Improving energy access for refugees in Rwanda

Practical ACTION

WORKING WITH THE PRIVATE SECTOR

About Practical Action

We are an international development organization putting ingenious ideas to work so people in poverty can change their world.

We help people find solutions to some of the world's toughest problems. Challenges made worse by catastrophic climate change and persistent gender inequality. We work with communities to develop ingenious, lasting and locally owned solutions for agriculture, water and waste management, climate resilience and clean energy. And we share what works with others, so answers that start small can grow big.

We're a global change-making group. The group consists of a UK registered charity with community projects in Africa, Asia and Latin America, an independent development publishing company and a technical consulting service. We combine these specialisms to multiply our impact and help shape a world that works better for everyone.

The Renewable Energy for Refugees project

Working in partnership with UNHCR, the UN Refugee Agency, and supported by the IKEA Foundation, the Renewable Energy for Refugees project will help refugees and their host communities access renewable energy, enabling refugees to move from reliance on aid to economic independence. This project will deliver renewable energy investments through innovative approaches in humanitarian settings, working directly with refugees and host communities in Kigeme, Nyabiheke, and Gihembe refugee camps in Rwanda and with urban refugees in Irbid in Jordan. The project will provide access to affordable and sustainable sources of renewable energy, and improve the health, wellbeing, and security of target populations. It draws on Practical Action's considerable existing experience in renewable energy programmes in developing countries – working directly with communities to deliver the best energy services and products possible for local people.

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CONTENTS

EXECUTIVE SUMMARY

This paper presents learnings from the Renewable Energy for Refugees (RE4R) project for humanitarian practitioners, the private sector, and donors looking to engage the private sector in the provision of energy services and products in remote, protracted displacement contexts.

In 2017, Practical Action started the RE4R project to deliver inclusive access to affordable and reliable clean energy within protracted displacement contexts. The project adopted a total energy access approach with the aim of addressing energy access for households, enterprises, and communities in displaced settings. In a bid to deliver systemic change and reduce dependency on continuous aid, the project sought to use market systems development approaches to stimulate change within local energy systems in order to improve clean energy access for refugees in three camps in Rwanda.

RE4R identified a number of systemic constraints restricting clean energy access for refugee communities and developed an intervention strategy to address them. A key component of this strategy for households and enterprises involved engagement with the private sector as a key market actor. Through a rigorous selection process, Practical Action chose to work with two different companies: one an established multinational solar home system (SHS) provider across African households with some experience in refugee contexts and reputable SHS products; the other an established Rwandan solar business breaking into a new market, looking for opportunities to test new business models for hard-to-reach consumers.

This provided an opportunity to compare two private sector actors – Bboxx Ltd and Belecom Ltd – operating in the same market with two different business models and levels of business maturity and market experience. Facilitating these two different companies would require different strategies in order to deliver the systemic changes in the market needed to achieve the intended impact of the RE4R project. This report was written in July 2020, 12 months after the companies started sales of SHS in the camps in July 2019.

The two business models offered different products, services, and financing mechanisms to reach different parts of the target market.

As an incumbent supplier, Bboxx managed to achieve its sales targets for RE4R in just three months with a high-quality product, validating a willingness-to-pay price point and appetite to engage with refugees in long-term payment models. To date, Bboxx's signals to maintain a permanent sales operation in the camps are low, with new sales ceasing once subsidies expired, no permanent staff or retail outlets established in the camps, and no long-term refugee employees. Belecom has generated sales over a longer time period but without any financial subsidies for a lower capacity, lower quality product and it has invested in maintaining a permanent market presence in the camp. Belecom's go-to-market strategy has been slower to roll out as it has developed its understanding of the market and adapted its model accordingly. Belecom's revolving fund is designed to increase access to its products for lower income households and, therefore, its sales reach and repayment rates, but is still in a pilot phase due to the operational restrictions imposed by the COVID-19 pandemic.

Supplier business models include

- SHS sales, installation, and user training
- Awareness raising, marketing, and product demonstration
- After sales services, such as technical repair and customer support, and warranties
- Refugee vocational training and employment
- Sales data, progress reporting, and monitoring

Bboxx	Belecom Ltd
50W system 3 bulbs + phone charger Optional appliances (additional cost): radio, TV, torch, subwoofer, shaver	12W/20W system 3 bulbs + phone charger + radio
Pay As You Go: RWF 2,900/month for 3 years (subsidized rate) then energy service fee of RWF 2,900/month for 1 year Can opt in or out of ESF annually for up to 7 years	Pay As You Go: RWF 2,600/month for 3 years

Figure 1 Business model summary
Note: US$1 = RWF 950, as at July 2020

While the project is ongoing, to date 42%[1] of households (HHs) across the three camps now have access to an SHS (representing more than 2,700 SHS sold in the 12 month period that the companies have been operating in the camps) with a 96% customer satisfaction rate. The majority of customers of both companies have reduced their energy expenditures on non-renewable sources to nil and defaulting rates on loan repayments have been very low at between 3.5% and 9%.

Results summary

Households reached	Customer satisfaction
42% (2,674) of HHs in camps have SHS systems	94% overall satisfaction with SHS products
Affordability	**Reduction in non-renewable energy spend**
Default rates are low, between 3.5% and 9%	88% reduction in spending on candles
42% of customers can afford SHS without reducing any other outgoings	100% reduction on non-chargeable batteries

It is the first time I have seen refugees choose to spend their own money on energy

UNHCR representative, June 2020

The project is too early in its delivery to determine whether the market constraints will be permanently overcome once RE4R has finished in February 2022, and whether sustainable, systemic change will be achieved, although there are signals suggesting some interventions may be succeeding in delivering this, while others may require further adaptation. Lessons learned on the facilitation strategies used have been documented in this paper, including recommendations on how they could be adapted in future engagements in similar markets.

Recommendations summary

1. When identifying private sector actors to work with, assess their risk and willingness appetite for working in fragile market environments.
2. Investigate what level of market information is required to build the confidence of market actors and challenge assumptions of the refugee market.
3. Establish what market conditions are required to make business models viable in the long term.
4. Beware of contracting as a means to guarantee delivery targets as you may not incentivize the behaviours and long-term change you are striving for.
5. Stimulate the system to incentivize behaviours that will achieve the vision for inclusivity of access.
6. Affordability of quality goods and services may always be an issue in protracted displacement environments, so strive for realistic goals.
7. Plan for external changes and allow time to deliver – these environments are not prescriptive and businesses need time to adapt and evolve.
8. Adopt smart strategies for subsidies to ensure financial support delivers market system development objectives.

INTRODUCTION

This paper is intended to share lessons from RE4R's experience of working with the private sector in order to provide practical examples and recommendations for humanitarian practitioners, the private sector, and donors to use in future programming.

Working in three refugee camps in Rwanda, the RE4R project sought to **increase the number of households and small enterprises who are able to access solar lighting and power solutions** with target populations able to:

- **access sustainable, efficient, and reliable energy services**;
- use these energy services to **maintain their rights and dignity** and **improve their quality of life**;
- switch from non-renewable to renewable sources, leading to **reductions in spending on fossil-fuel technologies and fuels**;
- **enhance their livelihood potential by creating additional income opportunities from renewable lighting and power solutions**.

Practical Action is using a market systems development approach to incentivize a long-term, sustainable change within the energy market systems that exist in refugee and remote host communities in Rwanda.[2] Such an approach attempts to move donors and humanitarian practitioners away from providing direct delivery of aid to address needs (for example, distributing solar lanterns) to use of facilitative approaches that incentivize behaviour changes by local actors (e.g. public, private, academia, civic society, individuals) to address known constraints in local systems that may be preventing access to certain goods and services. This intent is summarized in the project's Impact Statement (unpublished):

> ***Re-shaping humanitarian response:*** *Key international humanitarian agencies, stakeholders, and delivery agents at the local, national and global level use models demonstrated by RE4R to deliver sustainable, efficient, affordable and reliable renewable energy services for people, communities and institutions in humanitarian settings.*

Facilitation refrains from investing directly in the delivery of any critical goods or services for the target group and instead focuses on building local ownership and willingness to invest and deliver the changes required. Facilitators may indirectly support market actors through, for example, creating linkages and visibility between key stakeholders; de-risking investments; building capacity; and strengthening the enabling environment. Facilitation for systems development is a time-consuming process where the impacts for the target group may take a longer time to realize than direct aid distributions as systems shift behaviour to better serve them. Ultimately, the goal is to create permanent changes that eliminate local constraints such that these will not 'fall apart' when donor support and financing ends.

This approach has been employed in other projects – *the Moving Energy Initiative in Burkina Faso and Kenya, and Mercy Corps in Uganda* – attempting to improve access to energy for refugees as there is growing recognition of the need to apply longer-term solutions to protracted displacement contexts which, on average, are continuing for 18 years (Mercy Corps, 2019; Whitehouse, 2019). Applying temporary solutions to these problems does not best serve the needs of the displaced, nor the communities hosting them. However, realizing the impacts of market systems development approaches within short-term

In a market-development approach, facilitation seeks to catalyse a market system ... while remaining outside that market system
Mercy Corps, n.d.

funding cycles and project spans is often not possible and, as such, there is a need for longer-term approaches, such as RE4R, focused on systems change, to build an evidence base for replication and scale-up of these approaches.

Purpose of this paper

This aim of this paper is not to recommend a perfect private sector business model but to share the learning from RE4R's market systems development process. This learning will be used to inform adaptations of interventions and facilitation tactics for the remainder of the RE4R project and may also be of benefit to practitioners and stakeholders in the wider humanitarian energy sector.

