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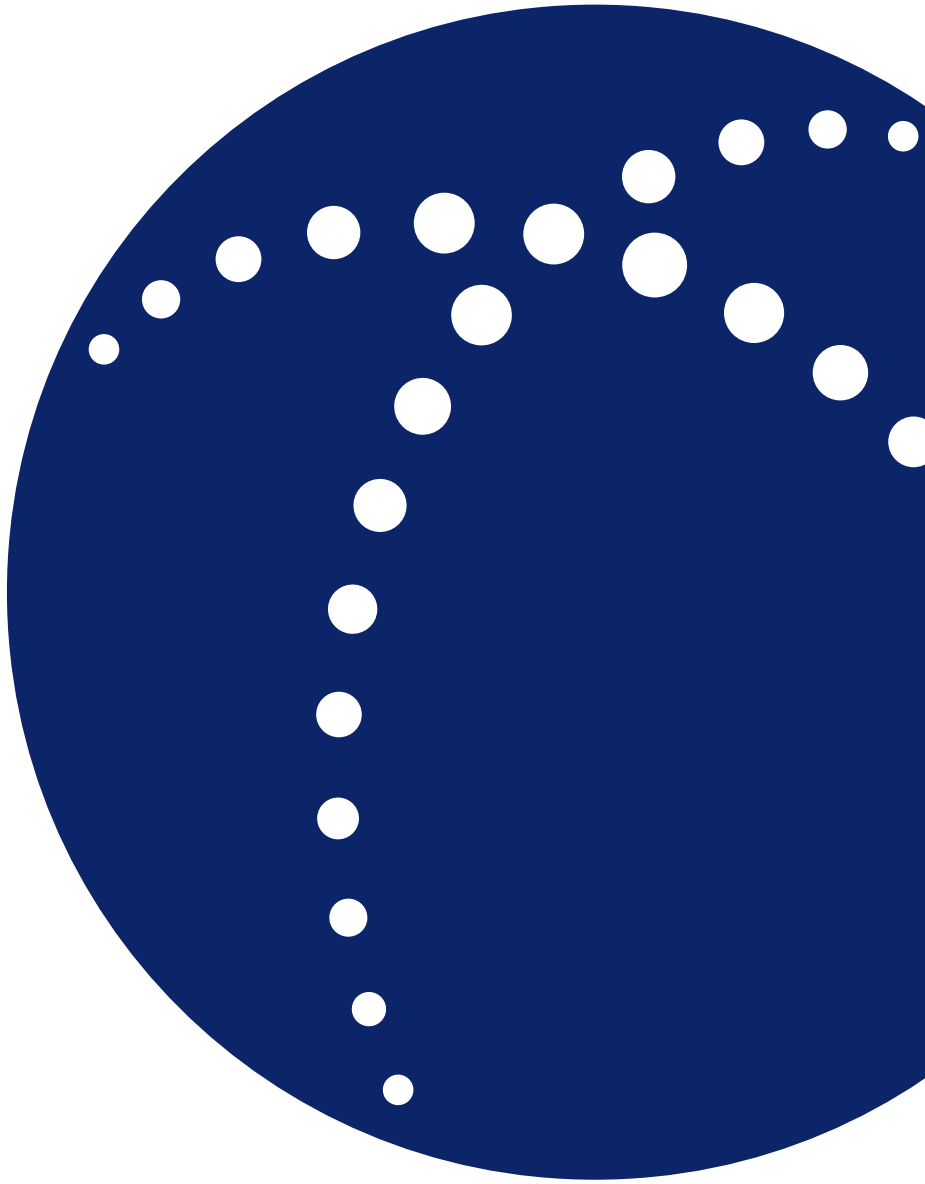
Minigrids and Productive uses of energy

Lessons from an Appliance Roadshow in Ethiopia



ESMAP
Energy Sector Management Assistance Program

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- How do they play out in practice?
- How do we scale roadshows up for more PUE on minigrid sites?

Poll: What do you think is the most critical barrier impacting the scaling of PUE today?

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01

What are roadshows and why do we need them anyway?

