

How to Sell Refrigerators for Productive Use



A STEP-BY-STEP GUIDE FOR
LAST MILE DISTRIBUTORS

Photo no. 1



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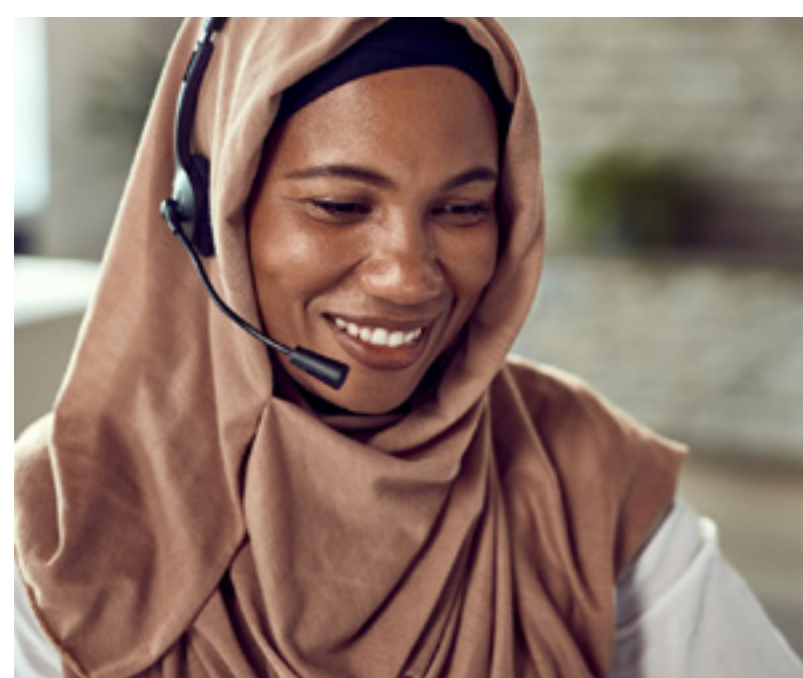
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Introduction

Discover the opportunities and challenges of selling refrigeration at the last mile.

→ READ



Step by step guide

Our seven step guide to operational best practice for last mile companies.

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Case studies

Three last mile distributors share their experience of selling refrigeration for productive use.

→ READ

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Global Distributors Collective

The Global Distributors Collective is a collective of over 200 last mile distribution companies operating in more than 50 countries. The GDC is dedicated to helping distributors improve business performance and grow, and to building a collective voice for the sector. The GDC is hosted by Practical Action and co-implemented with Bopinc.

→ globaldistributorscollective.org

Efficiency for Access

Efficiency for Access (EforA) is a catalyst for change, accelerating the growth of off- and weak-grid appliance markets to boost incomes, reduce carbon emissions, improve quality of life, and support sustainable development. It is co-chaired by UK aid and the IKEA Foundation. Efficiency for Access consists of 21 Donor Roundtable Members, 19 Programme Partners, and 34 Investor Network members. It is managed by CLASP and Energy Saving Trust.

→ efficiencyforaccess.org

COVER

INTRODUCTION

GUIDE

CASE STUDIES

*Click to
navigate*

INTRODUCTION

- 1 → WHY THIS PUBLICATION?
- 2 → WHO IS THIS PUBLICATION FOR?
- 3 → BACKGROUND RESEARCH
- 4 → IMPACT OPPORTUNITY
- 5 → CHALLENGES & OPPORTUNITIES

1

WHY THIS PUBLICATION?

Refrigeration is an emerging product category

Selling refrigerators for productive use is an emerging product category that can provide benefits to last mile communities.

Like other productive use of energy (PUE) appliances, off-grid refrigerators have the potential to play a critical role in improving the incomes and wellbeing of low income communities that are served by last mile distributors (LMDs).

Solar-powered refrigerators can reduce drudgery by minimising trips to the market, improve nutrition and healthcare by preserving food and medicine, and create new business opportunities for women micro-retailers such as food and beverage sellers.



»» ***This publication explains the challenges and best practices for selling refrigerators for productive use.***

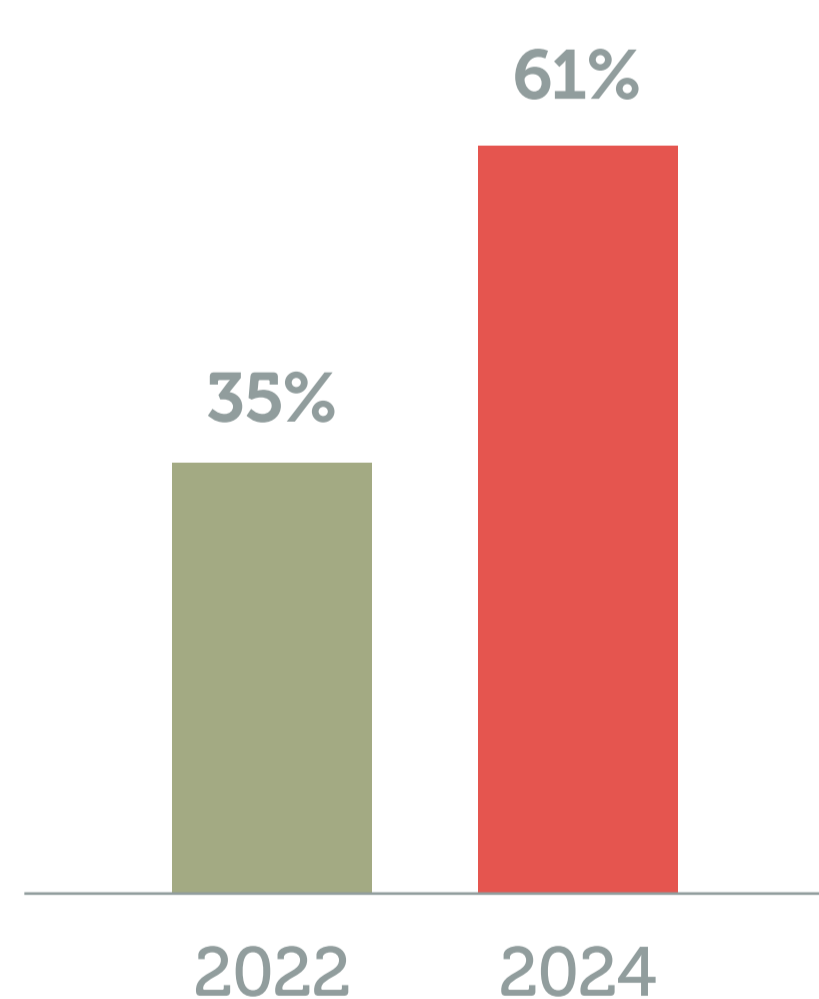
A recent member survey by the Global Distributors Collective (GDC) showed an increase in LMDs selling PUE appliances. The number of distributors selling PUE appliances, such as solar water pumps and refrigerators, increased by 26 percentage points from 35% of members in 2022 to 61% in 2024.

The estimated cumulative global sales of off-grid solar refrigerators between 2019 and 2023 was 68,000 units. This represents just 0.2% of the serviceable market, which is estimated to be 4.8 million units ([Efficiency for Access Coalition, 2024](#)).

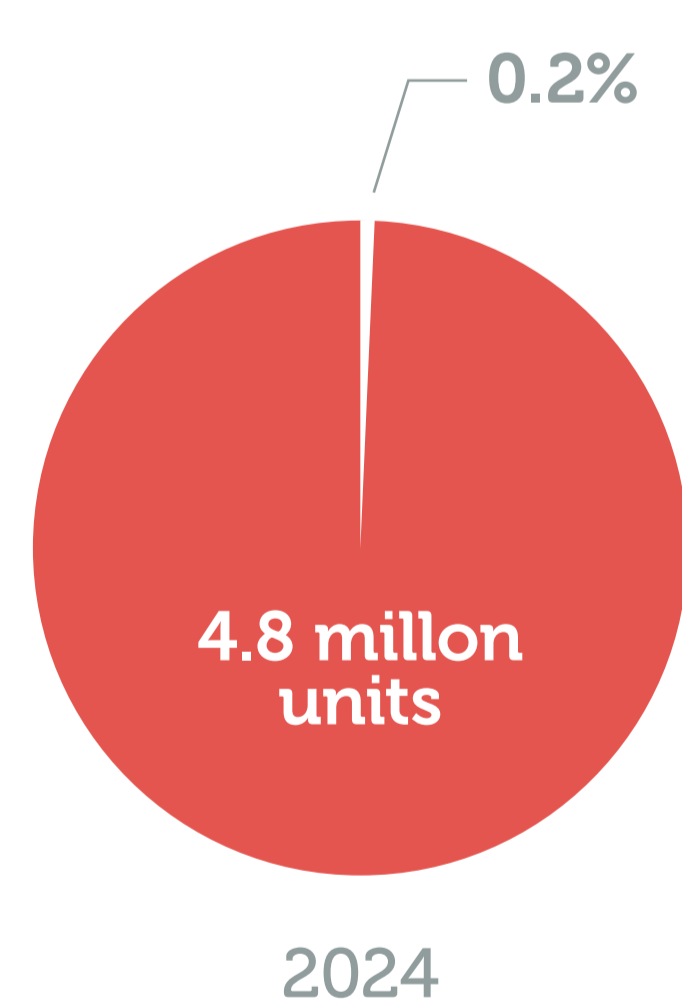
In comparison, sales of solar water pumps over the same period represented 1.5% of the total serviceable market.