This paper will discuss the ways in which RE4R has engaged with the private sector and will identify the successes and challenges experienced while attempting to stimulate systems change. This paper first sets the scene for the reader by summarizing the Rwandan energy market system; the constraints to energy access for refugee populations; and the intervention strategy created to address them. The paper will then discuss the facilitation strategies used to engage the private sector actors in these markets and the tactics used to support them. It will share examples of the business models employed by the two companies and the outcomes achieved to date from their activities. The paper will then step back to the wider intervention strategy and reflect on the impact of facilitation activities on the energy market system. The final section of this paper will share recommendations for humanitarian practitioners, donors, and the private sector. These can be applied to projects working in similar contexts, including those outside the energy sector. This structure is illustrated in Figure 2.

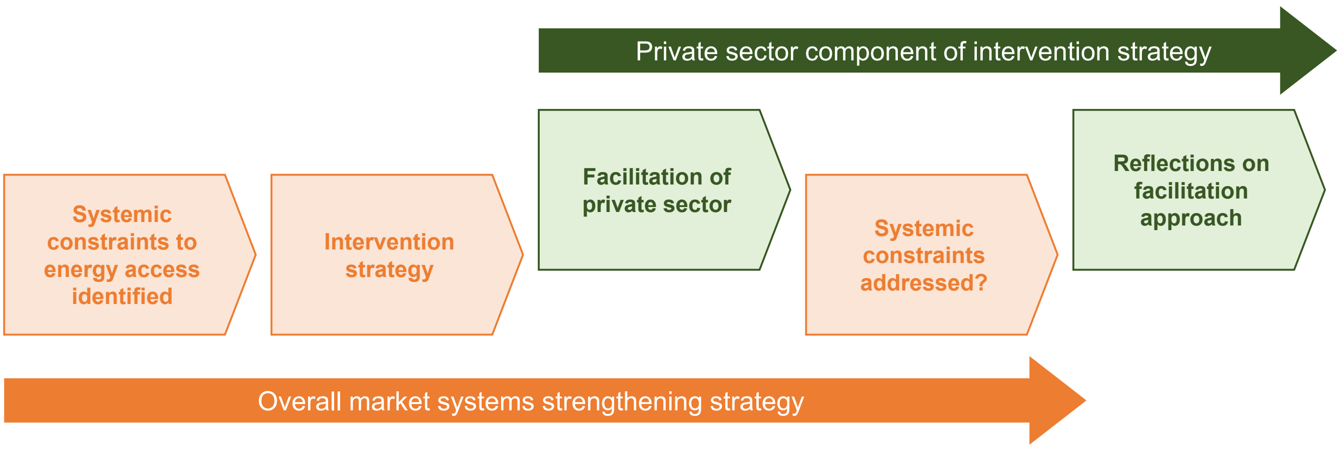


Figure 2 Structure of the paper

SETTING THE SCENE: RWANDAN ENERGY MARKET

It is important when reflecting upon intervention strategies employed and market actors engaged to be cognizant of the market system environment in which we are working. The interventions and facilitation tactics used in RE4R are context specific, and may not directly translate into another market system, so it is useful to set the scene first. This section of the report will summarize the energy market system characteristics in Rwanda which will have influenced energy access constraints as well as opportunities for addressing them. The RE4R intervention strategy to address these constraints will then be laid out.

Overview of the Rwandan energy market

Prior to designing an intervention strategy, Practical Action conducted a comprehensive assessment to understand energy needs across home, work, and community (total energy access).[3] This sought to generate a holistic understanding of the energy needs and priorities of refugees and host communities documented in the report *Ensuring Refugee Camps in Rwanda Have Access to Sustainable Energy* (Practical Action, 2020).

As part of this, the RE4R project included an energy market assessment between December 2017 and May 2018 to gain a broad understanding of the key opportunities and barriers within the wider Rwandan energy market system and the local energy market systems

A couple in Kigeme with an SHS installed on their roof in and around three refugee camps in Rwanda. Summary demographic data for the camps and the surrounding host community are provided in Table 1.

The key energy market system characteristics (from 2018) are summarized in Table 2, segmented using the market sector selection framework detailed in the Moving Energy Initiative's *Adopting a Market-based Approach to Boost Energy Access in Displaced Contexts* (Whitehouse, 2019).

Table 1 Population sizes in and surrounding the refugee camps

Camp name	Kigeme	Nyabiheke	Gihembe
Year formed	2012	2005	1997
Refugee population (2019) (no. of households)	20,626 (3,830)	14,479 (3,490)	13,181 (3,077)
Host community population (2012) (sector level)	41,500	36,500	30,270
Host community population (2012) (district level)	341,000	433,000	395,000
Location	Nyamagabe District, Southern Province	Gatsibo District, Eastern Province	Gicumbi District, Northern Province

Source: Practical Action, 2020

Table 2 Rwandan energy market systems characteristics

Location (***influences the supporting functions and rules required for the market system to function***)	Remote, rural Partial grid connection within host communities and camps Nascent solar energy markets Good mobile money and connectivity
Crisis type (***influences the type of support required dependent on crisis progression, duration, and impact***)	Protracted displacement in camps (> 20 years) Transition from camps to permanent settlements
Aid influence (***influences perception of the market for market-on-market viability and conflicting interventions***)	Movement away from in-kind distributions to reliable, monthly cash-transfers to refugee households Energy product distributions have happened in the past e.g. solar lanterns Camp access authorization process has acted as a barrier to local energy providers in the past although some are emerging in camps in both a formal and informal capacity
Political/cultural reception (***influences the system rules, regulations, and interactions that can limit access and livelihoods for refugees***)	Rwanda has seen steady economic growth in the last 20 years Joint strategy, the Comprehensive Refugee Response Framework, to enable all refugees to be self-reliant members of Rwandan society by 2020 between Rwanda's Ministry of Emergency Management (MINEMA) and the United Nations High Commissioner for Refugees (UNHCR) Limited livelihood opportunities available for current refugee skills Remittance payments also contribute to refugee incomes
Energy market maturity (***influences the adaptability and risk appetite in the market, and opportunities for clean energy***)	National energy strategy to reach 48% of households with off-grid solutions by 2024 (including refugees) National commitment, as part of Sustainable Energy for All (SE4All), to increase private sector participation to facilitate energy access strategy Vibrant renewable energy market exists with a total of 80 energy stakeholders mapped across public, private, and civil society

Market potential (*influences the viability of the market for public- or private-sector investment in the area*)	172,000 refugees living in camps across Rwanda, with connections to the host population living within the vicinity of camps
	> 95% of households have access to Tier 0–2 electricity services only.[4] Reliance on candles and mobile phones for lighting are most common
	A minority of households have access to any form of electricity/lighting – approx. 21% of HHs rely on solar lanterns and 16% on SHS across the three camps
	Some concern of flight risk of refugee customers through UNHCR active resettlement programmes (targeting 2,600 people in 2019) (UNHCR, 2019)

Source: Adapted from RE4R's market assessment, completed in 2018

Affordability

Market analysis by Practical Action indicated that the affordability of relatively expensive clean energy products on the market would likely be out of reach of refugees receiving, at minimum, a per person cash transfer of RWF 6,850 (~US$6.9) per month from the World Food Programme. Practical Action's analysis segmented consumers based on their household energy spend and reported willingness to pay (WTP)[5] (see Figure 3) to identify the potential market size for various price points across the three camps (see Appendix for calculation assumptions).[6]

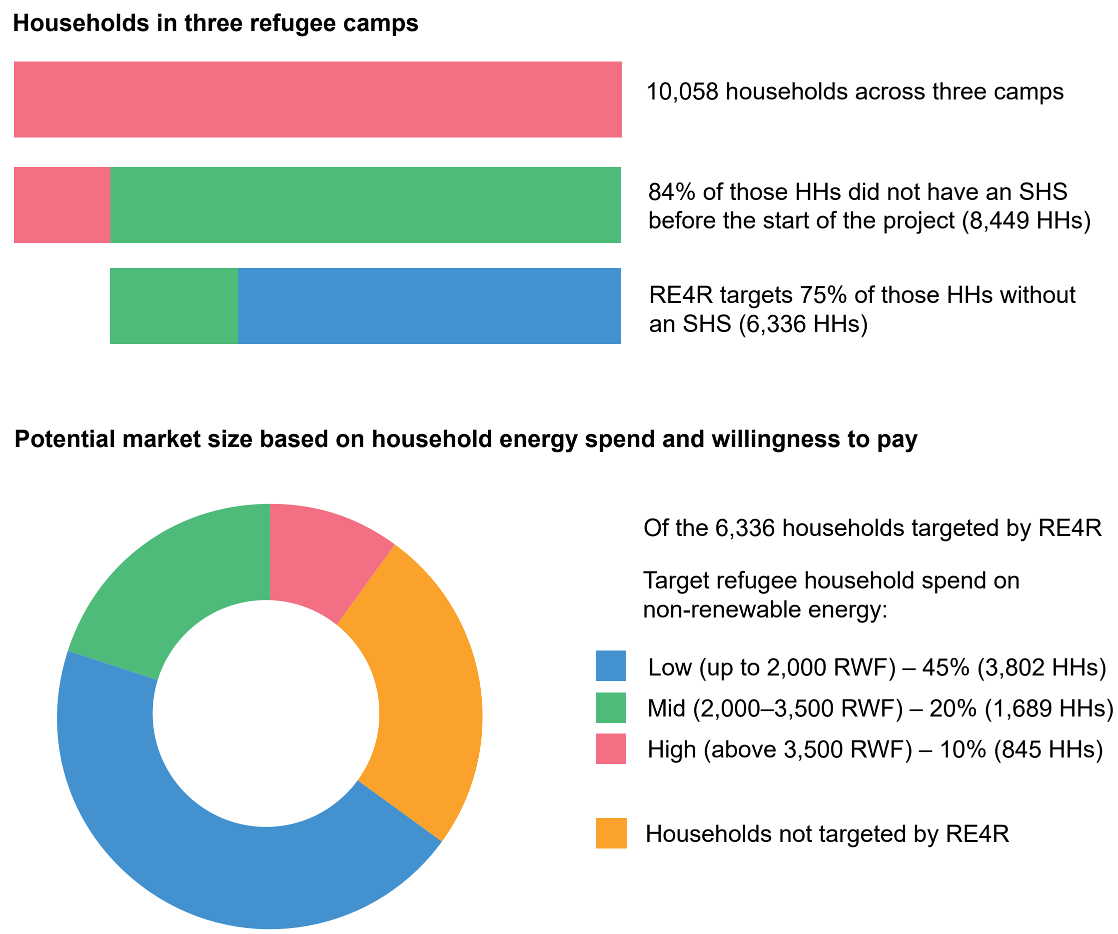


Figure 3 Refugee household spend and estimated willingness to pay on energy, 2018