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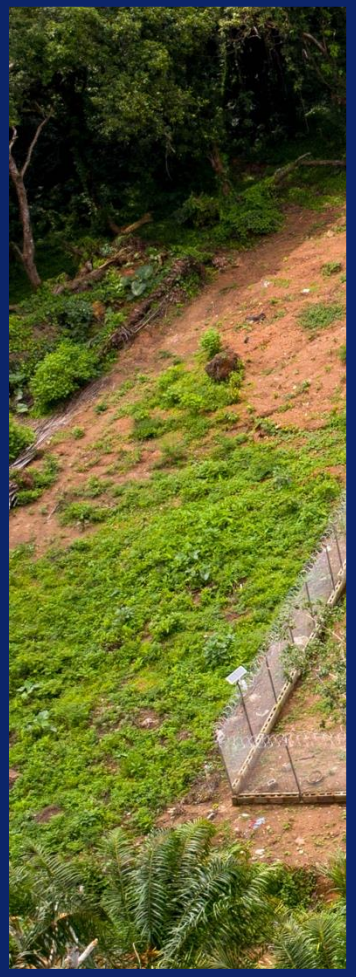
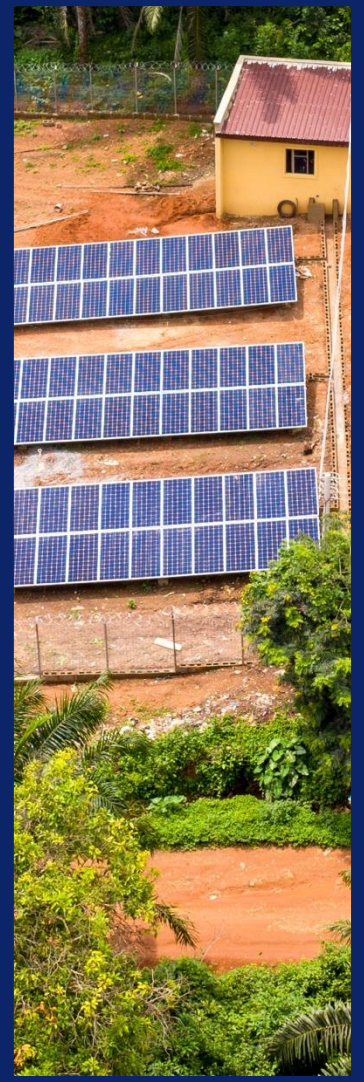
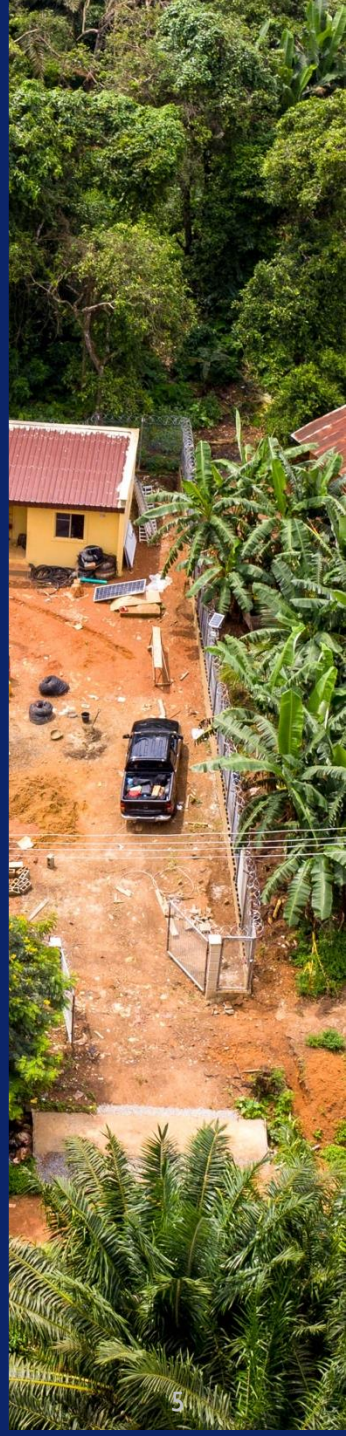
Appliance Financing and the employment of Productive uses of Energy are fundamental elements of viable, sustainable minigrids

They also contribute towards economic development in communities, improving livelihoods and increasing incomes

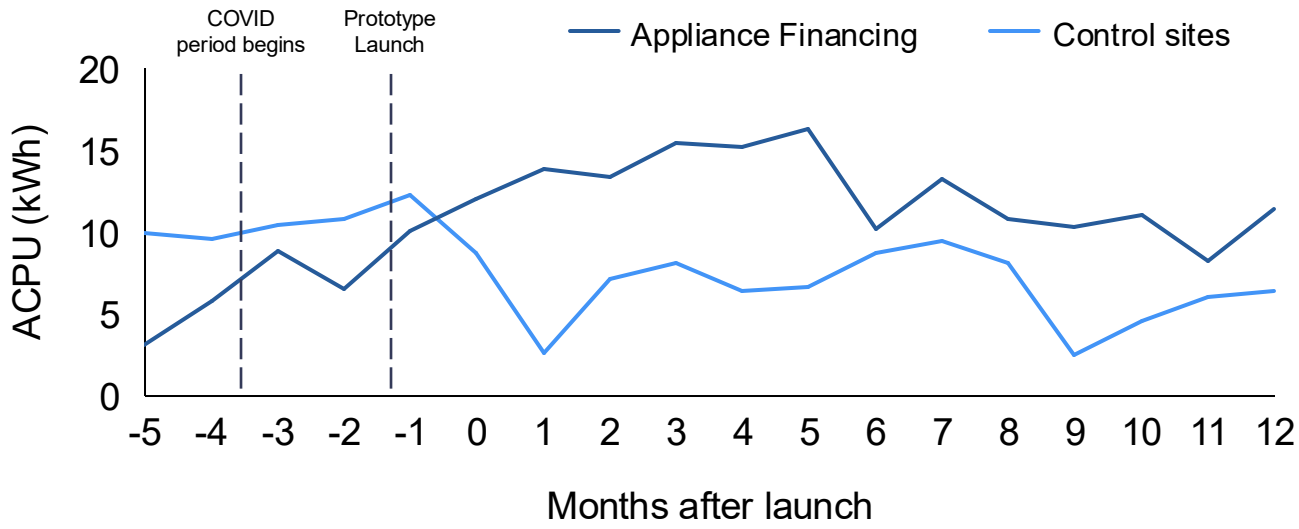




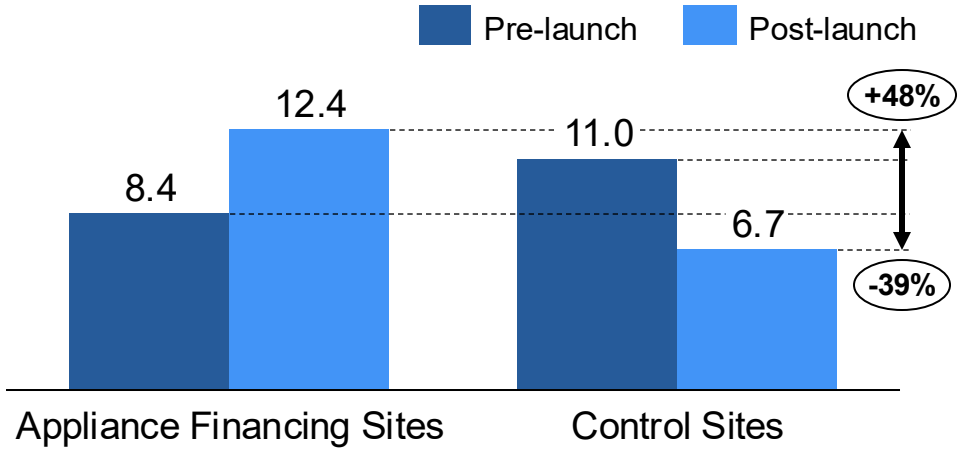


Innovation Lab data shows Average Consumption Per User (ACPU) is 48% higher on minigrid sites where appliance financing is offered to customers