As much as this presents an opportunity for LMDs to fulfil the demand of millions of customers, they should bear in mind that off-grid solar refrigeration technology is still relatively new to the market.

Selling expensive PUE appliances - such as solar powered refrigerators that cost up to USD \$1,000 - is not easy. Despite price reductions as a result of technological advances, affordability remains one of the largest barriers for low-income customers to access off-grid refrigeration.



The number of GDC members selling PUE appliances increased by 26 percentage points between 2022 and 2024.



Sales of off-grid solar refrigerators are 0.2% of the serviceable market.

Shared learning and recommendations

This publication aims to share learning and recommendations with LMDs who sell or are interested in selling refrigerators.

The GDC collaborated with Efficiency for Access to compile best practices for LMDs to follow when adding refrigeration solutions to their product category. Specifically, this publication considers small to mid-sized fridges and freezers with capacities between 100-200 litres, that are sold to households, micro-entrepreneurs, health facilities or other institutional customers.

LMDs play a crucial role in ensuring that innovative, off-grid technologies like these reach underserved communities, particularly in regions where access to reliable electricity is limited.

This publication serves as a field testing guide that provides LMDs with a structured approach to understanding the challenges and best practices associated with sales of refrigeration for productive use.

More broadly, it helps LMDs navigate the complexities of customer engagement, logistics, financing and after-sales support more effectively. Plus, identify necessary business model adaptations.

The publication features case studies from LMDs operating in East and West Africa. In particular it considers the importance of empowering women micro-entrepreneurs as customers, recognising their potential as key beneficiaries and drivers of demand for these products.

2

WHO IS THIS PUBLICATION FOR?

Key audiences

The primary audience for this resource is LMDs interested in expanding their product portfolio to include refrigeration.

Sector support actors and refrigeration manufacturers and suppliers will also find the information presented here useful.

**› Last mile distributors**

This guide will support LMDs at different stages of selling refrigeration: from those researching the opportunity, to piloting sales at a small scale, to preparing for a scale up of their sales operations.

While the case studies presented are from three specific countries, LMDs operating elsewhere can take inspiration from them and adapt their own sales strategies to align with local needs and conditions.

**› Sector support actors**

This publication is relevant to audiences such as donors, NGOs and other stakeholders involved in providing funding and technical assistance to scale up commercial off-grid refrigeration markets.

These stakeholders can use the resource to better understand the challenges faced by LMDs and to align their support strategies accordingly.

**› Refrigeration manufacturers and suppliers**

The publication highlights potential areas where manufacturers can better engage with LMDs.

There are, for example, opportunities for manufacturers to leverage the unique field insights and consumer feedback from LMDs to inform important product improvements.



3

BACKGROUND RESEARCH

Resources and literature

In an effort to identify the key challenges and best practices associated with the distribution of refrigeration products, the GDC and Efficiency for Access conducted a comprehensive background study.

This study was designed to gather insights that inform the development of effective strategies for LMDs operating in low-income communities.

We reviewed earlier publications from the GDC, Energy for Access and other sources. These provided insights into the challenges, best practices, and operational strategies for distributing productive use of renewable energy (PURE) appliances in general, with a few focused on refrigeration specifically.

Below are three publications that might be of interest for additional reading.

**How to expand your product basket in a strategic way**

Global Distributors Collective (2022)

[→ READ](#)**Evaluating appliance performance in the field: Results from refrigerator testing**

Efficiency for Access (2023)

[→ READ](#)**Leave no one behind: Bridging the energy access gap with innovative off-grid solar solutions**

Efficiency for Access (2024)

[→ READ](#)**How did we interact with GDC members?**

In parallel to the writing of this publication, the GDC and CLASP offered three LMDs a small grant and technical advice to improve their business performance in relation to solar powered refrigeration.

As part of our regular interactions with them over six months, the LMDs shared their operational challenges and presented recommendations for other LMDs.

The LMDs we engaged with were:

- Sosai, Nigeria
- Munyaxeco, Rwanda
- Popo, Uganda



NIGERIA



RWANDA



UGANDA

4^o

IMPACT OPPORTUNITY

Enable customers to generate income from refrigeration

In regions where access to reliable electricity is limited, solar-powered refrigeration can significantly improve the living standards of low income communities by reducing food spoilage, enhancing health outcomes, and supporting small businesses.

If the serviceable market were completely served by 2030, [Efficiency for Access](#) estimates 19 million people would experience improved livelihoods from owning a refrigerator.

Off-grid refrigeration customers

The diagrams below show data from a recent study about off-grid refrigeration customers by impact measurement company, [60 Decibels](#).



46%

Of off-grid refrigeration customers live in poverty.



88%

Use their off-grid refrigerator for income-generating activities at their places of business.



81%

Said their quality of life improved because their fridge contributed to cost-savings, increased independence and food preservation.

Through their cooling-as-a-service model, refrigeration supplier Koolboks has helped Nigerian women fish traders increase their income by an average of 43% ([Efficiency for Access, 2021](#)).

To access indicative amounts of income growth, refer to [The Productive Use of Energy Pilot Study in Rwanda](#) conducted by Efficiency for Access. This study shows that owners of refrigerators reported weekly income yields of approximately USD \$60 from the sales of perishable goods and cold beverages.

**Customer testimonial**

Grace is a young Ugandan woman who has been running a family retail shop with her brother Ezekiel for four years. Together they purchased two solar powered refrigerators from last mile distributor, POPO Africa.

The experience has been good for them, because they are now able to cool their drinks and refreshments, which has led to an increase in customers at the store.

Before buying the fridges they would cool drinks using water buckets, which was a slow and inconvenient process.

They used to sell an average of 10 cartons of soft drinks each week, but now Grace and her brother sell up to 30 cartons. Currently they are exploring whether they can buy a larger fridge from POPO Africa.

5

CHALLENGES & OPPORTUNITIES**Diversify product portfolios with competitive and attractive technologies**

Most LMDs serve customers who have had no prior access to off-grid refrigerators and limited access to good alternatives. Adding refrigerators to the company's portfolio offers a challenging but attractive business case, plus the potential for valuable community impact.

Considering the complexity of the technology, competition from the informal market is less likely compared to, for example, solar fans which can be found in abundance in small electronics shops.

Opportunities for LMDs selling refrigeration solutions**Growth in market demand**

There is growing demand for reliable refrigeration in off-grid and weak-grid areas, particularly in low-income communities.

Competitive advantage

As a first mover selling refrigerators, distributors can gain a competitive edge in emerging markets where these products are not yet widely available. Companies can position themselves as leaders in innovation.

Potential subsidies

There is potential access to subsidies, grants, and partnerships with governments and NGOs that are keen to support the distribution of sustainable energy solutions, which can offset costs and reduce financial risks.

Diversification

Adding refrigeration to a basket diversifies a company's product offering, allowing them to attract a broader customer base.

Community impact

If the serviceable market were completely served by millions of people would experience improved livelihoods from owning a refrigerator.

**Ensure refrigerators generate new income for customers**

Today many more LMDs are selling PUE appliances - including solar irrigation pumps, small agri-processing machinery like mills, and to a lesser extent refrigerators.

And although refrigerators do present compelling potential for community impact, they can also be a risky investment for low-income customers. This is because customers may fail to generate sufficiently new income from the technology to ensure reimbursement when purchased on credit.

In a similar way to how solar water pumps can directly contribute to increased yields and income for farmers, LMDs will need to educate and support small business owners on how to maximise the return on their investments by, for example, ensuring they sell sufficient cold beverages.

This requires a commitment by LMDs that should not be ignored. For further insights on this, refer to the recommendations [Hystra](#) collected for solar irrigation, which holds similarities with solar refrigeration.

Refrigerators can be a risky investment for low-income customers if they fail to generate sufficient new income.

Build on previous track records of selling off-grid lighting

Recent research by the GDC has shown that LMDs selling PUE appliances such as refrigerators are generally larger in terms of customers and revenue than single-product LMDs.

For LMDs that want to venture into sales of refrigerators, it will help if they have already built a solid track record with more mature product categories such as solar lanterns or solar home systems.