Notes:
1. Total number of HHs in all three camps = 10,058. Of these, the project's assessment showed that 16% of HHs already owned an SHS before the start of the intervention, leaving 84% without an SHS = 8,449 HHs.
2. US$1 = RWF 950, as at July 2020

Practical Action research suggested that most households had a willingness to pay for renewable energy technologies, but the levels of actual expenditure on energy were lower and did not prove capacity to afford them yet. It was important to have this analysis available first to support both the intervention strategy and facilitation approach because it provided:

- an understanding of financial inclusivity requirements to inform the selection of private sector partner;
- appropriate energy technologies and pricing and payment models;
- an insight into the potential refugee market size in the three camps; and
- data to inform negotiations with private sector actors on required financial support.

Energy market constraints and intervention strategy

The combined outputs of the assessments determined that facilitating access to solar energy (specifically solar home systems (SHS)) had the most immediate potential to meet the energy needs of household and small enterprises in refugee and remote host communities. Deep-dive research into the SHS market identified a number of priority constraints to be addressed to improve access to the SHS market for refugee and remote host communities.

An intervention strategy was created to address these constraints (see Table 3). Some of these interventions would need to be facilitated directly through private sector actors (in orange text) and complemented by other interventions (in black text). This overall strategy is dependent on the success of all the interventions (not just the private sector activities) to realize change.

Table 3 Energy market system constraints and intervention strategy

<table>
<tr><th>Market constraint</th><th>Intervention activities</th></tr>
<tr><td>Market linkages</td><td>• Facilitate camp access permissions, deliver induction and familiarization activities, and provide contextual information for private sector
• Deliver outreach and contextual awareness activities with private sector
• Conduct bidding process to select private sector actors for a package of support to enter the market</td></tr>
<tr><td colspan="2">Rationale
Encourage entry to the market. Constrained access to camps can reduce visibility of local market potential as well as linkages to local distributors and customers located outside the camps. It can also reinforce assumptions of aid competition and perceptions regarding market viability, reducing the appetite to invest. Addressing constraints to access; facilitating dialogue between local camp actors and suppliers; as well as challenging perceptions on refugee market viability may encourage greater entry to the market
Widen market linkages beyond camps. To interact with a larger potential market base, and reach underserved elements of the host community there is a need to look beyond the refugee camp. This has the potential to multiply the number of entry points that the private sector and other market actors could use to build relationships, connections, and structures with refugees and their surrounding host communities</td></tr>
</table>

<table>
<tr><th>Market constraint</th><th>Intervention activities</th></tr>
<tr><td>Demand perception</td><td>• Education and outreach to market actors through dissemination of market data
• Incentivize private sector to undertake tailored market research with financial support
• Incentivize private sector to engage host market and incorporate user feedback</td></tr>
<tr><td colspan="2">Rationale

Increase knowledge of the refugee market. Renewable energy (RE) suppliers have minimal knowledge of the market in the camps which fuels assumptions of limited market potential and a lack of knowledge of business and service models required to work within this market

Understand market potential of host market. There is a need to consider host market size potential to access a wider customer base and support business viability

Address perceptions of role of private sector in humanitarian contexts. Many private sector actors see the ‘market’ as the humanitarian or development organizations not the refugees themselves which can influence the business models and sustainability of interventions

Encourage incorporation of customer feedback mechanisms. To build knowledge of, and respond to, refugee and host community needs and preferences, and improve the sustainability of business models</td></tr>
<tr><td>Access to finance</td><td>• Conduct consumer ability and willingness to pay testing across income profiles
• Identify consumer finance support options from private sector
• Incentivize piloting of inclusive finance models
• Identify potential formal creditors to support inclusive energy finance</td></tr>
<tr><td colspan="2">Rationale

Limited understanding of affordability across income levels. Refugee ability to pay was estimated based on the project’s assessments but required validation within the business models used by SHS suppliers. In addition, the businesses would benefit from testing consumer preferences for different solar products and financing options relative to their income levels.

Flight risk is still a concern for long-term payment models. PAYGO remains an option but flight risk is a concern for companies extending long-term (3 year) payment plans/loans and may need de-risking financial support

Limited access to formal credit. The FSD Africa (2018) study showed that refugees have used financial services before and want to use them; however they lack collateral and status to access formal loans and bank accounts. There is a need to identify actors in the local system (not NGOs) who could take up the function of credit support and share information with these institutions on how energy markets work</td></tr>
<tr><td>Marketing</td><td>• Incentivize private sector to demonstrate and market products, explaining the benefits of RE products
• Incentivize private sector to hire and train local sales agents
• Promote RE through information campaigns and community mobilization</td></tr>
<tr><td colspan="2">Rationale

Limited awareness of RE products and benefits. Demand is affected by limited public awareness of RE products and their value proposition compared to traditional and cheaper lighting and power technologies. Even when the benefits of RE products are demonstrated, cost remains a significant factor

Sales and marketing are not tailored to these consumers and contexts. There is limited understanding of how to adapt marketing strategies for refugee markets, and strategies that work well in the host community may not be as successful. There is need to further develop the skills of sales and marketing personnel through customer service training of agents and technicians</td></tr>
<tr><td>Quality and trust</td><td>• Promote energy literacy and behaviour change activities: trade fairs, roadshows, local radio
• Incentivize private sector to provide certified products and after-care support</td></tr>
<tr><td colspan="2">Rationale

Limited technical knowledge of RE services and products. This causes issues of unrealistic expectations, incorrect use and damage of solar equipment affecting perceptions of quality and trust in new products

Influx of low-quality products into the market could affect trust. There is a need to maintain the quality of products and after-care support to stimulate and sustain demand and continued usage</td></tr>
<tr><td>Skills</td><td>• Incentivize private sector to deliver vocational/technical training for refugees/host community employees as part of their business model</td></tr>
<tr><td colspan="2">Rationale

Limited vocational skills (refugees) affecting suppliers’ local energy employment and last mile delivery of sales and after-sales support. There is a need to further develop sales, marketing, and customer support channels through: (1) recruiting sales agents, customer support staff, and technicians in refugee camps and other rural areas; and/or (2) upgrading existing agents to become stockists or retailers; and/or (3) supporting retailers to establish their own agent networks as field staff to integrate refugee markets into their existing regional operations</td></tr>
</table>

Source: Adapted from Practical Action market assessment report, 2018

ATTRACTING MARKET PLAYERS TO NASCENT MARKETS

Identifying and selecting market actors

Although the Rwandan solar energy market is fairly mature and diverse, the refugee camps are still relatively nascent markets which are much less developed (e.g. there are limited actors locally delivering solar services and uptake levels are low). However, encouraging both market entry and competition into this type of environment is challenging. It may take a lot of effort on the part of the facilitator to support and incentivize sustained investment by early entrants into these markets as well as generate further momentum for crowding-in of competition.

As part of the intervention strategy, Practical Action chose to attract potential private sector actors to deliver energy services in this market using the process shown in Figure 4.

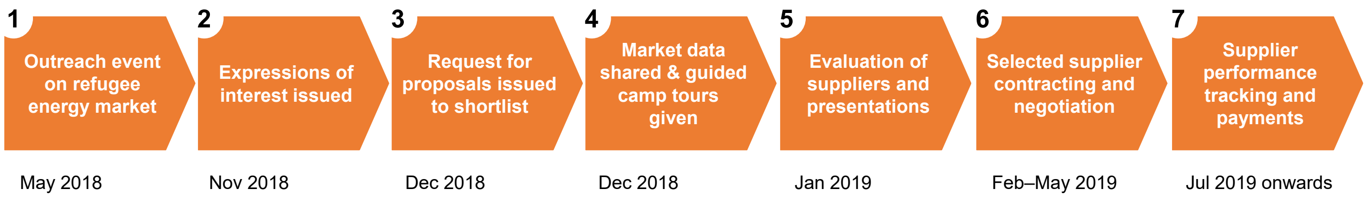


Figure 4 Practical Action process to attract private sector actors

- **Expressions of interest (EoI).** A market engagement event was held prior to the EoI advertisement, to widen awareness of the market potential and the aims of the project. The EoI request was deliberately broad in order to gauge interest and filter the most promising partners.
- **Request for proposals (RFP).** Eight suppliers were shortlisted from the EoI stage, and invited to submit an application to the RFP. Market information was shared in the RFP and applicants were invited to guided tours of the camps. The RFP asked applicants to outline how they would reach 75% of households without energy access within the three camps. Applicants were requested to outline what financial and technical support they required to address the barriers they perceived in accessing the markets in the camps. This included financial support for their own market research if required.
- **Supplier evaluation.** Proposals were shortlisted by a multi-stakeholder committee using a thorough scorecard assessment comparing: capacity to deliver; delivery model potential; budget and timing feasibility; community engagement; and monitoring, evaluation, and learning (MEL) approaches. Applicants delivered presentations of their proposals to a diverse panel of experts from

A view of Kigeme with an SHS installed on the roof of a refugee household

the humanitarian, energy, and public sector. A number of the applications proposed a supplier-distribution model in which RE4R would pay for the SHS in full and the supplier would distribute to refugees – effectively a temporary in-kind distribution without a sustainable financing model – and were therefore unlikely to achieve the aims of the project.