ACPU (kWh) by type of site



Change in ACPU (kWh) before and after launching appliance financing[1]



- **Data from 5 sites across Nigeria and Kenya show that consumption increased by 48%, while at sites where there was no appliance financing offered, consumption decreased 39% over the same period**
- **The results show that appliance financing allows customers to increase their consumption sustainably over a prolonged period of time, despite economic shocks (including COVID)**

Note: (1) Compares ACPU 3 months before launching Appliance Financing to the same period one year after. Showing data for 2 control sites, 5 treatment sites, and 36 AF users

Appliance financing and PUE have been difficult to scale, despite the clear benefits

	Key Barriers to uptake	Description
 **Supply-side**	**Accessibility to end-users**	• Limited distribution networks mean customers in remote or underserved areas **cannot easily access appliances/equipment** • Suppliers are unwilling to bear the cost of servicing customers beyond their established **supply chain range** • Many potential consumers **do not have reliable or affordable electricity** to operate PUE technologies • Even connected customers may experience frequent outages or surges, leading them to **prefer alternative solutions to avoid equipment damage or reduced performance**
 **Demand-side**	**Budget constraints**	• Limited household or business budgets restrict spending on electricity and the **ability to purchase new equipment/appliances**
	Lack of access to affordable credit	• Many potential customers lack a comprehensive credit history, so **credit assessments are expensive and complex to conduct**, resulting in high interest rates and low credit uptake rates • Customers are geographically dispersed, making **loan collection costly and time-consuming**
	Lack of awareness of potential offerings	• Many **potential customers are unaware of available appliances** or any financing solutions that could make them more affordable
 **Enabling environment challenges**	**Policy and regulatory gaps**	• **Absence of incentives** to serve rural customers means suppliers and financiers focus on other customer demographics • Inadequate or unclear policies around **renewable energy integration and synergies with other development priorities** (e.g., Agriculture/Irrigation) can **hinder private sector participation** and investment in PUE solutions

Appliance Roadshows are not new – they have been historically used in electrification drives across developed and developing markets

U.S. REA "Electric Circus" (1939–41)

A traveling demo show that toured rural towns with live appliance try-outs to drive farm electrification sign-ups

India's UJALA LED campaign (2015 onwards)

Mobile vans and pop-up counters swapped millions of bulbs for low-cost LEDs, pairing awareness with point-of-sale fulfilment

Bangladesh—Grameen Shakti SHS outreach (late 1990s onwards)

Village demos plus micro-finance at the doorstep mainstreamed SHS

Source: Duke University Energy Access Project, gshakti.org, rightlivlihood. Org. Press search

Similarly, Appliance Financing roadshows could provide a one-stop shop approach to scaling PUE across SSA minigrids

What is it?

- A program that **offers appliances and income generating machinery, together with affordable financing,** to newly connected mini-grid customers at their location

Why do we need it?

- Enables newly electrified communities to enjoy the **full benefits of electricity** and improve their **income generation potential**
- Consumption supports **mini-grid revenues and profitability**
- **Propels private sector participation**, ensuring that appliance financing can scale without significant subsidies

How will we do it?

- Convene key stakeholders into a taskforce that **identifies end-user needs**, **facilitates the supply chain and corresponding financing**, and host roadshows to **bring the offering to the community**

02

How did they play out in practice?

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Ethiopia was selected as a priority country to test this approach, to be rolled-out in parallel of the planned mini-grid component of the ADELE program

Qorile was selected as a pilot location in consultation with EEU

Location: Somali Region, **1223km** from Addis Ababa

Population: **~4000** people, **650** households

Demographics: **80%** pastorialist, **15%** commerce, **5%** agro-pastorialist

Electricity access: Qorile is served by a **560kW** EEU mini-grid

We convened a task-force with local implementation partners to drive the roadshow

	Customers/ end-users	Technical partners	Machinery suppliers/ manufacturers	Government Agencies	Appliance/Capital Goods Financiers
Core members	EEU	ESMAP; vida; UNCDF Microfinance + Capital Development; ADWA PARTNERS CONSULTANCY, PLC	ኢቴልኮ ETHELCO; GLORIOUS PLC	ውሃና ኢነርጂ ሚኒስቴር MINISTRY OF WATER AND ENERGY	ShabelleBank; Oromia Bank Baankii Oromiyaa
Consulted groups	Community representatives	RMI; clasp	Energy Exell; AGSOL	ኢንዱስትሪ ሚኒስቴር MINISTRY OF INDUSTRY	

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A user-centred design community consultation was conducted in February 2023 to establish community needs and demand for equipment and appliances

Local community members and business owners were consulted on the proposed roadshow..