To be able to sell refrigerators successfully LMDs will need to consider the core business practices that are outlined in this publication.

COVER

INTRODUCTION

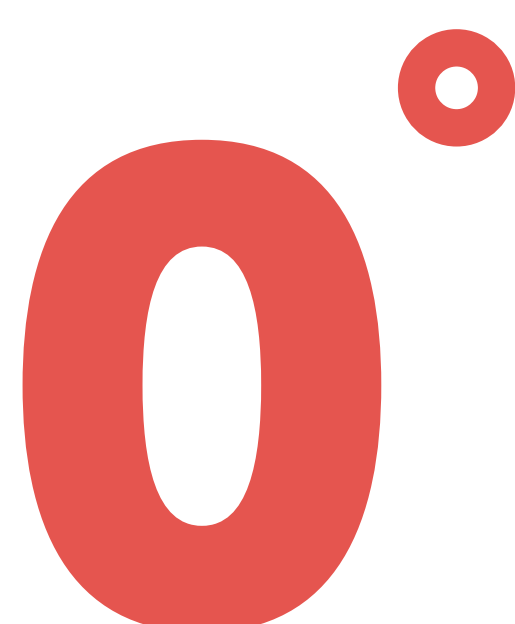
GUIDE

CASE STUDIES

*Click to
navigate*

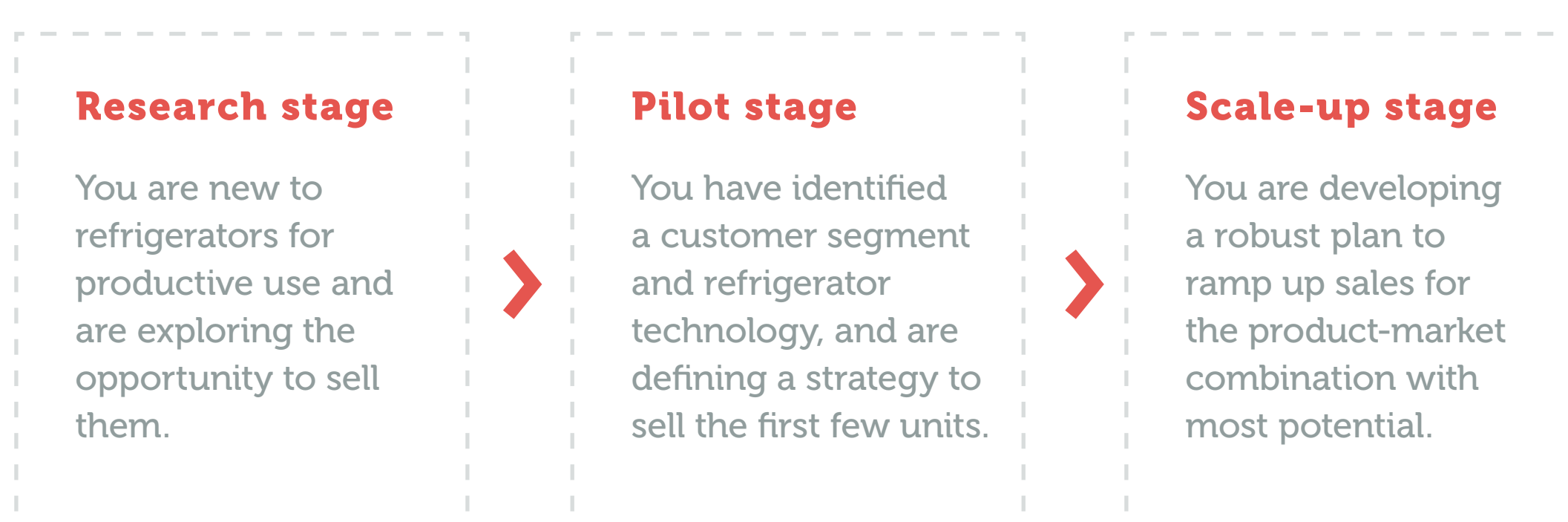
GUIDE

- 0 → BEFORE YOU START
- 1 → CONSUMER DEMAND & VALUE PROPOSITION
- 2 → SALES & MARKETING
- 3 → PRODUCT & SUPPLIER SELECTION
- 4 → CONSUMER FINANCE
- 5 → STOCK FINANCING
- 6 → LOGISTICS
- 7 → AFTER-SALES SUPPORT



BEFORE YOU START

Determine which stage your last mile distribution company is in



Adopt the right mindset

We recommend LMDs adopt a learning mindset and “design, test and iterate” on their ideas.

Practically speaking, LMDs should run small experiments and gather field data and insights in order to validate assumptions, determine the right strategies, and inform decisions on whether to proceed to the next stage.

To start, LMDs should research the demand for refrigeration in their market and validate willingness and ability to pay for different market segments.

After that, LMDs can look for a supplier. Once LMDs have established a product-market fit, they can look into operational aspects such as stock financing and after-sales support.

Adopting “lean start-up approach” - particularly during the research and pilot stages - will allow a LMD to maximise their company’s time and resources, and not waste time deciding the opportunity and business model adaptation requirements.

➤➤ **At the research stage you should assess the opportunity to add refrigeration for productive use as a new product category.**

Step by step overview

The table below shows the questions you will have to answer depending on the stage your company is at. We have kept the scale-up stage out of scope for this publication, given that the majority of LMDs are not there yet.

	Research stage	Pilot stage
1. CONSUMER DEMAND & VALUE PROPOSITION	<ul style="list-style-type: none"> Q What customer segment presents the best and safest opportunity? Q How many customers can you realistically serve? 	<ul style="list-style-type: none"> Q Have you tested the product with a sample of customers and collected their feedback?
2. SALES & MARKETING	<ul style="list-style-type: none"> Q What training will your sales team require? Q Have you tested different marketing channels and messages? 	<ul style="list-style-type: none"> Q Do conversion rates justify marketing expenses? Q What incentives do sales agents need?
3. PRODUCT & SUPPLIER SELECTION	<ul style="list-style-type: none"> Q Have you compared multiple manufacturers or suppliers based on price & quality? Q Have you tested their products in the field? 	<ul style="list-style-type: none"> Q Have you established a mutually beneficial relationship with the supplier and agreed terms?
4. CONSUMER FINANCE	<ul style="list-style-type: none"> Q How do customers wish to pay? Q Would PAYGo or cooling-as-a-service be the best solution? Q Can customers make enough money from the asset or service to pay you? 	<ul style="list-style-type: none"> Q Have you monitored repayment rates and adjusted financing terms, if needed?
5. STOCK FINANCING	<ul style="list-style-type: none"> Q Have you calculated the working capital requirements to ensure viable cash flow? Q Have you explored options like (repayable) grants? 	<ul style="list-style-type: none"> Q Have you been able to attract external finance? Q Can you buy stock on credit with the supplier?
6. LOGISTICS	<ul style="list-style-type: none"> Q Have you identified potential logistical challenges for storage and last mile delivery given the size of the product? 	<ul style="list-style-type: none"> Q Have you improved the cost-efficiency of transport and reduced the number of damaged goods?
7. AFTER-SALES SUPPORT	<ul style="list-style-type: none"> Q How will you handle customer care? Q What new capabilities, tools and spares would you require? Q Is there any no-cost support your supplier can make available? 	<ul style="list-style-type: none"> Q Have you identified common faults and can you address these? Q How can you educate consumers on good maintenance and hygiene? Q Have you developed and tested the repair and replacement protocols?

1

CUSTOMER DEMAND & VALUE PROPOSITION

Use a mix of market research tools

As a first step, conducting rigorous market research is essential to validate whether there is demand for refrigeration in the regions LMDs operate in.

This involves studying social and gender dynamics, economic conditions, and cultural contexts, in order to tailor the product offering effectively.

Market research should identify the unique challenges and preferences of the community, and ensure that products meet their actual, rather than assumed, needs.

This can be achieved through various methods such as face-to-face interviews, focus groups and public product demonstrations.

While these qualitative methods provide unique insights and let you empathise with your potential customers, quantitative methods such as SMS surveys and phone interviews allow LMDs to validate demand among a larger group.

Questions to ask**Q1**

Which customer segments present the most potential for using refrigeration as a productivity booster?

Q2

How large is this segment and how many customers can you realistically serve in the first year?

Q3

What are the key characteristics of these customers, considering their buying patterns and decision-making processes?

Identify customers with most potential

Sales to small business owners remain the most viable segment for sales of refrigeration for productive use.

Almost half of business owners interviewed in a [60 Decibels and Efficiency for Access](#) study said they purchased a refrigerator because they wanted to generate more income and/or improve their business performance.

LMDs new to refrigeration as a product category are advised to meet with existing users of fridges in the markets they operate.

Finding out what motivated customers to purchase their refrigerator will provide unique insights into how to best target and market to potential users.