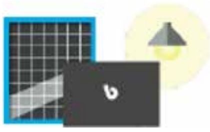
The evaluation process identified that no single supplier would be able to reach 75% of the target market, with the product and price structures offered.

- **Supplier selection.** Two suppliers were selected to potentially reach the widest range of the market and to provide choice to refugees with their differentiated products, prices, and payment models. Very few applicants proposed a business model likely to reach low-income HHs and, as such, options for partnering with a supplier for this market segment were restricted to one applicant.
- **Supplier contracting.** Following negotiations, the two suppliers were engaged under contracts with Practical Action, providing a specific package of technical and financial support. Each supplier was set different targets and milestones, based on the size of the market sector their business model was likely to address, their implementation schedule, and the levels of support required to address their perceived barriers to market entry.

Financial support to facilitate market entry

The following section summarizes the financial support offered to the selected suppliers to address the barriers each faced and de-risk their delivery models in order to facilitate their entry to the market. It also outlines the potential sustainability benefits and risks of providing support in this way.

Demand side financial support for suppliers



Subsidies. The proposed Bboxx SHS unit usually costs RWF 4,800 pcm (US$5.05) paid over a 3-year period (a total of RWF 172,800; $181.89), to cover hardware installation and ongoing after-sales services (customer support, maintenance and repair, warranty) to ensure customers have consistent and reliable access to a working SHS. At the end of the 3-year period, customers switch to paying an energy service fee (ESF) of RWF 2,900 pcm ($3.05) which provides an extended warranty and continuing after-sales services. This is renewed on an annual basis for up to 7 more years, for a total period of 10 years.

RE4R agreed to subsidize a portion of the unit cost to reduce the monthly cost to the consumer to RWF 2,900 for the initial 3-year period. It was anticipated that this would accustom refugee customers to the financial commitment of the ESF after the initial three years was completed and increase uptake for middle-income households noted in Table 3. After this period, the customer would own the SHS and would subscribe to the ESF for a further one year at a charge of RWF 2,900 pcm, with the option of subscribing to the ESF on an annual basis for up to six more years.

(+) The subsidy lowers the monthly cost of the SHS for customers and potentially enables a wider market segment to access Bboxx products and services.
(+) The subsidy accustoms customers to paying RWF 2,900 pcm to subscribe to the ESF over a longer period, supporting a sustainable business model for Bboxx, and providing reliable energy access to customers as long as they keep up payments.
(-) Bboxx's proposal gave no indication that it was going to adapt its prices or payment models (or work with other actors) to address future affordability issues once subsidy financing was exhausted.
(-) Bboxx's proposal outlined aims to provide its customers with as much flexibility for payments as possible, but did not set out any specific measures to address specific flexible models to cater for refugees.

Revolving fund seed capital. The Belecom proposal requested financial support for the seed capital of a revolving fund which aims to provide access to finance services for low-income households so that they can boost their income and afford the monthly payments for Belecom SHS systems.

The revolving fund provides loans to Belecom customers to support small-scale income-generating activities, such as selling of food and goods, and animal rearing. In coordination with the Refugee Committee, Belecom customers are formed into groups of 10–15 members, provided with training, and then provided with loans of between RWF 10,000 and RWF 100,000. Groups are collectively liable for loan repayments and benefit from a share of savings when loan repayments are completed; in effect, a group savings scheme.

By boosting the income of participating members, the fund aims to generate economic activity to cover both loan repayments and monthly SHS costs and therefore make Belecom products more affordable.

(+) The seed funding does not reduce the overall cost of the product to the consumer, but creates access to finance to boost household incomes. Acknowledging the need to find a business model that would work once any external funding ceased, the fund is a financial mechanism that could provide continuous access to finance for lower income households (and act as a loan mechanism for other households experiencing financial stress in the future) post-RE4R.

Financial support for de-risking investments

De-risking stock purchases. Unlike Bboxx, which has an established business, national customer base, and supply chains, Belecom was starting up and investing in the purchase and importation of stock, presenting a significant risk if it did not sell. RE4R agreed to purchase wholesale batches of the product to be sold under the RE4R project. The grant would de-risk purchase of stock in case the units did not sell.

(+) If the units sell, the funding used to purchase the stock would be recycled into the revolving fund. This recycling approach was designed to de-risk the supply of SHS, not subsidize sales. This revealed a commitment to future financial sustainability.

Additional business costs. As part of the RFP, Practical Action asked each company to present a breakdown of costs of activities: for example, sales, training, outlet investments, marketing, logistics, and communications. There were no stipulations in the RFP of cost-sharing between RE4R and the company. Both companies received financial support for additional business costs associated with entering the camps.

(–) There is a danger that this approach could mask whether or not a company is committed to develop the market in the long run. It could incentivize short-termist behaviour in which the company only invests while costs are being covered by the project.

A Belecom sales agent giving an SHS product demonstration

A COMPARISON OF THE BBOXX AND BELECOM BUSINESS MODELS

Bboxx overview

Bboxx has been operating for over a decade, delivering SHS solutions across 11 countries. The company has over 50,000 active customers in Rwanda alone, predominantly in rural areas. Bboxx has experience working in refugee camps previously in Kenya and Rwanda providing the company with contextual understanding of the humanitarian context and market potential. Notably, however, the success and financial sustainability of these refugee business models has not been shared with Practical Action.

Bboxx is a vertically integrated company controlling everything from design and manufacture of the solar technologies (and accessories) it sells through to distribution, financing, sales, and customer service. The company has full control of the customer experience. Rather than relying on high sales volumes, Bboxx's business model prefers to attract customers into long-term energy service contracts with the offer of high-quality products and maintenance services.

Value proposition

High-quality SHS ideal for providing reliable energy in all-weather conditions. The product is aimed at middle-income households wanting to power multiple rooms or appliances (e.g. TVs, mobile phones) or small enterprises requiring additional power.

Marketing

Conducted awareness raising activities through community consultations; 'market storming' – using *umuganda*[7]; leaflet distribution; and product demos. Bboxx mainly used existing camp structures to facilitate marketing. It was noted by Belecom that Bboxx's brand is the 'known' brand that every other competitor has to compete against to get their brand recognized.

Products

Bboxx proposed to offer a suite of appliances offering to meet a diversity of customer energy needs and price ranges. However, in reality, only one product was offered to the market – its lowest cost product. This is a high-quality product (a battery, 50W panel, phone charger, and three lights) – recent surveys with Refugee Committees and sales agents (from both Bboxx and Belecom) have commented that it is the superior quality product on the market. However, it is not possible to use non-Bboxx appliances with the system.

Pricing and payment

Pricing: With an RE4R-funded subsidy, RWF 2,900 pcm for 3 years, to cover hardware installation, and ongoing after-sales services switching to an ESF of RWF 2,900 pcm for up to 7 more years.

Payment: PAYGO payment system with remote monitoring and switch on/off. Mobile money payments only, plus a 30-day grace period for late payments, with the potential of repossession after the grace period. Customers have reported that Bboxx takes a long time to reactivate their system after customers pay because this is done remotely and there are limited customer service options to address these delays.

Default rates: Rates have been low at 3.5% (as of March 2020) after at least 7 months since sales commenced.

Sales

Planned to start sales operations in June 2019 and started in July due to initial set-up time and camp access permissions.

RE4R target sales: 1,534 SHS in all the camps

Actual sales: 1,516 within first 3 months

Distribution

Retail: Proposed to establish satellite shops in the camps and a sub-network of sales agents. In reality, no satellite shops have been set up within camps. Existing shops are located in local host communities up to 15–30 minutes' drive away.

Ongoing non-subsidized sales in target areas: No evidence of efforts to sell appliances nor up-sell systems or introduce other product offerings. Bboxx has not shared data for any sales made without the RE4R subsidy.	**Sales agents:** Proposed to hire local shop managers, technicians, and sales agents. Thirty refugees were recruited as sales agents but since RE4R sales targets were met, further sales have not been completed by these agents. Sales agents were only paid commission on sales, and were not engaged to provide after-sales support services.

Customer support

Purchase and installation: User training is completed at the point of installation. This includes basic technical knowledge on how to operate the SHS and how to contact Bboxx. Feedback from customers indicates that user training does not provide a full understanding of customer after-sales support, contract or warranty rights, and Bboxx has identified this as an area for improvement for future sustainability.

After-sales support and access: After-sales services exist, and for those that can access them, queries, maintenance, and technical issues are largely addressed. Bboxx has covered issues outside the product warranty (e.g. damaged cables) as these have been recurrent issues in camp environments. Bboxx's customer support is the same for all customers (refugee and host community): access to a toll-free hotline or support at one of Bboxx's retail outlets. However, these are not readily accessible to refugees. According to feedback, the toll-free hotline is often not operational and the cost of calling the company too costly for refugee customers. The nearest Bboxx shop requires an opportunity cost to reach and upon visiting may not be able to solve any maintenance or payment problems immediately on arrival.