..with findings incorporated into roadshow program design

Shop owner with her freezer

Local business lady with her sewing machine

Access to financing

- No banks or MFIs in area – apart from 3 branches of HelloCash
- Limited access/experience with personal financing such as credit or loans

Appliances/equipment in demand from the community

- Commercial appliances for shops and livestock related equipment
- Lifestyle appliances including washing machines, TVs and freezers/fridges

Potential implementation challenges

- High rates of delinquency from the community on paying electricity bills
- Frequent power interruptions due to local windy climatic conditions

11 different types of household, commercial and livestock related appliances and equipment were selected to be put on offer during the roadshow

	Description
Household	• Blenders • TVs • Washing Machines • Fridge/Freezers
Commercial	• Grinders • Drills • Baker Ovens • Sewing Machines • Hair Clippers
Livestock	• Meat Blenders • Milk Churners

Shebelle and Oromia Bank proposed to offer loans to finance this equipment list

Loans were subject to approval to be determined based deposit/ability to repay and loan amount

- Typical tenor of 2-3 years
- Interest rate of 16-20%

The roadshow was successfully conducted in December 2023, providing an exhibition of appliances, explanations of their potential benefits and access to financing

The roadshow team consisted of the local implementation team from Adwa Partners and one representative from Shebelle Bank and Oromia Bank respectively
The team performed the following activities over two days:

- **Exhibition and demonstration of the appliances** on offer
- Explanation of the **potential benefits** of purchasing the appliances
- Provision of **financing options** to the community to ensure affordability

Roadshow team member shares information on breadth of equipment on offer

Roadshow team member demonstrates equipment function to onlookers

Purchaser stands proudly with his newly purchased washing machine

The roadshow generated excitement with active engagement from women who were estimated to be 60% of total participants

Local women in the community enquire about equipment and machinery available at the roadshow

Local man inspects blender exhibited as part of the roadshow offering

Bank representatives sign up community members registering for equipment specific loans

The pilot demonstrated that the roadshow approach could be a successful way of scaling electrical equipment

An estimated **250-300 people** attended the roadshow over the two-day period

Demand for appliances was high

- Three items of equipment were purchased outright by community members: **a washing machine, grinder and a sewing machine**
- Community members lacking cash-on-hand expressed willingness to **access financing** for their purchases

93 individuals registered for loans for specific equipment;

- 53 with Shebelle Bank
- 40 with Oromia Bank

But it was not all plain sailing… Perspectives from our implementing partner

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Implementation perspectives

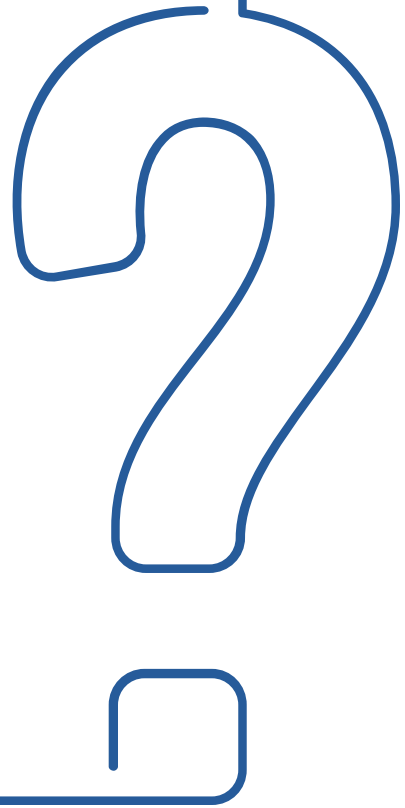
01 What was it like introducing this “roadshow” to the community and how did they respond?

02 What surprised you about the response to the roadshow?

03 What were the factors that made demand high in this community?

04 What would you highlight as potentially unique factors that should be considered in this and other similar rural communities?

05 What should future roadshows do better?



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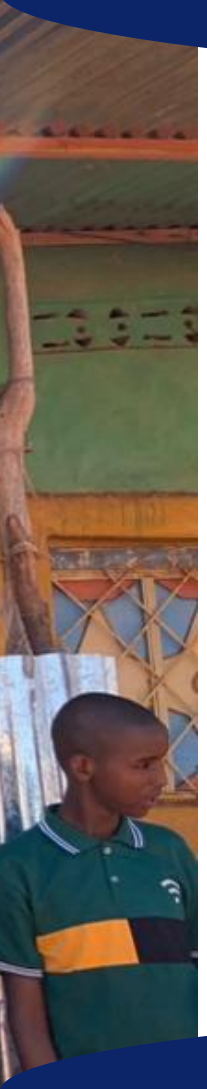

What was it like introducing this “roadshow” to the community
and how did they respond?