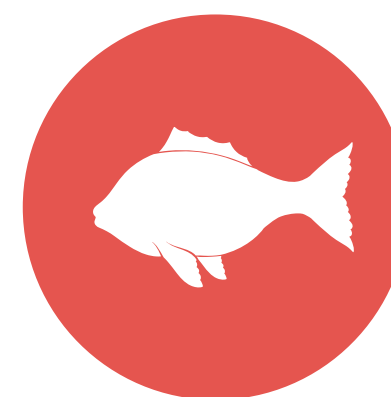
A helpful tool to capture a customer's characteristics is the [Persona](#) tool, which can be an insightful exercise for a LMD sales team.

**Potential customers for refrigeration for productive use**

› Individual farmers or farmer cooperatives



› Restaurants and bars



› Fish farmers and traders



› Micro-retailers selling perishable food and cold drinks



› Livestock farmers



› Health centres and agro-vets

**Turn consumer insights into tangible and credible benefits of solar refrigeration**

Depending on the chosen customer segments, LMDs can highlight the specific benefits of refrigerators that alleviate critical customer pain points.

Fish traders, for example, can spend less time travelling back and forth between a centralised cooling hub and their retail point of sale if the cooling solution is directly located at the marketplace.

The same benefit might be applicable to micro-retailers selling perishable goods. They can reduce their restocking frequencies, store larger quantities at their shop, and demonstrate to customers that the product is kept fresh.

The time saving benefit might not immediately seem compelling, but sometimes women entrepreneurs have to travel long distances by bicycle each day. This is not only a waste of time, it can also be dangerous.

Solar lanterns that replace kerosene lamps or candles result in a direct cost saving. But solar powered, direct current (DC) refrigerators are rarely a direct substitute for another product. That's because only a tiny fraction of conventional alternating current (AC) refrigerators have been sold across Sub Saharan Africa.

**Build feedback loops**

When piloting refrigeration sales, LMDs should first test the product with a sample of customers and collect their feedback.

The saying "seeing is believing" reflects the idea that visual evidence has a powerful impact on perception, understanding and trust. Only once people have experienced the product will they be able to clearly articulate its benefits and the potential impact on their livelihoods.

By engaging with customers regularly during the pilot process LMDs can sharpen their value proposition to their selected customer profile(s).

Piloting sales can also help LMDs understand how selling a small number of fridges can drive demand within the same area.

As an example, POPO's sales agents reported that if one retailer started selling chilled beverages, there was a ripple effect as community members started looking for cold beverages in other stores as well.

2

SALES & MARKETING

Choose the right channels

After researching and fine tuning the product-market fit, in which the product's benefits are in sync with the customers' needs, the next step is to craft the sales pitch and deliver it through the right channels.

It is important to develop a comprehensive sales and marketing strategy that is tailored to this new product category.

LMDs often sell through more than one channel, but the most common is through sales agents that promote the products within the community they live.

An [Efficiency for Access and 60 Decibels](#) study found that 40% of customers heard about refrigerators through word of mouth. Pursuing sales tactics like promoting brand ambassadors and client referrals in communities can help reach more customers.

LMDs can choose radio advertising to target local audiences or social media and SMS campaigns to engage a broader, tech-savvy population. Field group meetings can also be highly effective as they offer direct interaction and product demos that let LMDs foster community trust and engagement with the new technology.



Master product demos

LMDs and their agents can either bring the product to the customers or the customers to the product.

When last mile distributor SolarWorks started selling fridges they invited prospective customers to see the fridges at their stores. This meant their sales teams had to travel to fishing communities once a week and give potential customers a ride to the company shop. After they had sold a couple of fridges, these visits were no longer necessary because the refrigerators were on display at the nearest fish trader.

ENRAPOWER, another distributor, takes a different approach. After giving out product flyers they gauge interest among people in the community: when two to three people express interest in a product, the company sends a sales agent to give a product demonstration.

»» ***A good sales pitch speaks to the pain points or aspirations of the audience.***

Craft the sales pitch

Once you have identified the marketing channels that let you reach your target customers, such as radio, social media, SMS, or in-person meetings, you can choose the content of the marketing materials.

A good sales pitch speaks to the pain points or aspirations of the audience. Sales agents should be engaged in this design process as they know their customers best and will deliver the pitch.

Through roleplay sales agents can master their sales pitch and gain confidence in selling this new product category.

Sales pitches should only be semi-structured, allowing agents to deviate from the script when necessary. For example, when they are speaking to an audience that requires more technical information than one would provide usually.

LMDs can use tools like the [Bopinc](#) ATEAR marketing and sales funnel to define strategies for each stage, starting with attention raising and trust building among its customers.



What can manufacturers do?

Manufacturers are invited to share proven sales and marketing practices with LMDs, based on what they have seen work well with other distributors. They can also provide companies with training materials on after-sales support, given that refrigerators require more maintenance than most other products sold at the last mile.

Evaluate sales agent performance

Once LMDs engage more sales agents with the sale of refrigerators, they can start monitoring the performance of the agents, including their conversion rates, average deal size, and customer satisfaction levels.

These will help distributors to identify areas where agents may need additional training or support. It also lets the lower performing agents learn from the higher performing ones.

LMDs may choose to onboard the best performing sales agents for a pilot with solar powered refrigeration sales. POPO Uganda found that such growth opportunities enabled them to attract reliable sales agents as well as ensure avenues for growth for the best performing sales agents.

Opportunities for both income and responsibility growth have proven to be integral to retaining the best performing agents.

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PRODUCT & SUPPLIER SELECTION

Prioritise reliable products and suppliers

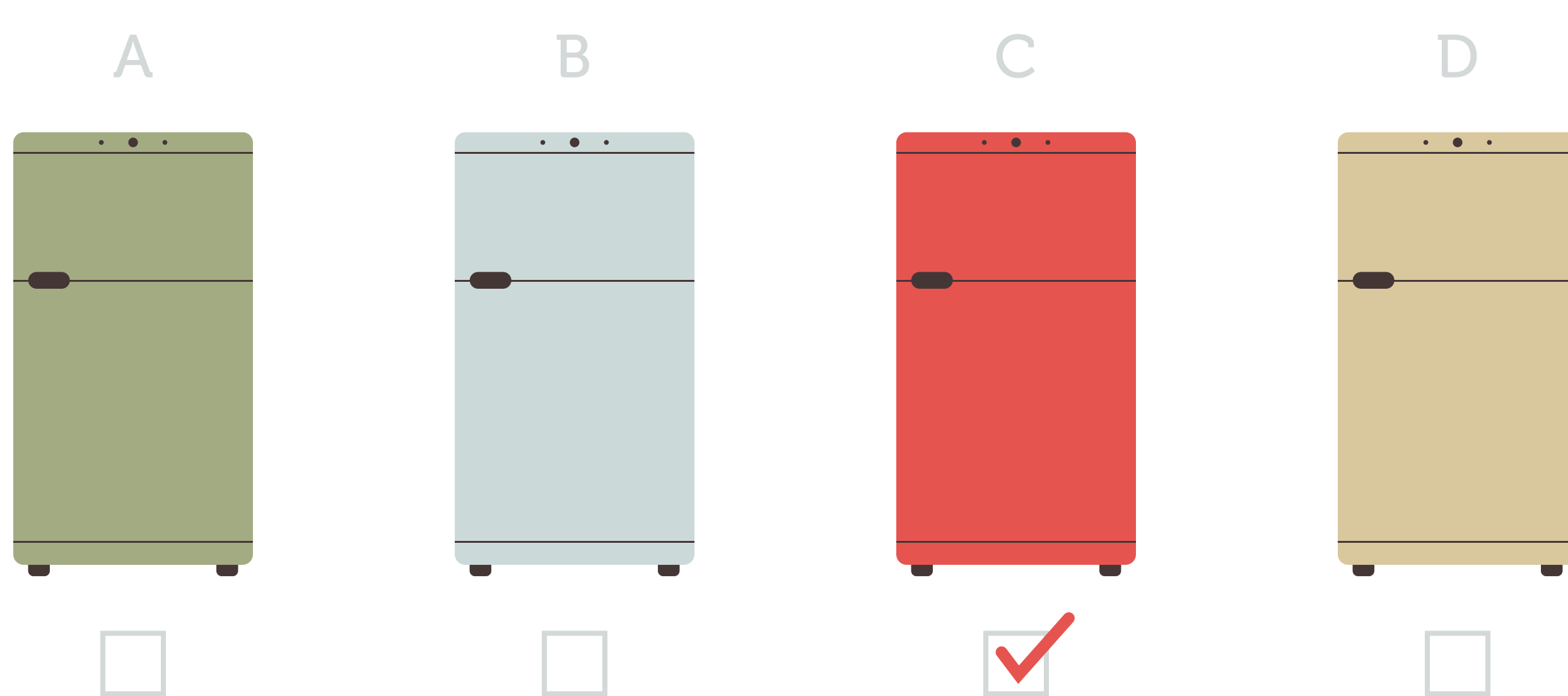
After validating the demand for refrigeration, the next important step is to find a manufacturer with a relevant offering.

