniques), provide informal technical training (e.g. identifying genuine manufacturing defects); provide marketing and promotional materials; participate in promotional activities; transport stock, and provide credit.

While a well-functioning and resilient market system is possible without some of these elements, they are nonetheless indicators of a market's health. In this case, the lead firms failed to adopt many of the above functions. They provided some business mentoring support, but only when facilitated by Mercy Corps. They provided technical training, but required on-going support from Mercy Corps to coordinate logistics and provide advice on key technical parts. Some marketing materials were provided by lead firms to small businesses, but only to the most successful. Credit was provided to only a small number of businesses that had the best track record of sales.

The main reason for this underperformance appears to be the nature of lead firms' businesses, and insufficient incentives. The lead firms are relatively large businesses by Timor-Leste standards – they were, for example, willing and able to invest their own capital for the initial order. Revenue and profits from solar and cookstove sales, however, represented a very small part of their overall business. The owners are extremely busy individuals, and although they were committed to the vision of developing a distribution channels for products, they were unable or unwilling to invest the time needed. Even when sales of solar products and cookstoves took off, the revenue generated was relatively low in comparison with their core products. Owners were motivated as much by doing something good for the people of Timor-Leste (and the social prestige this gave them) as by profit; yet social good did not prove to be sufficient incentive to commit the required time and resources to building an alternative energy sector, and may have ultimately undermined the program's objective.

Another factor in the stunted performance of the lead firms was the role played by Mercy Corps. Lead firms were expected to identify new retailers, yet they failed to do so. This, combined with low sales from the initial five businesses, meant Mercy Corps grew concerned about achieving change in the three-year



timeframe of the program, and about meeting the expectations of the donor. In response, Mercy Corps stepped in to identify additional retailers for scale-up and avoid a collapse of the system. While this was deemed necessary – to meet both contractual obligations and donor expectations – lead firms became dependent on Mercy Corps as a ‘fixer’ for their problems.

### **Government electrification and free distributions**

The Timor-Leste Government's national electrification program also proved a major challenge for E4A, and for rural businesses trying to generate sales of solar products. At the time of proposal design, the electrification program was still in its infancy and very little infrastructure work was being done. However, longer than normal lag time between design and start-up (18 months) meant that when E4A finally started, communities had become aware of the government plan, and infrastructure construction was well under way. Even though many communities will not have access under the government plan, the prospect of grid connectivity acts as a huge disincentive in terms of buying solar products, as households instead opt to wait and see if they will receive electricity – which many of them also believe will be free.

A similar disincentive was the government solar PV distribution program, which involved free distribution of solar home systems to certain households. Although the numbers of households receiving installations will be very low (3,000 nationally), uncertainty over who will receive free systems creates reluctance to purchase solar. Households were set to find out by the end of 2014 whether they would receive grid connectivity or free PVC installations; as many households realize they will not be served, or will need to pay for grid electricity, they may choose to purchase solar to reduce costs. Households that receive service may also opt to purchase solar products as a backup for unreliable grid electricity, given that a national grid system will be a huge challenge in terms of maintenance.

A similar problem exists with respect to the government's involvement in cookstoves. The Secretary of State for Environment committed to promoting cookstoves to reduce the problem of deforestation, yet despite Mercy Corps' advocacy efforts, the government did not envisage a model beyond free distribution. In one Dili community, the government distributed 200 stoves; this received extensive media coverage, and cookstove manufacturers across the city immediately found their sales dropped, as customers anticipated a free stove from the government. Mercy Corps eventually persuaded the government to only do distribution in remote communities far from Dili where they would not undermine Dili's fledgling market system. Nonetheless, free distribution threatens to jeopardize commercial sustainability of the solar and cookstove markets.

### **Lack of Trust**

At the start of the program, trust along the supply chain was deemed essential for the market system to function effectively. Households had to trust the quality of the products, and trust that businesses would honour warranty agreements. Rural businesses and cookstove manufacturers had to trust that lead firms would maintain stock levels and honour the warranty agreement; they also had to trust that households would repay when granted credit. Rural businesses engaged in sales through agents had to trust that, once products were sold, those agents would return the revenue provided on credit. Lead firms had to trust the international suppliers would honour their warranty, and trust that rural retailers would repay any credit provided.

- E4A appears to have been successful in encouraging trust in several of these areas:

- Trust in products among households is now high, in part due to their excellent quality, and also partly due to the marketing campaign.
- In neighboring communities, households trust businesses to replace faulty products, because rural businesses are fearful of risking social backlash for not honoring warranties.
- For one lead firm, Startec Enterprises, there is strong trust that the international supplier (d.light) will refund faulty products. Based on Startec's good track record of replacing products, rural businesses are now confident that Startec will replace or repair products.
- Lead firms developed enough trust in rural businesses to provide credit to several of them, once they had a proven purchasing record.