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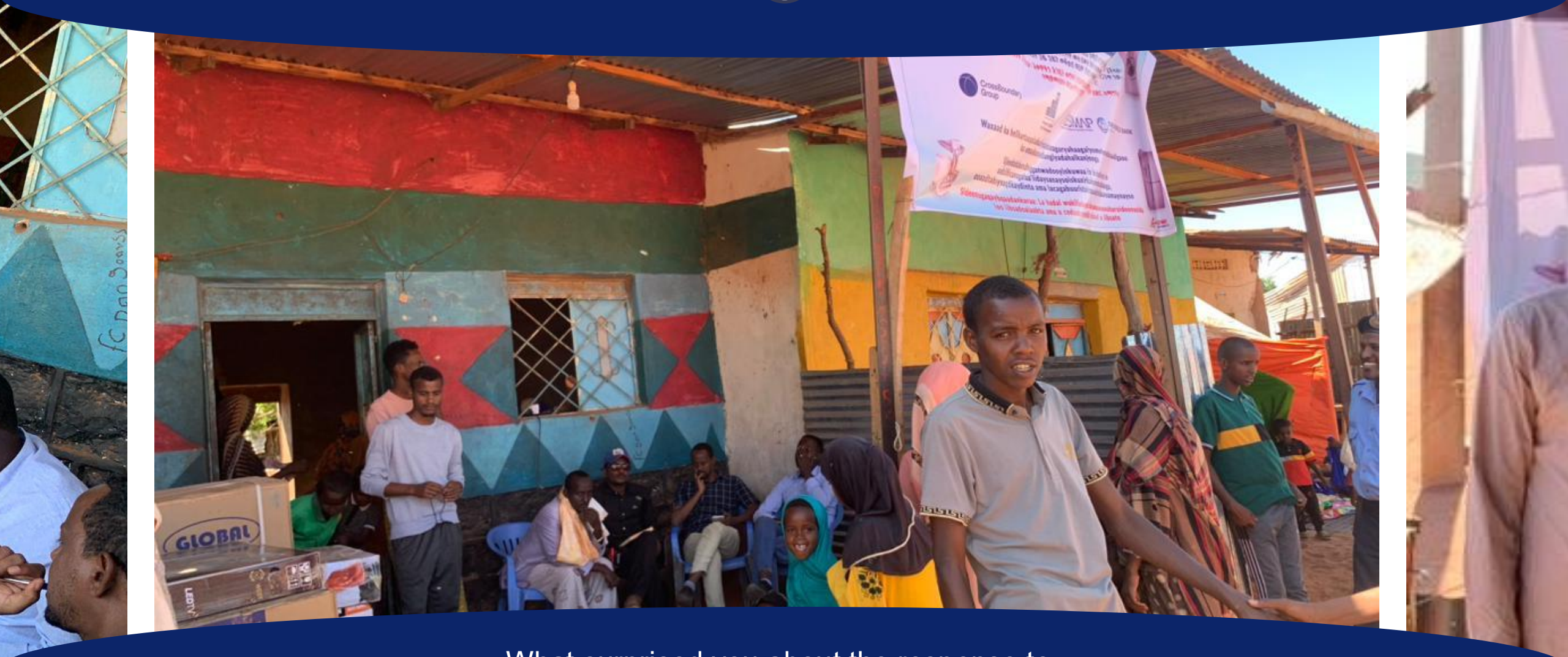

What surprised you about the response to the roadshow?

03

What were the factors that made demand high in this community?

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What would you highlight as potentially unique factors that should be considered in this and other similar rural communities?

What should future roadshows do better?

03

How do we scale Roadshows up for more PUE on minigrid sites?

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Tailored financial options, increased community engagement and careful site selection should be incorporated to ensure greater success in future roadshows

Tailored financial options

- Affordability was the key challenge that prevented equipment uptake, but both Shebelle and Oromia Bank were not willing to provide flexible and quickly accessible financing

- **Provide guarantees** to banks to enable them to offer more favourable terms
- Conduct **pre-roadshow loan sign-ups** so community members are able to **pick up equipment on roadshow days**

Increased community engagement

- Though electrical equipment and appliances offered at the roadshow were derived from this engagement, feedback was received as follows
  - Prices offered were deemed too high
  - Additional equipment was requested e.g., TVs bundled with satellite dishes and decoders

- Conduct **multiple community engagements** prior to future roadshows
- Include **community associations/ representatives** in roadshow planning
- Engage equipment suppliers closer to the roadshow venue for **potential price savings and efficiency**

Careful site selection

- The team initially selected Mino as the pilot site, however it was established Mino suffered capacity challenges and would not be able to support additional load

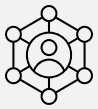
- Prioritize future roadshow sites that are
  - **Easily accessible with sufficient load capacity**
  - **High uptime**

Learnings from other Appliance financing initiatives could also be applied to structure incentives and enablers for successful future roadshows

Stakeholder group	Incentive/Value driver	Description
Financiers	Reduced **default risk** through data sharing	• Utilities can share utility bill payment data to help financiers conduct risk assessments (could also help suppliers tailor their product offerings)
	Reduced **risk perception** through "KYC"	• Identify partners/programs to provide training to banks and MFIs for serving the mini-grid customer demographic
	Reduced **collection costs** through integration with billing processes	• Utilities can channel loan repayments through regular power bills, reducing collection cost and potentially improving repayment behavior
End-users	**Increased income potential** leveraging parallel development programs	• Loans for immediate business needs outside PUE (e.g., stock, ag inputs) can support end-users fulfil growth plans • Enterprise development support / loan management training can create new businesses • Investment readiness support training can help end-users access additional credit • Route to market support for surplus produce can help end-users further capitalize on increased productivity
Developers/Utilities	**Increased consumption and revenue** potential by supporting utilities/developers expand role and capacity	• Enterprise development support for developer led hubs can further boost PUE within communities • Generation Expansion support for additional load can support developers to continue to supply reliable power • Subsidies for ancillary equipment needed to add new loads to grids (e.g., VFDs, soft starters) can further reduce the financial barrier to uptake

The more incentives and value drivers that are employed, the more likely roadshows are to be attractive to private sector partners

We are updating the Roadshow design with the aim of proving a model that can be implemented at scale with the support of local implementation partners after a POC



Taskforce Convening
Bringing together all key stakeholders - communities, developers, suppliers, and financiers - to ensure coordinated action

Equipment Curation
Developing comprehensive fit-for-purpose equipment lists tailored to local productive opportunities and energy capacity

Finance Facilitation
Unlocking affordable financing pathways through partnerships with banks and microfinance institutions

Market Activation
Running targeted market roadshows and demonstrations to accelerate equipment uptake