Priority should be given to reliable refrigerators that minimise the risk of frequent breakdowns and maintenance issues, as these become prohibitive after-sales expenses for LMDs.

Besides asking other LMDs for peer reviews, the [Verasol](#) product database provides a great starting point to compare different brands and models. It lists more than 100 units that have been quality verified by independent testing institutions.

As an additional metric to the Verasol database, [Efficiency for Access](#) suggests considering how easy the product is to repair. LMDs should, for example, consider whether the supplier can make spare parts available, even at small quantities.

A key advance in refrigeration technology for LMDs to keep an eye on is the use of thermal energy storage. This will reduce the need for electrical batteries, lowering the cost of solar systems to operate a refrigerator, while making the system more durable and resilient.



Challenges faced by smaller LMDs

Building strong ongoing relationships with manufacturers is essential to ensure smooth collaboration when piloting refrigeration sales.

Establishing these relationships involves working with manufacturers who are open to feedback and responsive to suggestions for product design and performance improvements.

POPO in Uganda learned that such manufacturers are valuable partners because they can adapt their products to better meet the specific needs and challenges of the target communities.

Some manufacturers might even be willing to customise their product design if an LMD buys larger quantities.

Smaller LMDs (in terms of revenue) often face more barriers when it comes to accessing products. Specific challenges include unfavourable payment terms and having to pay more to order smaller quantities. LMDs invest significant time in vetting suppliers and building strong partnerships ([GDC and Solar Sisters, 2022](#)).

Procuring from a supplier in the same country can be an advantage to building the relationship. However, LMDs such as Sosai in Nigeria, have chosen to only work with manufacturers that do not have a distribution presence in Nigeria. This is to avoid their suppliers becoming future competitors.



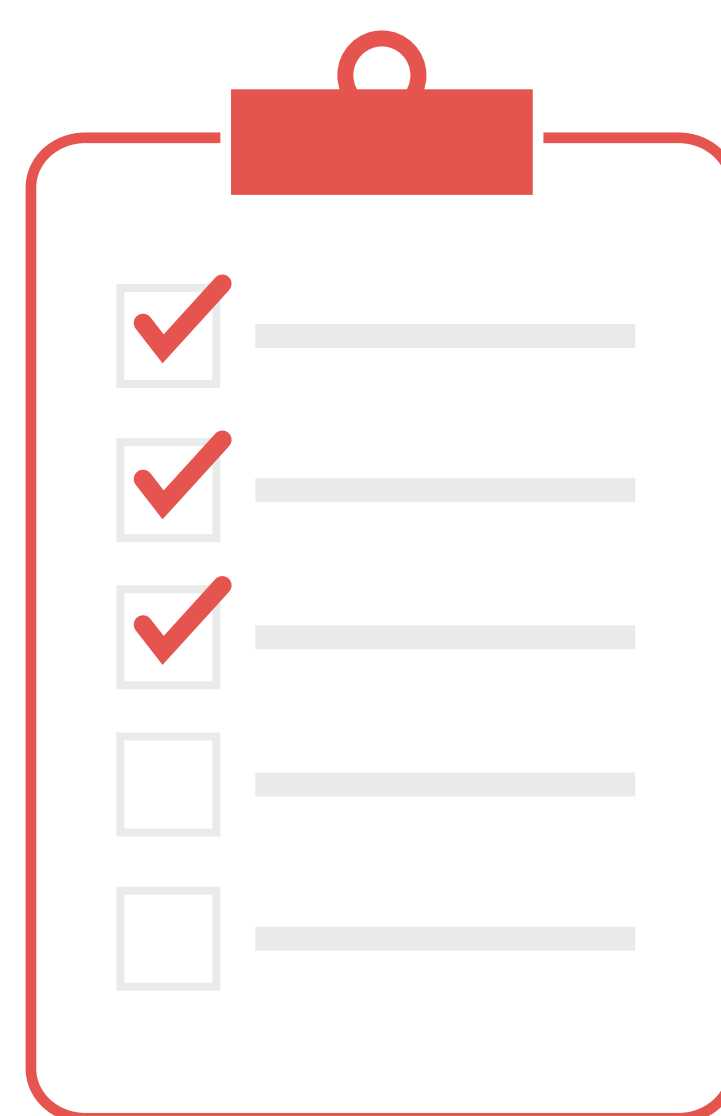
Make a first order to test and compare

Once LMDs have conducted rigorous desk research on potential manufacturers, they can compile a shortlist that can be reviewed through further consultation.

One could, for example, ask other LMDs about their experience of working with the supplier. Furthermore, sales managers could take a picture of the product to their sales agents and customers and ask for feedback on the design specifications, such as product dimensions and, for solar power fridges, the guaranteed cooling time during cloudy days.

Manufacturers often sell fridges at different sizes. Choosing the right size is important to ensure it has sufficient capacity for retailers to store the amount of beverages they expect to sell.

When LMDs have assessed the product's compatibility with their customers needs, it is time to order a few units to assess the quality and performance of the refrigeration units and identify potential issues before committing to a large purchase.



» Ask sales agents and customers for feedback on the product specifications.

Agree on supplier terms and conditions

To build a mutually beneficial relationships, LMDs and manufacturers should make clear terms of agreement.

✓ TERMS

➤ **Agree on terms of communication**

Clear communication, reliability and responsiveness are critical during the piloting stage because LMDs may need to make quick adjustments based on feedback and performance data.

✓ TERMS

➤ **Agree on warranty terms**

Both LMDs and the manufacturer should be aligned on the responsibilities for product repairs and replacements. This minimises disputes and ensures that any product defects are addressed quickly and costs are reduced.

✓ TERMS

➤ **Establish clear terms for logistics and order management**

This should include minimum and maximum order quantities, delivery schedules, shipping responsibilities, insurances, and how to handle delays or damaged goods costs.

4

CONSUMER FINANCE

Tackle the affordability challenge

PURE appliances such as refrigerators have the potential to increase the productivity and earnings of people significantly.

Affordability of refrigeration solutions, however, is a major barrier and providing consumer finance is far from straightforward due to the complexity of credit risk management and high working capital requirements for LMDs.

A household or small business with an average monthly income of USD \$100, for example, does not have the ability to save up for a refrigerator costing up to USD \$1,000.

And even if LMDs provide PAYGo or other financing solutions, credit sales for expensive technologies like refrigerators can have a huge impact on the financial wellbeing of customers.

A recent [Efficiency for Access and 60 Decibels](#) study in East Africa found that 50% of respondents said they had to make unacceptable sacrifices or even cut back on their daily necessities to pay for their fridges.

In conclusion, LMDs should thoroughly research their customers' financial capability. If LMDs cannot provide their own credit, they can consider collaborating with microfinance institutions or savings and credit co-operatives, and target small business owners that could benefit from refrigeration solutions.



» **Small business owners should be told about opportunities to generate income from their fridges.**

Explore different consumer finance models» **PAYGo**

LMDs that already have experience with PAYGo sales of solar home systems might be inclined to use PAYGo-enabled refrigerators.

However, even more so for refrigerators, LMDs should evaluate whether they can afford the credit risks, given the longer time that consumers generally require to pay off their product.

Some LMDs require cash sales next to PAYGo sales and focus on institutional clients such as hospitals and schools.

LMDs are recommended to pilot PAYGo sales and monitor repayment rates. If lower than expected, it may be necessary to adjust financing terms, such as extending the payment period or modifying the payment frequency, to better align with customers' financial situations.

Retailers that purchase a fridge on PAYGo, for example, would appreciate a (monthly) plan that mirrors the business's cash flow cycles.

When PAYGo fridges are deactivated due to late payments, customers might experience this as an even bigger pain point than with solar lights. This is because it will destroy perishable goods stored in the fridge, which leads to a loss of income. Also, it will take customers quite some time for the fridges to get back to the cooling temperature once activated again. LMDs are therefore recommended to consider alternative incentives and grace periods.

31

» **Cooling-as-a-service (CaaS)**

This is a relatively nascent business model that is especially relevant for end-users that do not use their productive appliances regularly or at full capacity.

Sosai in Nigeria has piloted a service agreement for solar dryers that are used only seasonally. With CaaS, customers pay for cooling or freezing services instead of purchasing and owning the refrigerator themselves.

Since 2020, Koolboks has offered CaaS to its customers in Nigeria, including small businesses and health centres.