Other types of trust have not been easy to build, or were undermined:

- One lead firm did not trust that the international supplier (Barefoot Power) would replace faulty products, and was inconsistent about honoring warranties for rural businesses. As a result, rural businesses stocking these products lost confidence that they could get a product replaced, and one LEA stopped offering customers a warranty on these products. Trust never completely eroded, due largely to Mercy Corps following-up with the lead firm when there were problems. However, without this intervention, trust would likely have dropped even lower.
- After an initial period of smooth transactions and consistent stock supplies, lengthy periods of stock shortages in Dili undermined rural businesses' trust in the lead firms' ability to maintain supplies. Annoyed by what they saw as a failure on the part of lead firm owners, some rural businesses dropped out of the market system. Poor access to information and other communication-related challenges can exacerbate mistrust along the supply chain. For example, solar retailers and cookstove manufacturers unable to purchase stock became suspicious of lead firms' motives, and sought alternative income.
- Several local retailers struggled to find trustworthy mobile sales agents for solar products; there were two reports of individuals disappearing with cash that they'd received from mobile sales. Mobile agents represented a lucrative sales channel, so lack of trust eroded potential market growth.

While household trust in the cookstove product developed through E4A was extremely high, there were challenges to that trust as well. The combustion chamber made locally by one of the cookstove manufacturers was of inferior quality to the imported chamber from China, in particular in terms of durability; based on advice from Mercy Corps, local manufacturers were happy to rely on the imported chamber, despite it costing \$3 more per piece than the locally made version. This was put to the test, however, during a five-month period when cookstove components were not available, and several manufacturers bought local chambers to make stoves. The final products were identical – whether a local or imported combustion chamber was used – but the local stove would start to degrade after three months, instead of after three to five years. This now poses a huge risk to the hard-won reputation of the stove and to consumer trust. At the same time, sales of the local combustion chamber stoves stayed relatively low until a new shipment of imported chambers arrived, so it seems unlikely that the inferior products will completely undermine the market. But for households unlucky enough to purchase the inferior stoves (and for the neighbors they complain to) it will take a long time to convince them to invest in a stove again. This is just one example of how difficult trust is to earn, and how easily it can be lost.

## Lessons Learned

### 1. Rigorous analysis of informal rules improves intervention design and tactics.

Trust and social capital between market actors is critical. Market facilitators should identify areas where trust needs to develop, as well as potential points of vulnerability that could erode trust. By identifying these in advance, market facilitators can devise an explicit strategy to build and strengthen trust.

*E4A identified targeted efforts at building trust with significant success. But when external factors tested this trust (such as defective products, or periods when lead firms ran out of stock) communication between market actors tended to break down, leading to mistrust.*

A deep understanding of business owners' norms and mindsets can improve success in 'picking winners'. It also ensures appropriate incentives are identified and capitalized on, and encourages more effective interventions. Consumer norms around purchasing decisions and credit should also be taken into account. These informal cultural rules should be understood and planned for during program design, and should influence program adaptation.

*The business mindset of LEAs combined with a cultural reluctance to engage in proactive marketing limited business performance in Timor-Leste. Dedicating more time at the start of the program to understanding norms would have led to more appropriate activities, and could have saved both time and effort.*

### 2. Understanding incentives and capacities is key to sustainability and systemic change.

One challenge of stimulating a nascent market system is balancing the desire to work with established businesses able to invest their own capital, and identifying businesses with a strong drive to make the market system function, which are often much smaller and may have less formal capacity. Understanding the motivations and skills of businesses allows a program to select appropriate partners and tailor support according to needs. If a business's incentive is 'social good,' or corporate and social responsibility, rather than profit, this may not be enough motivation to commit the time and energy required for success. Understanding both incentives and capacities is key to enabling programs to stimulate systemic change.

*Lead firms in Timor-Leste are continuing to function as importers and distributors, but have never grown into the role of market catalyzers. This is partly because profit incentives (relative to the rest of their business) are not sufficient to justify the owners investing significant time and effort. With rural businesses, those most motivated – and most active – often proved to be the smallest.*

### **3. Implementing ‘hybrid’ market development programs that combine pure market facilitation with more traditional activities can undermine market objectives.**

Donor interests or demands – combined with realities, capacities, and timeframes on the ground – mean that pure market development programs are very rare; most programs will include some service delivery or subsidy. It is important to be strategic in planning direct interventions, and to take care not to undermine the broader program approach.

*While E4A had a strong focus on a market-driven approach, certain components of the program were based on more traditional NGO interventions, such as a large-scale marketing campaign. While this achieved good results in terms of raising awareness of alternative energy products, it also encouraged businesses to think of marketing as expensive, blanket promotion, rather than part of their own sales and marketing tactics.*

When carrying out hybrid programs, community perceptions of the implementing organization are influenced by the scope of more traditional NGO activities. Those perceptions can have unintended repercussions in terms of community expectations and understanding of market activities. As such, we as implementers need to be strategic in how we present ourselves to communities. In some cases, it may be more effective to work through other organizations to deliver particular elements of a program.