Camp presence: Bboxx's technical support staff will be sent to the camp when there is a critical mass of customer issues to address, otherwise individual customers must travel to the Bboxx shops. Refugees engaged as Bboxx sales agents remain present in the camp but are not paid for after-sales service activities, only sales. These sales agents remain the face of Bboxx and are subject to challenging interactions with customers who they have limited incentive and no company support to help.

Customer feedback resolution: Data on technical issues and resolution rates have been shared but detailed customer feedback from Bboxx has not been provided at this stage. Bboxx has not shown any indications of iterating its business and service models based on RE4R customer feedback.

Employment	**Inclusivity**
The aim of Bboxx was to recruit and train at least 10 refugee sales agents per camp, which Bboxx exceeded; refugee sales agents were contracted and receive commission for sales. No refugee technicians were hired and upskilled to support remote maintenance. All technicians came from existing Bboxx shops in host community locations outside the camps. Bboxx has a global hiring policy which restricts who they can hire on a permanent basis, and constrains the way in which they can employ refugees.	Uptake for the Bboxx product in the camps has significantly increased under RE4R. Further validation activities are required post-COVID-19 restrictions to evaluate the demographics and income levels of the households that have become Bboxx customers. Outside the camps, it is unknown how many host populations have also been customers to Bboxx as this was not reported nor how many sales (and continued repayments) are needed within the satellite areas to sustain a viable business model. There is limited change in the operational and payment model to serve less accessible customers (e.g. persons with disabilities) and those with fluctuating incomes in these remote areas.

Belecom overview

Belecom has over a decade of experience in provision of large-scale solar systems across Rwanda. As part of a recent expansion into new markets it has been looking to apply its expertise to the provision of SHS for households in remote areas. Belecom's ambition is to connect everyone, including low-income households, to information and energy, and leave no one behind. It is a new business expansion with acknowledged risks.

Previous to RE4R Belecom had been providing SHS at bulk sale to customers with challenges in retrieving payments for such purposes. The company needed an opportunity to work within new markets to design, build, and test new business and service models. RE4R allowed an opportunity to access these new markets with less risk and support to navigate within this context. Compared to Bboxx, Belecom was completely fresh to the humanitarian market with no incumbent experience with SHS service models but, at the same time, had the flexibility of being a start-up to design from scratch and iterate as needed.

Value proposition

To be the company that is 'connected to their customers' with an intention to be close to the customer to understand their needs and provide the most accessible solar home products and services to the hardest-to-reach.

Marketing

Developed a community engagement plan and conducted mass meetings, product demos, and focus groups. Belecom depended on Practical Action's market research to inform its product choice and business model in the beginning but realized it needed to do more detailed market studies once in the camp to iterate on its products, prices, payment, and service models. Unfortunately, the timing of Practical Action's first round of RE awareness raising activities did not synchronize with the readiness of Belecom to sell, which could have undermined its position to engage customers.

Products

Belecom originally offered two different products but changed to a single-sized SHS with a radio on the basis of market research. The product is widely known in camp to be of lesser quality than the Bboxx product but this is reflected in the 50% lower price (when Bboxx's product is not subsidized). According to recent surveys, it is perceived that the product is better for lower income households and women wanting a basic unit to conduct chores rather than a unit to power appliances. The company is also investigating diversification of its product and pricing models to supply larger SHS to serve larger-scale businesses in the camps as well as products for nearby host communities.

Pricing and payment

Pricing: A pilot of the revolving fund started on 14 February 2020 but the pandemic has delayed this activity. In the interim, sales have been made if people have chosen to pay without accessing the fund. The total cost to consumer is RWF 2,600 pcm ($2.74) with repayments for 3 years.

Payment: Developing its payment system to support delivery model was delayed. Currently payments are done cash-in-hand through trusted sales agents or directly at the camp shop. Belecom is currently developing a mobile money payment system to facilitate safer and faster transactions (especially in light of COVID-19). Recent surveys also noted that payment defaults do not systematically trigger switch off due to the manual rather than remote switch-off processes.

Default rates: Rates have been low at around 9% (as of March 2020)

Sales

Planned to start sales in May but delayed, partially due to product change, started in Sep 2019 (just as Bboxx was in its final month of sales activities):

RE4R target sales: 2,700

Actual sales without revolving fund: 1,140

Actual sales with revolving fund: TBD.

Distribution

Retail: Belecom has an established retail shop in each camp where people can come for product demos, sales, payments, customer support, and maintenance enquiries. There is an ambition to sell additional products and stacking accessories in the future.

Sales agents: 19 sales agents were employed

Customer support

Purchase and installation: Belecom's user training is completed at the point of installation and aims to ensure that all new SHS customers have basic knowledge on how to use the SHS and how to report a malfunction. Feedback from customers indicates that user training does not provide a full understanding of customer after-sales support, contract, or warranty rights. There are issues with stock availability once purchase agreements have been made, which has led to delayed installations and lost sales. There appear to be challenges with demand forecasting and last mile distribution of stock to enable Belecom to serve new customers in a timely manner.

After-care support and access: Customer feedback mechanisms are available through the local sales agents and locally based shops which are readily accessible for customers. Technical issues are addressed on site although the limited number of technicians can lead to delays as there is limited planning and prioritization between installation and maintenance/technical support.

Customer feedback resolution: Belecom has taken measures to address customer feedback and has been reasonably responsive so far in addressing complaints and using user feedback to improve its business (for example, switching to a product that includes a radio and upgrading the system from 12W to 20W to address performance issues of the SHS in the field). There are still issues that require resolution but there is active intention to adapt the business based on feedback in this market.

Employment

Trained and employed sales agents, security agents, and technicians from the local refugee community. A number of the employees have contracts. There is an appreciation from the company that as the market becomes saturated and sales decrease there will need to be a shift to more customer service roles for staff for which it is planning ahead.

Inclusivity

The revolving fund has been developed to provide a continuous loan mechanism to lower income customers such that sales reach and inclusive energy access can expand. Information access constraints, however, may still exist for certain lower income households (e.g. persons with disabilities, the elderly) about these products and loans based on recent surveys.

However, to date, the product has been affordable even without the revolving fund to certain refugee households. Further validation activities are required post-COVID-19 restrictions to evaluate which income-level households have become Belecom customers.

There is an appreciation that some lower income households who may not be able to use their SHS purchase to realize immediate income-earning opportunities may require access to more flexible payment models to match their fluctuating incomes and these are currently being investigated.

Comparative performance of business models

Bboxx
Iterambere ryanjye muri byose

Successes to date

- **Immediate go-to-market strategy deployed:** Bboxx could start operations immediately because it had operations set up across Rwanda and in the camps already
- **Sales target met:** The speed at which Bboxx delivered its sales target was unexpectedly rapid (in just 3 months), delivering high quality, Tier 1, energy access to over 1,500 refugee HH and fulfilling its contractual target with Practical Action.

- **Immediate go-to-market strategy deployed:** Bboxx could start operations immediately because it had operations set up across Rwanda and in the camps already
- **Sales target met:** The speed at which Bboxx delivered its sales target was unexpectedly rapid (in just 3 months), delivering high quality, Tier 1, energy access to over 1,500 refugee HH and fulfilling its contractual target with Practical Action.

- **Product satisfaction:** Across all three camps the Bboxx product is deemed superior and the one people would prefer to purchase if they could afford it given its capacity, reliability in poor weather, and ability to power additional appliances. Word-of-mouth reputation has built trust in the product around the camps.
- **Payment ease:** The PAYGO system offers relatively easy payment via mobile money which is preferred to the cash system used by Belecom. However, complaints have been raised regarding the length of time for switching units back on after defaulted payments have been paid.

Ongoing challenges

- **Continuity of sales without subsidy support:** Bboxx seems to have used the deployment as a time-bound promotional offer rather than a chance to test new business models. Further sales are unlikely given signals to date, unless further external financing is sourced. Seemingly there has been no effort to engage local microfinance institutions to provide credit support to back the proven price point.
- **Potential market viability of a localized Bboxx service:** It is unclear how many active customers Bboxx could register in each refugee area with the current product and price to be able to invest in operations that would supply service levels equivalent to those in other areas it serves. This is a key sustainability issue for the future of this model.
- **Equitable access to customer services for ESF paid:** Subsidized customers are paying the same amount for the ESF as other non-subsidized customers but may not be able to equitably access these services due to the contextual environment in the camps. Sales agents are expected to direct complaints or maintenance issues to hotlines (which are unavailable according to consumer feedback) or the nearest Bboxx retail shop. Sales agents are only paid commission for sales, not for providing customer service support, so there is no mechanism to provide in-camp assistance.

- **Lack of options for consumer recourse if complaints are not addressed:** Consumer protection is a concern given the lack of presence of Bboxx in camps. Customers can switch to another supplier should they be unhappy with the customer service they receive from Bboxx but they will need to forfeit their product (and payments made so far) and purchase from another provider. It is unknown how well customers understand their rights and ability to do this. Customers have also highlighted confusion with changes in contracts and payment terms after sales have been agreed.

  For Bboxx it seems we will continue to pay for an unknown period of time (gender and family promotion representative, Gihembe camp).