With fees as low as USD \$10 per month, paid through PAYGo software, customers can access reliable cooling services without worrying about upfront payments, technology risks, or issues such as installation, operation and maintenance.

Koolboks work with local distributors that operate the fridges. Depending on the size of the system, CaaS providers can typically recover investment costs after approximately three years of usage. This can be shortened by increasing the utilisation rate of their equipment and reducing costs by using energy-efficient equipment and providing preventive maintenance.

However, working capital needs associated with inventory are still higher under the CaaS model as compared to the lease-to-own model because reimbursement from customers takes longer.

**Maximise repayment rates**

If the productive use promise of refrigeration is not fulfilled, this could lead to high default rates. It can also have detrimental effects on the faith that communities put in this new product category.

When selling solar irrigation pumps farmers should be oriented on how this technology unlocks opportunities for them to grow new crops and access new markets that are more lucrative. Similarly, small business owners buying refrigerators should be told about new income opportunities they can generate from their fridges.

POPO in Uganda is exploring whether they can help women retailers access beverage supplies that can be chilled in fridges.

They also found that these women need their support to explain to their spouses that they are not bringing debt to the family. POPO sometimes needs to help customers to understand and even calculate the return on their investment.

Unless subsidised by women entrepreneurship programmes that target the same customers for example, any form of extended customer support requires new investment from a distributor and this should be recouped through reduced credit risks.

5

STOCK FINANCING

The challenges of accessing finance for LMDs

Access to finance has consistently been reported as one of the largest challenges among LMDs of all sizes.

Specific challenges include limited availability of local debt financing, collateral requirements and unfavorable interest rates.

Considering that many PURE technologies are still considered too risky by financial institutions, securing the necessary capital to purchase an inventory of refrigerators is often difficult for LMDs.

In addition, LMDs that import PURE appliances also face challenges that arise from volatile foreign exchange rates as stock often loses value between import and sale ([GOGLA, 2023](#)).



When piloting refrigeration sales, LMDs may be able to purchase small numbers of fridges using their own cash or through small grants.

Munyax Eco has received small grants from Efficiency for Access and NGOs in Rwanda. Procuring small numbers can however be a challenge if manufacturers require minimum order quantities.

When distributors transition to scale, they should assess their working capital requirements. Based on their sales pilot data on conversion rates and repayment

periods, LMDs can calculate whether the forecasted additional revenues from the sales of refrigeration is sufficient to maintain an inventory.

At this point, LMDs might also qualify for results-based financing (RBF) programmes. Several GDC members selling PUE appliances have successfully raised RBF but they are typically larger with average revenues exceeding \$350,000.

**What can manufacturers do?**

When LMDs are new to suppliers they will often be required to pay upfront. One of the reasons distributors find procurement of PUE appliances more challenging than other off-grid products such as solar lanterns, is because these manufacturers are generally new players and still working out the logistics side of their own business.

Manufacturers and suppliers are requested to ensure they produce or supply sufficient products to meet the growing demand of LMDs.

Solar Sister, for example, reported that one of their suppliers constantly had issues with keeping solar irrigation pumps in stock. This meant their customers would have to wait for a couple of weeks before they received their product.

6

LOGISTICS

Ensure timely delivery at acceptable costs

Transporting and storing large and heavy appliances such as refrigerators is not easy, especially if they have to travel over long distances and in areas with poor infrastructure such as unpaved roads.

LMDs will need to map out the entire supply chain to identify potential bottlenecks, estimate delivery times, and ensure that the product can reach the target market efficiently and reliably.

As a reference, for Munyax Eco in Rwanda it takes at least 1-2 months for a new order of refrigerators to arrive.

Identifying the logistical challenges early on allows a distributor to plan for adequate transportation, handling and storage solutions.



Photo no.15

**> Importing**

Smooth logistics requires selecting shipping agents who are experienced in handling the complexities of customs, fees, tariffs and documentation.

LMDs should look for shipping agents that are capable of navigating the complex regulatory requirements, safety standards and documentation needed for international shipping, especially for products that require specialised handling like batteries and refrigerants.

In some markets, there may be tax advantages to importing components and assembling them in-country, which should be considered if assembly is something that the distributor is capable of.

When starting with refrigerator sales, working with in-country resellers may be preferable due to the convenience of working in both parties' first language and having in-person meetings to build trust.

> In-country transportation

In Nigeria, goods enter the country at the port of Lagos, which is far away from areas where LMDs such as Sosai operate. Plus land travel can be a challenge and costly for bulky items such as refrigerators.

For the last leg of the journey it is important to manage the number of goods damaged during delivery. Fewer damaged goods mean fewer replacements or repairs, leading to lower costs and a positive reputation amongst customers.

**> Warehousing**

To optimise delivery turnaround times once a customer order is confirmed, LMDs should explore stocking the product closer to sales hotspots.

Using this approach, POPO Uganda is able to deliver refrigerators within 24-48 hours after an order is made.

**> Installation**

Most LMDs have trained agents that install the equipment sold. POPO offers free installation for all their solar powered refrigerators, which they will continue with as they scale up.



7

AFTER-SALES SUPPORT**Ensure customer satisfaction**

After-sales services are offered by almost all LMDs and for nearly all durable products.

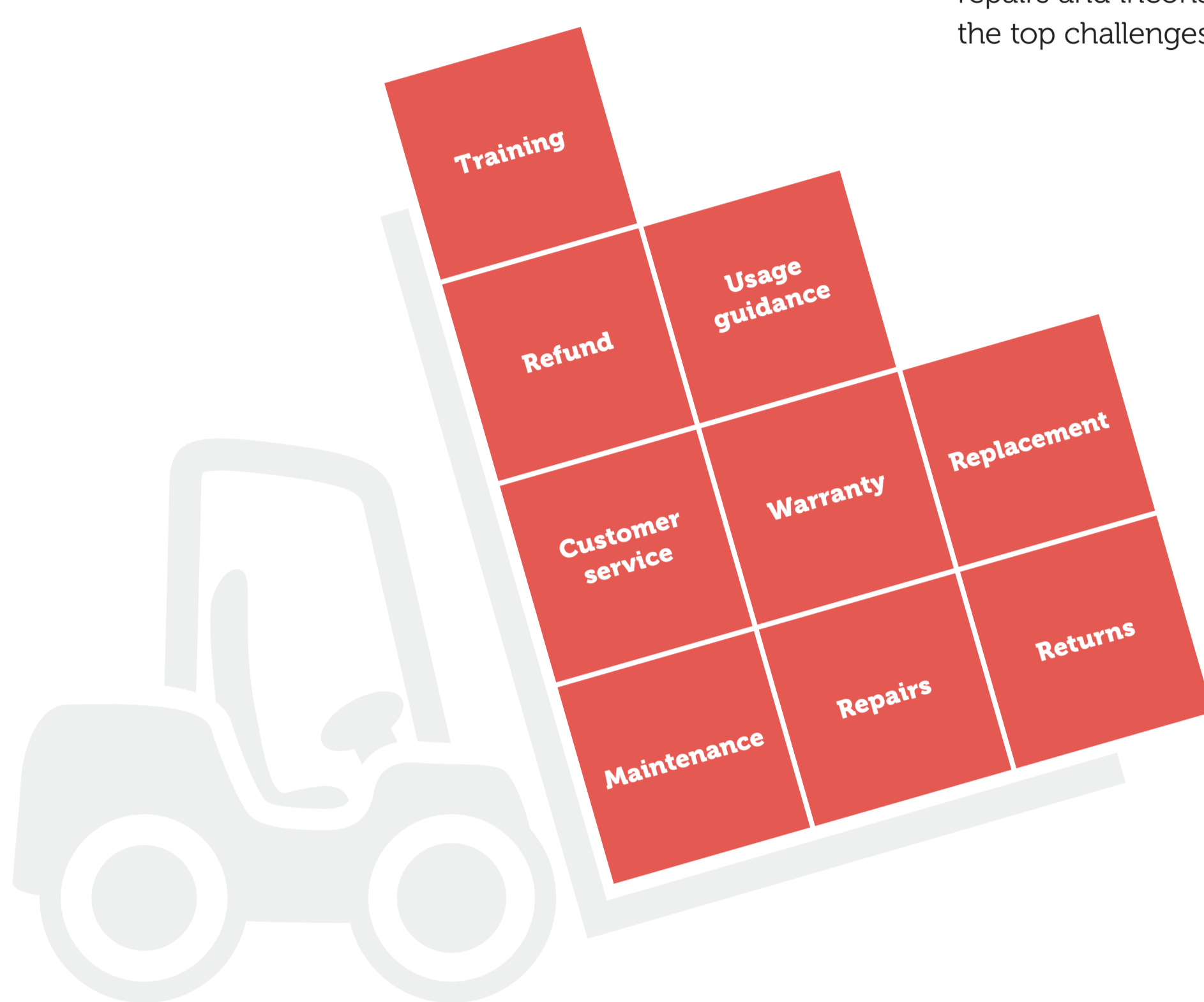
These services play a crucial role in ensuring that customers remain satisfied and confident with their purchase. Warranties, proactive maintenance, customer service, training and usage guidance, as well as returns and refunds, are all considered part of after-sales service.