*In the areas where Mercy Corps had the heaviest footprint (i.e. where community installation activities were taking place, and where Mercy Corps was involved in promoting products directly) sales of solar products were some of the lowest in the country. This can be attributed to the belief that Mercy Corps would be providing technologies free-of-charge, and there was no need to purchase these products.*

As much as possible, program designs should avoid mixing market approaches with direct-delivery approaches. Given donor preferences, this is not always possible; in these instances, Mercy Corps should avoid any mention of the market components from the very beginning of its conversations with communities, and should also inform businesses to avoid mentioning Mercy Corps in relation to market components.

### **4. Subsidies should be intentionally crafted, and direct cash subsidies avoided when possible.**

It is always a challenge to find optimum levels of subsidies that will catalyze a market without undermining it. The first step should always be to encourage actors to act without cash subsidies, or to offer as little as possible to test incentives and encourage those most willing to invest.

*LEAs were micro and small businesses that required a reduction in risk in order to incentivize investing in the market. Mercy Corps chose to provide a 50% cash subsidy to participating LEAs to purchase initial stock. This level of matching funds proved to be an attractive business opportunity for LEAs. By the end of the program, 25 of the 26 LEAs had reinvested capital in additional product stock, indicating they recognize the business opportunity. At the same time, because this subsidy was consistent, it remains unclear whether LEAs would have participated with a lower up-front subsidy and perhaps invested more in the activity.*

## **5. Market development programs require longer or more flexible intervention time frames, particularly those in high-risk settings.**

It is difficult to predict the timeframe needed to facilitate sustainable market growth. Programs with short timeframes may be forced to intervene directly to accelerate the process and ensure linear objectives are reached on deadline. These actions may be counter-productive to the long-term health of the market system.

*The E4A Program was consistently racing the clock to achieve its objective of stimulating a nascent alternative energy market. The program was well managed and exceeded nearly every project-specified target; however, a tight schedule meant Mercy Corps sometimes played a role beyond that of pure facilitator. Additionally, Mercy Corps interventions ended when the market was still growing, and when LEA owners, cookstove producers, and lead firms were still utilizing Mercy Corps' resources to problem solve, communicate, coordinate, and fund activities or issues that materialized during the project. As a result, the time pressure that initially forced the program to intervene more directly also created a need for more time to then accommodate Mercy Corps' gradual withdrawal.*

Where market systems are very weak, a single program may not be able to reach its target of a fully functioning market system. In such cases, follow-up programs or legacy grants from the initial donor may be needed to allow a core team to shift roles and continue light-touch facilitation activities.

## **6. Upfront and regular engagement with government and donors is vital to minimize disruptions to programming.**

To ensure the project approach is supported – and that government-subsidized activities will not impact target areas – consultation with government is critical, during program design and program implementation. Market distortions caused by the government or other development actors should be anticipated during the project risk management analyses. An advocacy strategy may prove useful for some risks, while others will require a mitigation strategy.

*At design stage, E4A discussed program strategy with the government, and selected target areas that would be least affected by grid expansion. During implementation, E4A advocated with the government and persuaded them to change their stove distribution strategy, so they did not undermine a nascent market. While the government could not be convinced to stop distribution, the program ensured that it happened in remote mountain villages, rather than in towns with a potential market.*

## **7. Programs must develop indicators that measure system change, as well as the sustainability of the market system, in addition to the targets reported to the donor.**

When designing a program, it is difficult to develop indicators and targets that determine whether a sustainable market has been created. Nonetheless, systems for measuring systemic change need to be set up alongside the outcome indicators of a program, and should be revisited and adjusted regularly as a deeper understanding of the market evolves.

*The E4A Program vastly exceeded targets in terms of businesses involved and products sold; yet there are still questions as to whether the market will be sustainable and therefore successful in reducing energy poverty over the long-term. The targets chosen at the project outset were never revisited with the donor, which means interventions may have evolved more to meet specific donor targets, rather than to facilitate systemic change, and achieve the larger goal.*

## **8. Market development programs would benefit from a package of market development core tools and guidance.**

The E4A program was very well managed and exceeded every target. This, however, was largely due to the vision of the program manager, rather than any established processes. At present, there are no accessible, ready-to-use guidelines that can lead a new manager through program startup, recruitment, design, and implementation. Mercy Corps is currently working on a set of tools and guidelines to help managers run programs in a way that is efficient and simple, and adheres to a set of standards – rather than having to build each program from the ground up.

*The E4A program manager did draw up a market system diagram and results chain after the Springfield Centre training he attended – but he did not actually use them for management. This is one simple illustration of how the program lacked internal processes for the sharing of useful core tools, and how it also lacked the expectations that such tools and processes should be used.*

## ABOUT MERCY CORPS

**Mercy Corps is a leading global humanitarian agency saving and improving lives in the world's toughest places.**

With a network of experienced professionals in more than 40 countries, we partner with local communities to put bold ideas into action to help people recover, overcome hardship and build better lives. Now, and for the future.



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