Successes to date

- **Sales without revolving fund:** The revolving fund has been set up to help reach the lowest income households; however, at the RWF 2,600 pcm ($2.74) price point, Belecom was able to start selling without the revolving fund, and has already achieved considerable progress towards its target.
- **Willingness to pivot business models based on user feedback:** Although this slows rollout it may be building the foundations for a more sustainable business model for the local context.
- **Customer service potential:** Belecom is investing in customer service, which it sees as a differentiator in the market and essential to meeting the needs of its customers. Customer satisfaction has been poor due to challenges with the performance of the first product but interventions have been put in place to address this by improving the product.
- **Continued investment in new service improvements:** Belecom is also currently investing in building customer management databases and switching over its payment processes to mobile money. Such investment signals a longer-term intention to remain in this market.
- **Contracted local staff:** Staff have been recruited within the camps, including technicians and sales agents, in an effort to gain local insights to improve marketing and customer services. Some staff are contracted, showing an intention to maintain operations.

Ongoing challenges

- **Building back trust and reputation:** Belecom struggled to gather momentum in terms of sales because of the need to iterate on its product choice and service approach.

  People choose Belecom for price not quality (interview with refugee representative, June 2020).

  Earlier setbacks from the product challenges and slower go-to-market sales and distribution approach have made it harder for Belecom to compete with the sales rate of Bboxx and take advantage of concurrent market activation activities supported by Practical Action. However, now that Bboxx has stopped subsidized sales in the camps, the only practical alternative for SHS access is Belecom. This may result in increased sales momentum for Belecom although this requires further validation.

- **Improving demand forecasting:** Lack of stock is leading to leakage of sales opportunities. Sales agents cannot plan sales as unavailability of stock in store means they cannot bring on new customers nor get paid themselves.

  There are no sales until there is stock (interview with Belecom representative, June 2020).

- **Proving efficacy of revolving fund:** The fund is yet to be proven in improving affordable access to SHS. If the revolving fund is not successful it is unclear whether Belecom's business will be viable without it as it may not be able to access a higher proportion of the market size in these areas.
- **Reducing risk of stock depreciation and defaults:** The continuation of the revolving fund will be dependent on high repayment rates and reducing default risks and damage/theft of issued stock (thereby lowering maintenance and replacement costs) to maintain the necessary capital to support further sales to lower income households requiring loan access.

ENERGY SYSTEM CONSTRAINTS ADDRESSED THROUGH PRIVATE SECTOR FACILITATION

This section explores the comparative successes and challenges of the business models employed by Bboxx and Belecom to determine whether they have addressed the energy system constraints identified earlier in Table 4.

At this stage in the RE4R project it is difficult to determine whether there has been any sustained change in addressing the constraints, but there is enough learning (and potential signals in behaviour) to make some assessment of progress to date and inform future adaptations to the intervention strategy for the remainder of the project.

The constraints and intervention activities presented in Table 4 are the same as those in Table 3 and as before activities delivered directly through private sector actors are shown in orange text, and those delivered by other interventions implemented by Practical Action are shown in black text.

Table 4 RE4R intervention progress

Market constraint	Intervention activities	Intervention progress
Market linkages	Facilitate camp access permissions and deliver inductions for private sector on engagement/processes in camps Deliver contextual awareness activities with private sector *e.g. guided tours; Q&As* **Conduct bidding process to incentivize private sector proposals to enter the market**	• **Awareness of and process to access market for new entrants without facilitated support is not yet certain.** Positively UNHCR and MINEMA have signalled their intention to have 'open-ended' access to established businesses.[1] Practical Action needs to consider how new entrants can be facilitated to the camps without external support, by incentivizing changes in the enabling environment. • **Crowding-in[2] is not happening yet but new entrants into the market will take time.** Crowding-in has not yet been observed (and may not happen in these remote areas) but communication of market viability, as a result of the activities undertaken, will be needed to make other actors aware of the market potential in order to diversify business models on offer to consumers and to allow the approaches to be adopted in other similar contexts. • **Feedback from the private sector actors acknowledged that engagement with humanitarian actors is time-consuming but necessary**. Practical Action needs to further engage with private sector actors on how to address coordination issues or better prepare for them: e.g. a dedicated coordination manager for businesses engaging in these markets.

Market constraint	Intervention activities	Intervention progress
		• **Bidding process may have sent the wrong signals to market players.** As reflected in the proposals received, the bidding process could have created the assumption that Practical Action was looking for a supplier rather than a partnership for long-term investment and commitment to the market. Reconsider how to engage market actors for facilitation partnerships.
Demand perception	Educate and outreach to market actors through dissemination of market data **Incentivize private sector to undertake tailored market research with financial support** **Incentivize private sector to engage host market and incorporate user feedback**	• **Market data disseminated in the RFP did not necessarily match needs.** There is a need to more clearly understand business strategy capacity and market information gaps (as well as incorrect assumptions) to inform data collection activities. • **Market viability of business models implemented is still not clear.** This is perhaps the most critical risk for the RE4R project. Until a common vision is established by market actors and Practical Action it will be hard to invest in future activities as well as address perceptions of the market (including its potential saturation risk) for future entrants. • **There is no data on the host market demand.** Neither of the market actors (nor Practical Action in its initial market assessment) determined the demand and market size of nearby host communities despite it being a pivotal requirement of the RFP. The refugee market could quickly be saturated given its size and thus there is a need to test the assumption that access to host markets will strengthen the business case for investment especially if the demand is nullified by grid access. • **Incorporation of user feedback partially displayed.** Both companies have made efforts to conduct consumer surveys and monitor feedback. It is more difficult to determine how much feedback will then be incorporated into the business going forwards.
Access to finance	Conduct consumer ability and willingness to pay testing across income profiles **Identify consumer finance support options from private sector** **Incentivize piloting of inclusive finance models** Identify potential formal creditors to support inclusive energy finance	• **An affordable price point and acceptable timeframes for loans commitments has been identified within the refugee community.** The assurance of regular cash transfers and foreseeable access to future livelihood opportunities may be encouraging this. There are now 2,674 refugees with at least 3-year payment programmes with a low default rate which may provide some evidence for discussion with financial service providers to provide credit for this segment. These purchasing and repayment behaviours will need to be reassessed given the impacts of COVID-19. • **Proving price points meet inclusivity goals will need further validation.** Estimations of consumer willingness to pay, and meeting these needs through different products and pricing mechanisms, are promising but their inclusivity reach requires further validation with consumer surveys. • **Potentially distorting subsidies.** Given the high quality of the Bboxx SHS unit, it is unsurprising that it sold so quickly as it was only RWF 300 ($0.32) more expensive than the lower capacity, lower quality product offered by Belecom. The amount of subsidy perhaps undermined Belecom's ability to generate sales and if employed as a facilitation tactic in the future should be reflected upon. • **Local financing options to expand credit options have yet to be explored.** Given the unsustainable nature of externally financed subsidies, understanding which financial service providers will be available to provide access to affordable credit or partner with energy service providers may be useful to maintain product diversity.
Marketing	**Incentivize private sector to demonstrate and market products** **Incentivize private sector to hire and train local sales agents**	• **Awareness of RE products and benefits may have been increased but requires further validation especially of marginalized households.** Recent surveys with Refugee Committees and sales agents suggest that certain households may not be accessing marketing, information, and financial assistance for energy access and it is questionable whether the cost to market to these customers is considered viable to private sector actors.

Market constraint	Intervention activities	Intervention progress
	Promote renewable energy through information campaigns and community mobilization Deliver business advisory services to identify improved livelihood opportunities from solar energy access	• **Refugee sales agents improve targeting and access to credit-worthy customers.** Refugee sales agents understand the needs of local consumers, their ability to pay, language, and customs in order to support sales and deal with customer issues. There appears more of a commitment to retain refugee staff by Belecom (due to the need to continue camp presence for sales and customer service) than Bboxx. • **First mover advantage builds overall brand recognition in nascent markets potentially making it harder for other players to enter.** Belecom noted that potential customers in the market referred to them as Bboxx and word-of-mouth marketing plays a big role in trust and sales; gaining recognition as a reputable provider will take time. • **Business advisory services (BDS) could increase market potential but who takes this role in the future is unclear.** Energy4Impact (E4I) is providing business mentoring, knowledge, and technical expertise to small enterprises in the camps to support productive uses of energy in their businesses. E4I is substituting the non-existent BDS in these environments. To create continuity, the next steps will be to identify who can do and pay for this locally such that BDS (and new customers) are not depleted once E4I's work ceases.
Quality and trust	Promote energy literacy and behaviour change activities: *trade fairs, roadshows, local radio* **Incentivize private sector to provide certified products and after-care support**	• **Access to consistent consumer service and understanding of consumer rights are areas that may require further support.** Mashirika was hired by Practical Action to co-design and deliver theatre-based awareness raising activities within the camp to raise awareness of the benefits of renewable energy products. This is the only independent household level information available on energy products and services for this market. There is a requirement for more research into consumers' understanding of their payment terms, warranty uses, and access to after-care services. Future access to independent energy information and regulatory support may be required to generate future sales and better customer service for ongoing customers. • **Incorrect use and damaged stock are cited as key business continuity risks.** Replacement of stock due to damage/theft or poor product perception due to incorrect use is very risky to business viability. Further investigations on how to minimize this risk should be prioritized.
Skills	**Incentivize private sector to deliver vocational/technical training for refugees/host community employees**	• **The direct livelihood impact of refugees employed by energy companies is relatively low compared to its indirect impact to increase energy access and livelihoods of refugee consumers.** Employment of refugees is a desired livelihood indicator for RE4R and is proposed in the RFP without articulating the business benefits of doing so to sales, which may incentivize greater uptake of refugee employees. • **Local technicians could address maintenance issues but there is still limited timely access to them.** Customers pay for access to technical support and maintenance services in the cost of their products so it makes no financial sense to search for independent maintenance services. Bboxx technicians are not readily available as they are Kigali-based and Belecom technicians are not plentiful with complaints made in terms of the turnaround time to deliver services. Further investigation into improving the efficiency of last mile technical assistance is required. • **Other last mile sales and distribution models are yet to be explored which may fill service or continuity gaps.** Further research may be valid into the potential of upgrading sales agents to stockists or retailers to develop last mile distribution models to address supply-side constraints, remote operational costs, and customer care issues.