After-sales support is often more complex and intensive for PUE appliances such as fridges because they require more technical knowledge than solar home systems for example.

Good after sales service requires trained agents that are skilled in the technical aspects of the product you sell.

These specialised agents can provide in-depth knowledge and expertise, ensuring that both the sales team and customers fully understand the features, installation processes, and maintenance and hygiene requirements for refrigerators.

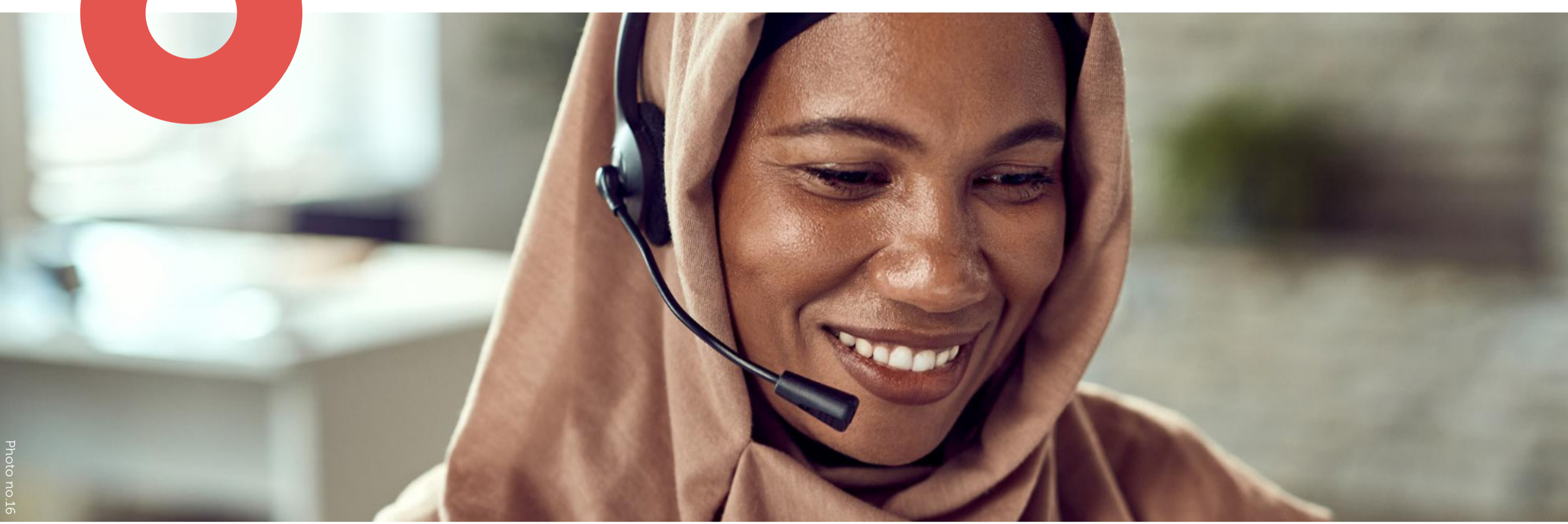
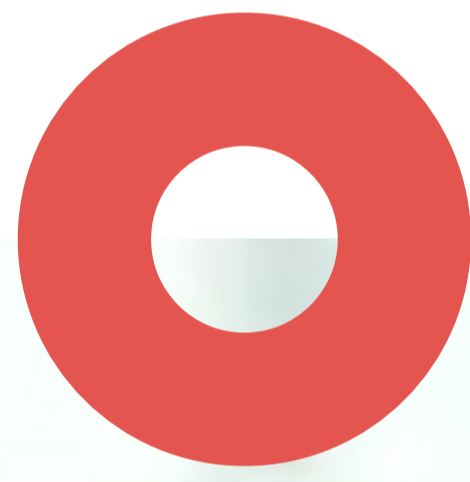
According to a [60 Decibels](#) study in 2024 many customers reported challenges with their refrigerators. As a result, satisfaction was troublingly low. A Net Promoter Score of -1 reflects critical feedback on customer service, pricing and reliability. Frequent repairs and inconsistent cooling are among the top challenges faced by users.



LMDs should develop a robust after-sales service plan that reflects the most common issues. If these cannot be identified from historical sales data, then distributors could consult others or run a pilot first and list the most common faults.

By identifying after-sales issues early, LMDs can plan for adequate resources and staff training to handle them, reducing the likelihood of product returns and customer complaints.

Distributors should also consider legal and warranty requirements in their countries of operation. Ensuring that the after-sales support meets these requirements helps avoid legal issues and builds trust with customers.

**Repair faulty fridges**

POPO has plans to establish five storage facilities for spare parts throughout Uganda. This will ensure timely access to the parts that fail most frequently. While basic repairs can be done at the customers' premises, products with more complicated failures need to be collected and serviced at a dedicated workshop.

Customers may have to be provided with a (temporary) replacement if repair cannot be completed promptly.

»» **Customers have a role to play in product longevity through appropriate usage and basic routine maintenance.**

Customer education on hygiene and maintenance

Customers also have a role to play in product longevity through appropriate usage and basic routine maintenance.

Sales agents can educate customers on this, which can be supported with printed instructions or mobile videos when targeting customers with low literacy levels. With support from the GDC and Efficiency for Access, POPO in Uganda has developed customer education videos optimised for mobile viewing.

Instructions for appropriate use could include topics such as not overstocking the fridge. The desire to pack commercial

refrigerators as full as possible is an understandable one. Customers should keep fridges about two-thirds full and space items evenly to ensure that air circulates and keeps everything evenly chilled.

POPO lets their sales agents or supervisors make monthly visits to new customers within the first three months after a fridge is installed. During this period the customer learns how to use the product and often has many questions and requests for support with troubleshooting.

**What can manufacturers do?**

LMDs look for manufacturers that can support their after-sales services. For example, manufacturers could provide a buffer, for every stock consignment that will serve as replacements for faulty products they cannot help with promptly. For example, Last mile distributor [Natfort](#) suggest a minimum of 2% for every stock consignment of solar water pumps.

Providing a buffer stock lets distributors quickly address any product issues or defects without waiting for a new shipment. This immediacy is crucial in maintaining customer satisfaction and trust, as customers receive prompt solutions to their problems.

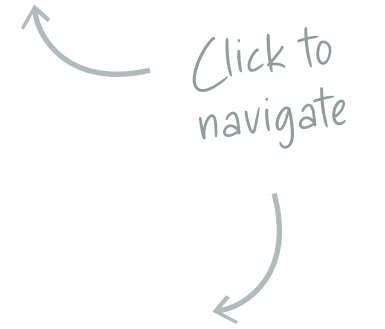
COVER

INTRODUCTION

GUIDE

CASE STUDIES

*Click to
navigate*



CASE STUDIES

- 1 → SOSAI RENEWABLE ENERGIES, NIGERIA
- 2 → MUNYAX ECO, RWANDA
- 3 → POPO, UGANDA

1

CASE STUDY

OVERVIEW

COMPANY
Sosai Renewable Energies

COUNTRY
Nigeria



PRIMARY PRODUCTS
Solar home systems
Mini grid systems
Clean cookstoves

WEBSITE
sosairen.org

**About**

Sosai Renewable Energies was established in 2010 with the idea of using market based strategies to address the issues of poverty and rural community development.

For this purpose, the company offers clean energy solutions such as solar home systems and clean cookstoves, and has built in-house expertise to design and deploy solar mini grid systems.

**Product-market fit**

Sosai has researched different product-market combinations (e.g. Koolboks, Surechill, EjaIce) and is now proceeding with Koolboks deep freezers for women groups that use them to chill drinks and fish.



12
UNITS
SOLD
2024



15
TARGET
UNITS
2025

**Why are they selling refrigeration?**

The company began selling solar fridges in 2023 and targeted women in rural communities who expressed a desire to own a refrigerator and sell chilled items from them.

Sosai has piloted distribution of ICECOOL and EjaIce solar powered fridges in Kaduna in Northern Nigeria since then. The company utilises sales agents to generate leads and sales.

How did they establish product-market fit?

The company has targeted women retailers as its main customers because women own [33% of micro businesses](#) in Nigeria. Since their rollout of solar refrigeration in 2023 the company has sold 12 units as part of its field testing activities.



“Through extensive testing of various solar fridges and freezers, we’ve learned that reliability and efficiency are paramount. We now focus on offering only the top two that meet our high performance standards.”