Replication Playbook for REAs and other local implementing partners

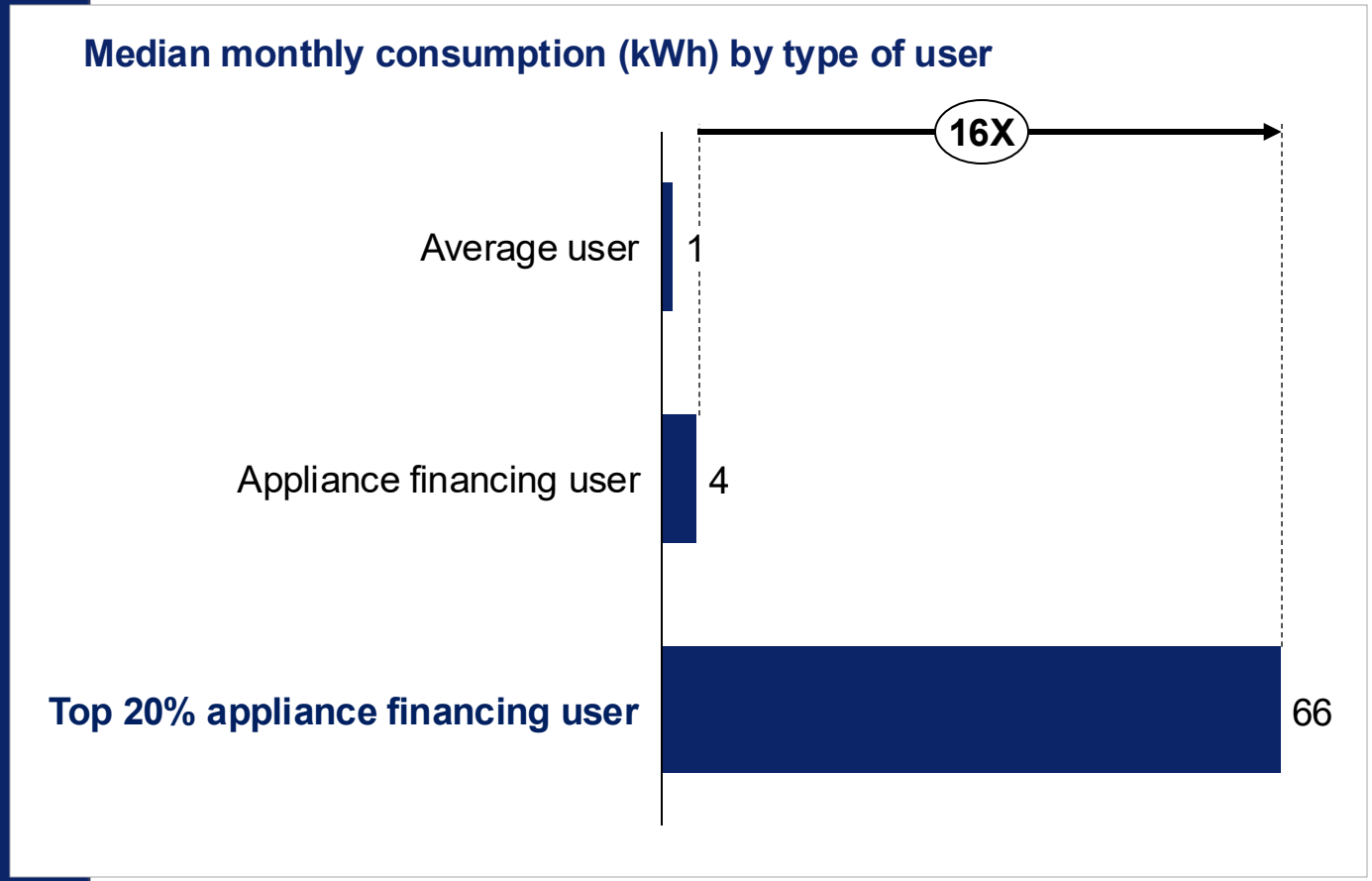
Proven Framework
Complete implementation guide based on real-world performance data and lessons learnt

Scalable Model
Ready-to-deploy toolkit enabling implementation partners to rapidly expand successful PUE hubs nationwide

We know Appliance Financing and PUE works – the median consumption of the top 20% of AF users is 16x more than the average user.

This roadshow approach addresses the key barriers to scaling Appliance Financing on the demand and supply side, and enables the attainment of affordable, fit-for-purpose, competitive machinery and appliances to communities where they are.

Implementing Appliance roadshows at scale could support in the viability of minigrids across the continent and improve community livelihoods at the same time. Would you consider testing this approach out?



The top 20% of appliance financing users in this group had appliances including Freezers/Fridges, Ice Machines, Sewing Machines, Welding Machines, Woodworking drills

Questions?

Contact the Lab team:
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Contact Adwa Partners:
Dr. Tefera Gezmu <adwapartners@gmail.com>