[1] Evaluation interviews, 2020.

[2] Crowding-in: enterprises at levels other than the target level copying behaviours that those affected by programme activities have adopted or entering a sector or value chain as a result of improved incentives and environment created (at least partly) by the programme <https://beamexchange.org/market-systems/glossary/>.

REFLECTIONS AND RECOMMENDATIONS

Reflection of RE4R facilitation outcomes

The RE4R project aims to **increase the number of households and small enterprises who are able to purchase solar lighting and power solutions** and to achieve this it uses a market systems development approach. The project aligns with UNHCR's Global Energy Strategy and Comprehensive Refugee Response Framework, and has had some success in driving forth an approach that is inclusive of local market actors. Although there are continuing challenges to address to maintain progress towards the sustainability of its outcomes, as of March 2020 the project had achieved the following:

Households reached	Customer satisfaction
42% (2,674) of HHs in camps have SHS systems	94% overall satisfaction with SHS products
Affordability	**Reduction in non-RE spend**
Default rates are low, between 3.5% and 9% 42% of customers can afford SHS without reducing any other outgoings	88% reduction in spending on candles 100% reduction on non-chargeable batteries

This evaluation has looked to critically assess progress against the market systems development agenda in order to support Practical Action on this journey, but recognizes that a certain level of realism needs to be employed in what is possible in these unpredictable environments. Practical Action, Bboxx, and Belecom have taken a bold stance in addressing the clean energy access gap in these challenging markets by trying something new in an uncertain environment where direct aid has been the norm for many years.

Market actors are working in risky and uncertain environments characterized by slow growth, challenging infrastructure, and limited financial and technical inputs. Facilitation in these types of markets requires additional consideration where 'crowding-in' of multiple players and financial independence (seen as a success factor by systems programmes) may not happen organically. Previous work in nascent markets has documented key facilitation strategies (listed below) useful to these environments, many of which Practical Action has drawn upon in delivering the RE4R programme (Mercy Corps, n.d.):

- **facilitating business expansion of established market players** who can manage greater risk while taking care to manage any monopolistic behaviour;
- **emphasis on linkages** of business to nascent markets as well as between businesses in these remote areas that may be unaware of each other;

Convincing suppliers to come to the camp is not easy. This needs to be recognized

UNHCR representative, June 2020

- **expanded use of cost-shared subsidies** as one-off interventions with a specific time-bound purpose of expansion, promotion, and adoption of new technology or practice and that does not create long-term dependency on the subsidy;
- **pilot support intensified** for quick and iterative testing to develop new innovations;
- **appropriate expectations set with donors and host governments** as it may take more time to create viable solutions in nascent markets;
- **supporting businesses crowding-in to nascent markets** which can better help them establish a foothold in these risky markets;
- **proactive outreach for identifying market players** that expand beyond traditional tendering to find players willing to work in these environments; and
- **enabling environment support in sharing of market information and R&D** where limited information, due to perception of the nascent market, is hard to find and invest in.

As outlined in this paper, some of the facilitation strategies employed have worked well to incentivize potential sustained change in the energy market, while others may have inadvertently disincentivized commitment or require more time to realize significant and sustained change.

There is a fine line between providing too much support and not enough support in these environments. Each facilitation strategy needs to be applied to each individual partner's needs and behaviours which Practical Action has attempted to do in its approach to Bboxx and Belecom given the very different nature of both businesses and their requirements for support. The project has been able to adapt to the changes and delays experienced by each private sector actor in order to provide the flexibility required for a market systems development approach. The flexibility of the project itself has created an environment in which market actors can pilot, test, and iterate on new business ideas without having to achieve long-lasting impact within unrealistic timeframes.

RE4R is achieving the project's aim though there is not yet enough evidence to suggest whether these impacts will be sustained once RE4R interventions have finished. Systems change cannot realistically be realized in the short period of facilitation to date; however, there are signals suggesting where some interventions may be succeeding while others may require further effort to sustain. As discussed in the previous section, further interventions will be required to pilot innovations and encourage the continued presence and crowding-in of market actors, particularly those that can provide inclusive financing mechanisms. Further engagement with the private sector on market viability realities; last mile implications for customer care; and addressing the inclusivity gap to access marginalized consumers is required. Additional interventions to build consumer awareness on product usage to reduce damages and defaulting risks, as well as consumer protection and warranty expectations may also be required.

Learning for facilitators working across the humanitarian/development nexus

1. When identifying private sector actors to work with, assess their risk and willingness appetite for working in fragile market environments

The shop is far, sometimes the customers may get [a] product which has malfunction[ed] and because the shop is [in] town the customer has to take it back and it is costly – transportation and time consuming.

A refugee in Gihembe who is a Bboxx customer

The project has given us time to build relationships and trust

Belecom representative, June 2020

Practical Action conducted a very thorough supplier selection process in terms of identifying their potential business capacity and capability to enter this market. However, a significant component missing from this activity was an assessment of private sector applicants' appetite for risk and willingness to commit to working in challenging market environments (see Springfield Centre, 2015) including commitment to refugee employment and local capacity building. The result of this was varying commitments between the two suppliers to engagement, communication, learning, and building sustainability of their business operations.

This can cause frustration for both the private sector players and facilitators, where there is a misalignment of expectations of what each player's behaviour towards the partnership should be.

2. Investigate what level of market information is required to build the confidence of market actors and challenge assumptions of the refugee market

Practical Action supplied some market data during the RFP (and the option of financial support to conduct additional analysis which neither company opted for). Belecom, new to both the SHS and refugee markets, soon realized more in-depth market analysis was needed to inform its business strategy to meet local needs.

> **There was a waste of money in not doing [more detailed analysis] beforehand**
>
> **Belecom representative, June 2020**

There may be a lack of incentive for current private sector players to invest in market analysis if there is an engrained perception that such markets are: not viable; too much work for too little gain; or saturated with distributed aid products. Conducting market analysis and demonstrating a viable business case could be a useful facilitation for Practical Action, leading to greater commitment to strengthening the market from private sector actors. Any NGO considering doing this needs to: 1) ensure they have the right knowledge and skills to do it; and 2) provide such information freely to any private sector actor (see the *Paying for Darkness* report by Mercy Corps, 2019) as exclusivity will create competitive advantage as well as discourage the crowding-in of other market actors into this market.

3. Establish what market conditions are required to make business models viable in the long term

Proposals only showed sales projections, cost structures, and implementation work plans. Neither private sector actor shared any estimated figures to make entry into the market (as well as continued provision of sales and after-care services) viable within the target areas in the long term. A standard profit/loss financial model should be provided during partnership set-up and monitored throughout the project. Where Practical Action is investing in a partner organization to support business viability, sharing of such information is essential for understanding the potential return on investment. By not disclosing such information it raises warning flags as to: 1) the actual viability of the business model; 2) the willingness of the company to adapt the business model; 3) the commitment of the company to invest and take some financial risk; and 4) whether the company sees this relationship as an investor relationship or just a time-bound contract to deliver.

Company propriety information should not be disclosed publicly and should be treated as confidential between the private sector actor and the facilitator, as it would be if they were negotiating a loan with a bank. Any NGO facilitators need to know how to talk in business language and be trained to discuss and negotiate on these sensitive topics.

4. Beware of contracting as a means to guarantee delivery targets as you may not incentivize the behaviours and long-term change you are striving for

Engaging private sector suppliers to deliver a service under a contract (even with outlined service specifications such as the provision of retail outlets or number of refugee employees) is a structured way to ensure that the target group receive a specific service. It also provides a framework to penalize partners for targets not made and quality of service not delivered. It is also a way of more easily tracking against project MEL targets. However, contracting can oblige, not incentivize, a certain behaviour by a contractor within a defined set of parameters and time period: for example, engaging refugee sales agents on a commission basis to ensure sales targets are met within a specific time period. If expectations are not set well before, during, and after partner selection processes, some private sector actors may understand a contract as procurement of goods or services *not* a partnership to facilitate long-term change in a refugee environment or a de-risking investment to gain a foothold in this fragile market space. Although it was not the intention of Practical Action to deliver contracting in this manner, the differing relationships between the two suppliers suggests that these expectations may not be well understood by all parties.

The RFP may have also limited the ability of Practical Action to partner with different actors in the SHS market, and limited the process to engage only those companies with the information access and size to receive and respond to an RFP and formal contracting arrangement. This may have prevented engagement with smaller and/or informal players in the market and unintentionally overlooked the potential part they could play in strengthening the system.

It is essential to ensure that the contracting process allows for the realization of a common vision between parties, and gives confidence that private sector partners are sufficiently committed, beyond any period of financial support. Agreements/contracts need to set out ways of working together and be based on clear expectations established before, during, and after the RFP process.

5. Stimulate the system to incentivize behaviours that will achieve the vision for inclusivity of access

When practising a market systems approach, it is not the responsibility of the facilitator to mandate that the company serves particular market segments of refugee consumers with certain services, even though there may be an expectation or a need to do so to achieve the project's energy access objectives. Change can be facilitated by incentivizing the private sector actors to address the issues that are knowingly restricting access for refugees, including marginalized groups. Practical Action cannot 'police' this but could also stimulate changes in the local system to incentivize it. For example, it could reinforce consumer protection rights and access to independent information by incentivizing policy changes with local governments and/or upskilling Refugee Committees.