Safiya Aliyu, General Manager

**What have they done to improve their operations?****Train sales agents**

Sosai staff received training from the GDC on how to improve sales of solar fridges and freezers. They then went on to train all of their sales staff.

Offer flexible payments

Sosai has gives women entrepreneurs the opportunity to pay in instalments for fridges and freezers, making them more affordable.

Build partnerships

Sosai identified a farmers group that it is now working with to increase market penetration in rural communities and improve sales.

**Impact**

Sosai sells fridges to hard-to-reach communities that live off-grid across northern Nigeria.

This has improved the economic well-being of small entrepreneurs, retailers, and local farmers who use these technologies to store processed farm produce and sell soft drinks.



2^o

CASE STUDY

OVERVIEW

COMPANY

Munyax Eco

COUNTRY

Rwanda



PRIMARY PRODUCTS

Solar water heaters
Solar panels
LED lights

WEBSITE

munyaxeco.com



About

Created in 2013, Munyax Eco is a Rwandan company that combines business goals with supporting a clean environment. The company aims to sell and install environmentally friendly and high quality solar powered equipment.



RWANDA



Product-market fit

The company sells Koolboks fridges and deep freezers to women micro entrepreneurs, farmers and fisheries.



7
UNITS
SOLD
2024



100
TARGET
UNITS
2025



Why are they selling refrigeration?

Considering the impact potential for their customers, Munyax Eco rolled out its solar fridge and freezer distribution in partnership with Koolbox. They distribute a 190 litre model that Koolbox directly supplies to them.

The company targets small retailers in the urban and semi-urban regions of Rwanda, with a key focus on Kigali.

How did they establish product-market fit?

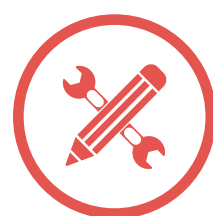
Based on customer feedback, the company intends to focus on small retailers of meat and vegetables as the main customer segment.

They plan to strengthen their financing mechanisms to ensure retailers are able to access credit from microfinance institutions that they can use to purchase fridges and freezers.



“When rolling out solar-powered freezers and refrigerators, you need to prioritise affordability and accessibility for the target market. It’s essential to ensure that the technology is not only reliable but also cost-effective, especially in regions where energy access may be limited.”

Francine Munyaneza, Founder & CEO



What have they done to improve their operations?

Partner with MFIs

The company is pursuing partnerships with microfinance institutions that will allow its customers to access credit financing and pay for fridges in installments.

Increase technical capacity

Through its partnership with Koolbox, the company has trained its technical officers and field agents to ensure a strong understanding of the product and its appropriate use.

Build customer awareness

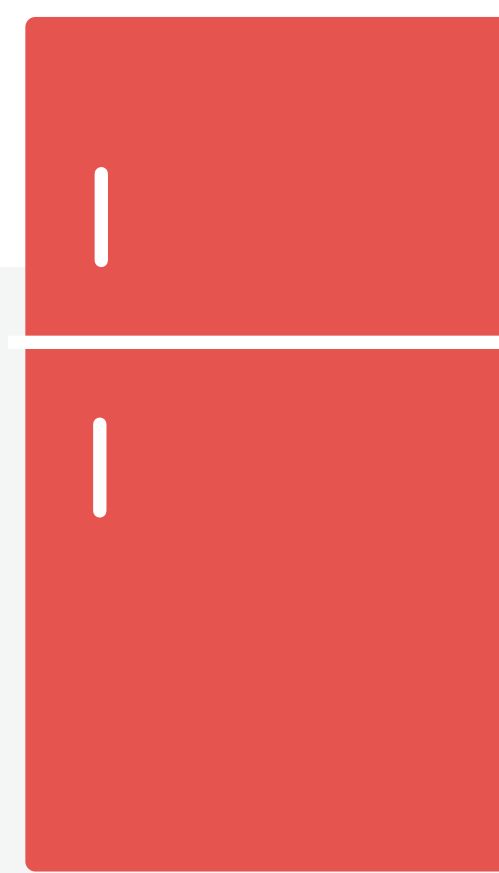
Munyax Eco has invested in marketing campaigns to educate customers on the benefits of the product and share customer testimonials, as well as organise product displays for potential customers to experience the product.



Impact

Munyax Eco has sold nine freezers and fridges since the rollout of their pilot. Their focus on solar refrigeration is driving multiple positive impacts, from environmental sustainability to economic empowerment and social development.

By supporting small retailers and educating customers, the company is helping local businesses grow and providing broader community benefits in Rwanda.



3^o

CASE STUDY

OVERVIEW

COMPANY
POPO Africa

COUNTRY
Uganda

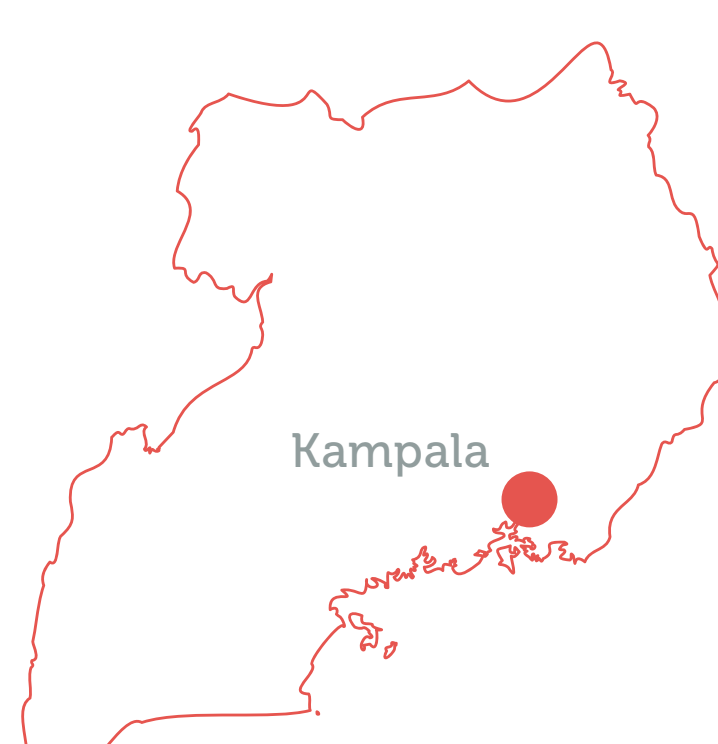
popo™

PRIMARY PRODUCTS
Smart batteries
Refrigerators

WEBSITE
popoafrika.org

**About**

POPO Africa is working towards bringing solar power to off-grid areas in Uganda. The company aims to serve 20 million Ugandans, meeting their basic daily needs for electricity. POPO aims to drive adoption of PUE technologies through PAYGo.



UGANDA

**Product-market fit**

POPO currently sell Surechill fridges to women micro entrepreneurs and are researching Koolboks.



170
UNITS
SOLD
2024



3,000
TARGET
UNITS
2025-26

**Why are they selling refrigeration?**

With support from CLASP and Nithio Productive Use Financing Facility, POPO started sales of solar fridges in October 2023.

The company targets off-grid business communities in refugee settlements in West Nile and Northern Uganda, Island communities on Lake Victoria, as well as

peri-urban communities in central and Eastern Uganda, due to strong demand for the products within the region.

They have also piloted the sales of Surechill technology under the POPO Cool Solar Fridge brand.

How did they establish product-market fit?

Following a customer segments scoping exercise, plus feedback from previous customers, POPO saw the need to expand its offering.

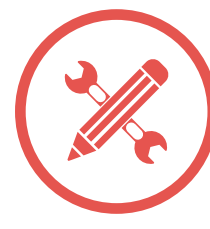
They now plan to include larger capacity fridges, specifically: 65L fridges for institutional clients such as retail pharmacies and health centres, 158L, 200L and 300L

freezers for small businesses selling cold beverages, and 208L and 300L fridges targeting dairy farmers and retail shops selling higher volumes of drinks.



“Personalised customer experience is critical in the rollout of PUE products and has enabled POPO to build lasting relationships and trust with our clients”

Timothy Musaaazi, Business Development Manager

**What have they done to improve their operations?****Decentralise logistics**

The company has segmented its target market into sales territories, enabling them to deliver the fridges within 48 hours.

Offer flexible payment models

The PAYGo approach allows their customers to experience the product and utilise it while paying in installments.

After-sales support

In addition to a two-year warranty on solar fridges and a guaranteed free replacement of all faulty solar fridges, customers are regularly visited by POPO field agents for routine checks. This ensures appropriate usage and reduces the rate of product failure.

**Impact**

In just six months POPO sold over 187 fridges. The majority of customers are women micro entrepreneurs who run retail shops, and health facilities that require fridges for medicine and vaccine storage.

Their small retail customers have more than doubled their revenue from cold drinks since purchasing fridges from POPO.



IMAGE CREDITS

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