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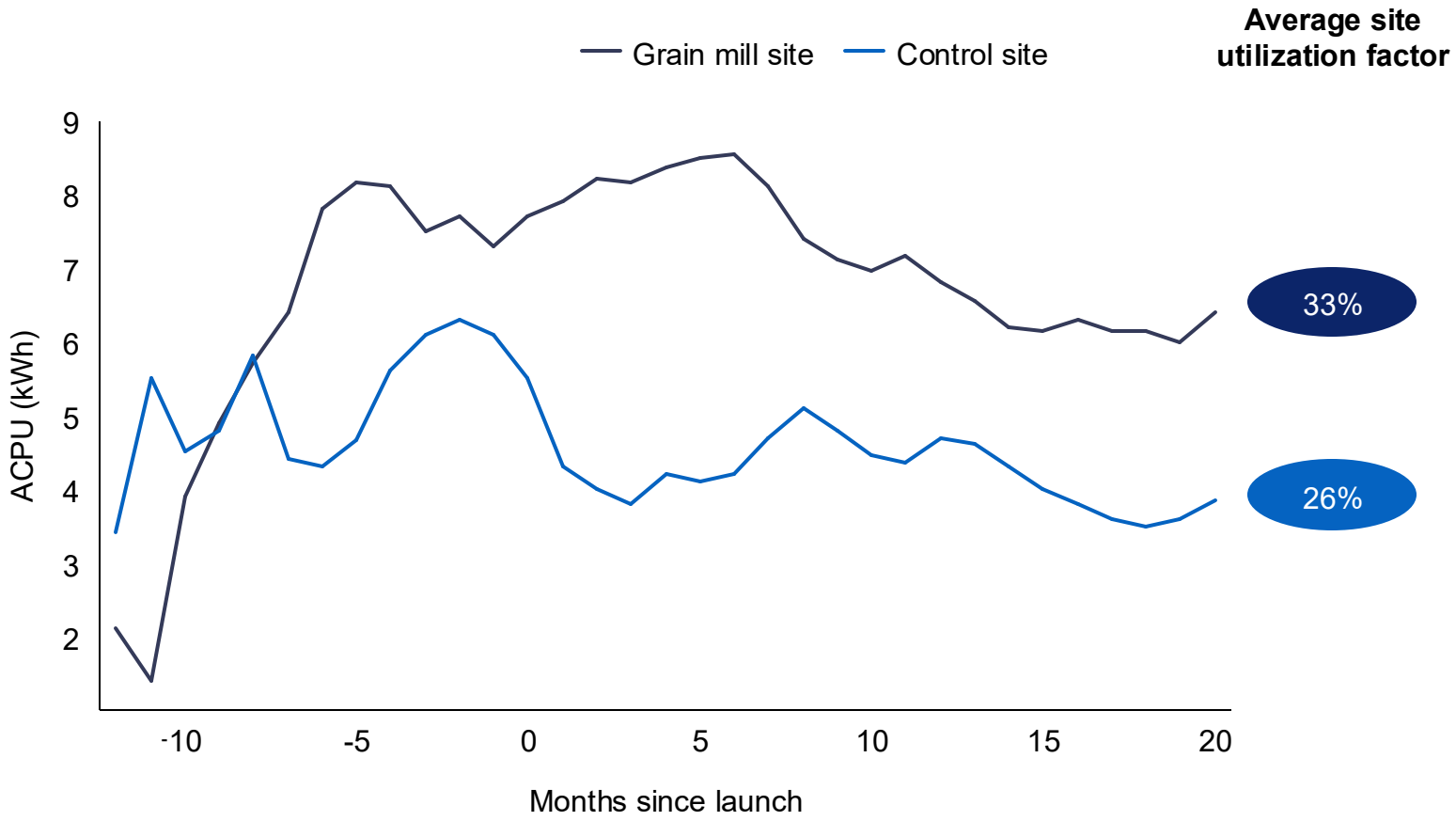
Mini-grid sites with grain mills have higher capacity utilization than those without

ACPU across sites in Kenya, Tanzania and Nigeria, kWh



Data from 11 Grain Milling Sites and 5 non-Grain Milling Sites

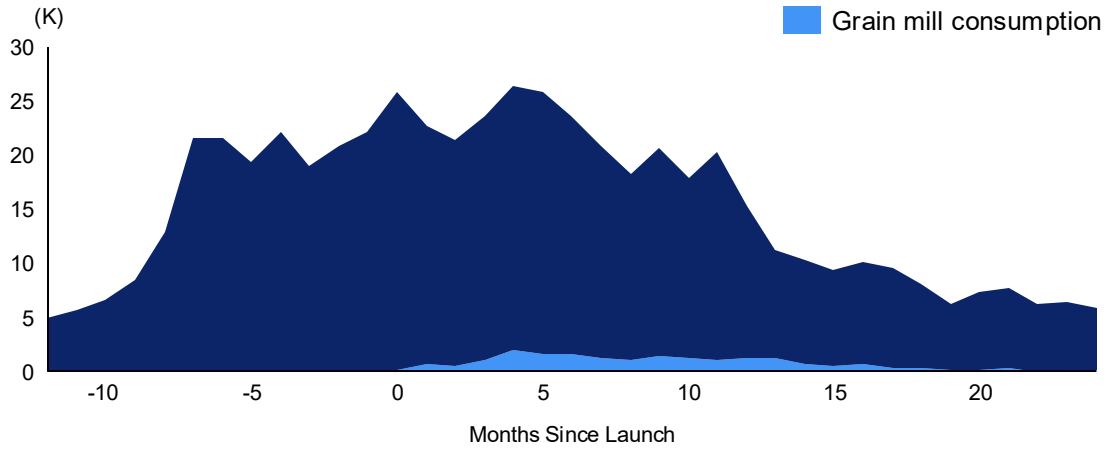
Low utilization is a major loss contributor across minigrid sites

Data from sixteen sites show mini-grid sites with grain mills on them have a higher utilization factor than those without

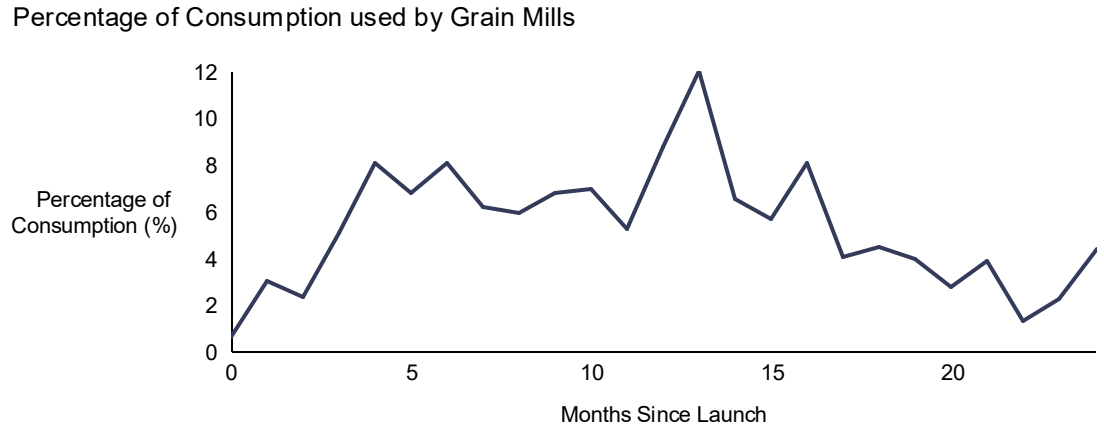
Scaling the use of electric mills on mini-grid sites improves capacity utilization factor and mini-grid economics