> **I would have mandated a shop in the contract**
>
> **Practical Action representative, June 2020**

If quality of the product and service is critical to market success and the viability of business models, a private sector actor is likely to address quality issues, particularly if quality impacts demand in areas in which they want to grow their business. If the financial support provided under the project is structured so the business model can still function in spite of the poor quality of product and service, then there will be no incentive to change.

6. Affordability of quality goods and services may always be an issue in protracted displacement environments, so strive for realistic goals

Although a protracted displacement situation may have a certain degree of stability, the utopian vision of provision of affordable goods and services through local market actors to refugee populations without external aid may be unrealistic. In many circumstances, refugees simply do not have equitable and safe access to stable livelihood opportunities or local

I want to have more companies operating in the camps – these will be future communities

UNHCR representative, June 2020

markets. Expecting a private sector actor to be able to enter this type of market and assume that they will be able to provide the required quality of product at a price point that is affordable to refugees without any subsidy may not be realistic, now or in the future. In effect, in Rwanda, UNHCR is already continually subsidizing access to energy services through cash assistance to refugee populations.

There is, therefore, a need to plan for market viability *and* if that is unlikely to come to fruition, work to provide the business case to determine whether subsidizing continued provision of these types of goods and services in certain contexts is more effective and sustainable over in-kind provision. Unlike national governments providing subsidies to host populations, host governments will not be expected to provide long-term financial subsidies to refugee populations. In crisis contexts, aid may still be required to secure financial viability of market-based solutions but with the strategic intention to reduce subsidies over time where appropriate.

7. Plan for external changes and allow time to deliver – these environments are not prescriptive and businesses need time to adapt and evolve

A key concern raised by UNHCR was the lack of adaptability of 'development-type' programmes to dynamic crisis contexts. The lack of stability of certain crisis environments makes it hard to provide a level of certainty for investments and hence why there are, rightfully, questions regarding the appropriateness and viability of market-based solutions in meeting the needs of crisis-affected populations. There is a need for piloting to build agile business and service models that can pivot when change is required and/or be adequately supported by external aid actors to maintain their services when there are extreme changes in conditions.

Both Bboxx and Belecom have had to adapt their business approaches in light of COVID-19 already. Facilitating scenario-based contingency/continuity planning with private sector partners, UNHCR, and local government on likely changes in the crisis environment and implications for local systems (e.g. supply disruptions, livelihood disruptions, asset damage) is a way of safeguarding investments for the private sector and building a more agile and localized emergency response and recovery approach. Temporary indirect support during the crisis may be necessary and can be planned for and uncertainties mitigated with better preparedness planning and local assurances of support.

8. Adopt smart strategies for subsidies to ensure financial support delivers market system development objectives

The structure of the financial support and subsidies provided under RE4R effectively led to some of the funding simply paying for a service. Smarter subsidy strategies could involve use of starter subsidies whereby smaller amounts are used to test private sector commitment in a low-cost, low-risk way; providing larger amounts of funding in a staggered fashion when evidence of financial commitment from the company is evident; ensuring all larger amounts of financial support are only provided as a minority share of costs to ensure meaningful investment; and linking subsidies to incentives that demonstrate change in behaviours: for example, future payments conditional on the business obtaining and using consumer feedback.

Creating a supportive stakeholder environment

There is a need to better understand that all stakeholders are working towards creating a working environment in which the provision of goods and services is not contingent on aid indefinitely but in creating a self-sustaining system that meets local needs.

For all stakeholders, there is a requirement to understand that market systems development is not synonymous with contracting the private sector to supply goods or services. Market systems development is trying to achieve something else with its engagement with the private sector in crisis contexts. Until this is understood we may continue to observe a supplier–purchaser relationship between the humanitarian and private sector which will affect the overall sustainability of interventions.

Table 5 Stakeholder support for market systems development

Donors	**Multi-year flexible finance is needed to support long-term system change.** Programmes can disincentivize long-term permanent change by being delivered too quickly for private sector actors to take risks and adapt to new markets to ensure long-term investment. **Business skills shortages in the humanitarian sector may be supplemented by knowledge from corporate donors.** Corporate donors can consider supporting humanitarian actors by sharing their skills in business strategy, user design, and impact investment, among others, to look at better ways to unlock systemic constraints for local market players. **Proactively promote adaptive management to pivot programmes as required without the fear of repercussions.** Work with facilitators and market actors to co-create an approach to adaptive management that is promoted from the top-down. **Expect that change will take time and affordability for all may never be fully addressed in crisis contexts.** Work with facilitators to set realistic expectations, milestones, and target of what might be achieved in fragile and nascent contexts.
Humanitarian and development actors	**Be clear about the vision of the system change the project wants to deliver, your facilitation role in that, and then develop tailored facilitation strategies to deliver this for each actor you work with.** Acknowledge that this facilitation relationship will be new to private sector actors (and often to humanitarian actors) and develop skills to facilitate rather than deliver directly. **Build internal capacity to talk in the same language as private sector actors to facilitate discussions.** Act as the 'bridge' between the humanitarian and private sector. **Set expectations of contracting as partners rather than buyers of a service.** Be clear on the rationale for contracting (particularly for financial support) and the relationship you are trying to maintain. **Work with private sector actors to understand the requirements for business viability.** If a business case cannot be presented and explained, consider whether this market actor is the most appropriate to engage with or whether support is required in creating one. **Facilitate scenario-based contingency planning to adapt to potential changes in protracted crisis contexts.** Build confidence around these uncertainties by preparing for them and understanding how to mitigate risk.
Private sector actors	**Reflect on your willingness to invest in these fragile markets and risk appetite for working within them.** Although the aid sector may be able to support with access and de-risking finance, the intention is for the private sector to establish a business model that can work within this market for the long term. **Reflect on business readiness and capability to potentially shift from supplying services to the humanitarian sector directly to refugee consumers.** This approach will be moving away from temporary distributions or subsidies to attempt to create a business model (potentially partially subsidized) that can sustain itself and potentially grow to meet the needs of refugee and remote host communities. **Appreciate that aid agencies do not speak business and vice versa.** There is a learning curve for working in partnership as both the private sector and aid sector evolve to bridge the gap in working together. **Understand that aid agencies are subject to accountability procedures that require a substantial amount of monitoring.** Many private sector actors complain about the burden of monitoring and engagement required with aid partners. This is something to be worked on but could be reduced by co-creating monitoring mechanisms that reduce duplication of activities.

NOTES

[1] Data from the RE4R project used in this report is correct as of March 2020.

[2] It is assumed that the reader has a basic knowledge of market systems development approaches in order to gain the benefit of this paper. For a good introduction to this topic for the humanitarian energy context see Whitehouse (2019).

[3] https://practicalaction.org/knowledge-centre/resources/total-energy-access-time-for-tea/

[4] Energy access is measured in the Multi-Tier Framework from Tier 0 (no access) to Tier 5 (the highest access level).

[5] The maximum price a customer is willing to pay for a product or service.

[6] Note that ability and willingness to pay data for nearby host communities was not researched by Practical Action as part of the RE4R assessments. It was expected that local market actors would already have this market intelligence or conduct their own market research to inform their business models.

[7] A nationwide and compulsory day of community work taking place in Rwanda on the last Saturday of each month.

A shop in Gihembe using the light provided by an SHS

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SHS being installed in a refugee household

APPENDIX

Evaluation approach

The evaluation for this paper consisted of desk research of project documentation (market assessments; project status reports; and supplier procurement processes) and 34 primary interviews with key stakeholders. Unfortunately, because of the coronavirus pandemic, consumer surveys designed to validate assumptions regarding consumer purchasing behaviour, satisfaction, inclusivity challenges, and supplier performance could not be conducted. Movement restrictions in camps meant that proxy interviews were conducted instead across the three camps with Refugee Committee representatives and sales agents from the two companies to gather field-level perspectives. Due to logistical challenges, interviews with Bboxx business managers were not possible but remote validation of key data points was provided upon request to support this evaluation.

Table A1 Index of key informant interviews conducted during the evaluation

Respondent	Organization
RE4R Global Project Manager	Practical Action
RE4R Global Technical Humanitarian Energy Analyst	Practical Action
RE4R Global MEL Adviser	Practical Action
RE4R Rwanda Technical Specialist	Practical Action
Global Energy & Environment Advisor	UNHCR
Rwanda Head of Energy & Environment	UNHCR
CEO	Belecom
Head of Sales & Marketing	Belecom
Sales Agents (× 6, 2 per camp)	Belecom
Sales Agents (× 6, 2 per camp)	Bboxx
Representatives (× 12, 4 per camp)	Refugee Committees
RE4R Project Team	E4I

PHOTO CAPTIONS AND CREDITS

Cover. A light-connected solar home system illuminates the front of a house in Kigeme, Rwanda. (Credit: Practical Action / Edoardo Santangelo)

Setting the scene: Rwandan energy market. A couple in Kigeme with an SHS installed on their roof. (Credit: Practical Action / Edoardo Santangelo)

Attracting market players to nascent markets. A view of Kigeme with an SHS installed on the roof of a refugee household. (Credit: Practical Action / Edoardo Santangelo)

A Belecom sales agent giving an SHS product demonstration. (Credit: Practical Action / UNHCR)

Notes. A shop in Gihembe using the light provided by an SHS. (Credit: Practical Action / Edoardo Santangelo)

References. SHS being installed in a refugee household. (Credit: Practical Action / David Nkurunziza)

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