Grain mills can contribute up to12% of a site's total consumption, depending on seasonality

Grain mill consumption as a proportion of total consumption, kWh



Corresponding percentage of consumption throughout the year, %



Data from 11 Grain Milling Sites and 5 non-Grain Milling Sites

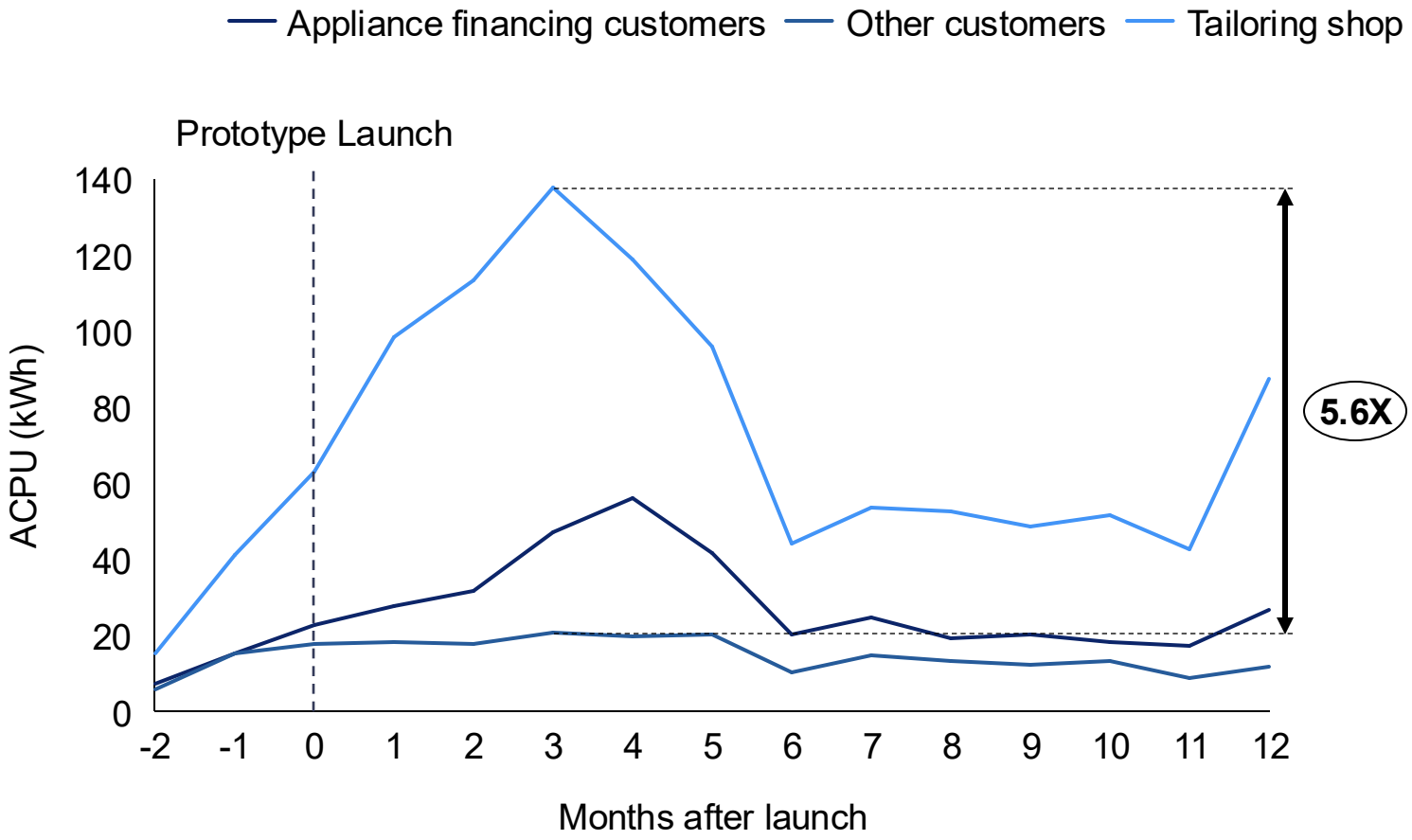
Grain mill usage is highly seasonal, and at peak can contribute up to **12% of total consumption** across sites

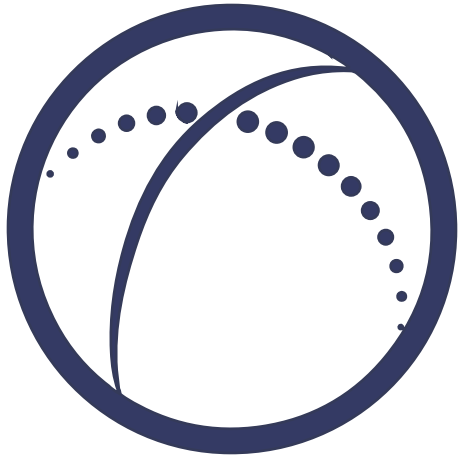
This consumption is an incentive for mini-grid developers to ensure **electric mills scale across their sites**

This top 20% of appliance financing customers utilize equipment or machinery that meets specific community needs

1. Ubiquitous appliances like freezers and TVs typically have a higher uptake rate and increase consumption
2. However, customers covering a **specific need in a community** tend to generate a disproportionate demand for electricity resulting in this significantly higher consumption
3. For example, one customer who has the only tailoring shop in the community that has two sewing machines **consumes up to 5x more** than other appliance financing customers

ACPU (kWh) comparison across customers in tailoring shop site





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