



MECS
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E-COOKING IN MINI-GRIDS REPORT

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Background

While huge progress has been made in Kenya in the last 10 years to extend the national grid throughout the country, some places, especially remote areas, remain inaccessible. Between the years 2014 and 2017, progress towards realizing the 100% electrification target set by the Kenyan Government by 2022 was encouraging given that access to electricity rose from 36% to 70%. Despite the advancement, nearly 4 million households were not yet connected by 2017, out of which 3.6 million were located in rural areas (Day et al 2018). When compared to the national grid, mini-grids may be the better and more cost-effective option for the rural population that is not yet connected. In such regions, mini-grids solutions can play a crucial role in ensuring that households in rural and peri-urban areas have access to electricity. According to Joanes et al (2021), decentralized mini-grids have been of great significance to the electrification landscape of Kenya for years. Worth noting is that mini-grids that were developed more than 50 years ago are still being used by some communities. With the formulation of clear policies and matching strategies integrated into the 2017-2037 Least Cost Power Development Plan (LCPDP) that encourages decentralized solutions, it will be easy to upscale mini-grids in the country (Day et al 2018).

Accessible and reliable electricity is key if e-cooking is to be adopted in Kenya on a wider scale. The MECS program conducted a global market assessment (GMA) for e-cooking to understand the existing opportunities and

challenges for the effective transition to electric cooking. Whereas many countries including Kenya recorded high GMA scores as well as the need to shift to cleaner cooking alternatives, the ability to transition presented itself as a challenge considering that many people use cheap fuels to cook, most of which they can freely collect (Coley et al 2021). The little expenses on cooking fuel tend to limit their ability to pay for modern cooking solutions, something that may help explain why the transition from the traditional use of biomass to MECS has relatively been slow.

Moreover, the feasibility of scaling up e-cooking, especially through the national grid has ordinarily been inhibited by weak electricity infrastructure and poor markets for clean fuel coupled with low human development levels to a lesser extent. The implication as such is that the electrical infrastructure has to be strengthened to guarantee that electricity is accessible and reliable to boost the growth of the clean cooking market, which will act as a strong catalyst toward the transition to e-cooking (Coley et al 2021). The improvements can only be achieved through mini-grid technologies and increased access to the national grid. Advancement in energy and human development are, therefore, two main indicators that are required, specifically, in sub-Saharan Africa (SSA) where the majority of the population still relies on biomass energy (Sola et al 2017). Nevertheless, unlike many SSA nations, Kenya has a strong potential for the rapid scale-up of e-cooking

in one or more scenarios. For that reason, it will be less affected should any of the enabling indicators be removed for the national grid scenario.

As a result, e-cooking can scale up as a viable option in Kenya if the national grid is effectively supported by the mini-grid systems. According to Coley et al (2021), countries with high GMA scores for electric cooking are those that have strong mini-grid infrastructures. In recent years, many private mini-grid developers in Kenya began to try-out electricity for cooking. Considering that it is an idea that is still new, the developers have to charge tariffs that are cost-reflective and stimulate demand for the power actively if they are to profit from it. PowerHive, RVE Sol, and PowerGen are some of the mini-grid developers in the country who are currently promoting electric cooking through mini-grids.

Introduction

In an attempt to promote e-cooking through mini-grids and understand the challenges faced by mini-grid developers, MECS Kenya through the e-cooking community of practice (CoP) virtually conducted its second monthly dialogue meeting on the 27th of July 2022. The meeting brought together key speakers from different mini-grid companies who were able to share their e-cooking journey with EPCs. The dialogue series presented an opportunity where experts in the sector got the chance to shed more light on the e-cooking modalities in mini-grids as well as the approach used to stimulate demand for the technology.

Key Speakers

1. Peter Ondara, Salesperson - Powerhive
2. Karlijn Groen, Project Advisor SNV
3. Mbithi Ndunda, Head of Solar Integrated Appliances Ltd and Solaria
4. Anderson Bett, Customer Manager PowerGen
5. Lorna Nyandat, Social Impact Lead Kudura Power East Africa

Roundtable Discussion Panelists

1. Elliot Avila, Research director at Access to Energy Institute
2. Penny-Jane of ARC Power
3. All the key speakers

E-cooking in PowerHive Mini-grids by Peter Ondara

Overview

PowerHive is a technology venture that was founded in 2011, and which partners with utilities and independent power producers to provide access to productive, affordable, and reliable mini-grid electricity for millions of rural homes and businesses around the globe. Through their proprietary technology platform and business model, they can finance, monetize, and manage off-grid utility solutions.

PowerHive began using electricity for cooking in 2019 when they introduced a hotplate at one of their mini-grid sites. While the hotplates were initially well-received by their consumers, their usage declined with time. Some of the reasons given for the minimal usage was that it consumes a lot of electricity and is thus expensive when compared to other available options. Besides, it was limited to some types of foods and hence not versatile.

From the customer's feedback as well as the company's analysis and surveys, the idea of electric pressure cookers was birthed in February 2020. The introduction of EPCs was a game changer as far as e-cooking was concerned. It had so many features and functions that were to the benefit of the end users. Likewise, its rating was accommodative, something that qualified it as the best and most accepted electric cooking appliance they have had so far.

Marketing Approach

Their best approach has focused on training customers on the importance of cooking using electricity through a mix of organized groups, barazas, and door-to-door engagements. Apart from verbal training, they do live cooking demonstrations to convince the users of its effectiveness. The EPCs are also marketed through sales agents who make regular visits to customers while having samples of the appliances for sale should there need be. The customers have equally been trained on how to calculate the cost of preparing different meals through the EPC for them to be able to compare it with

other fuel options for cooking and make informed decisions on which ones to embrace.

Financing Plans

Initially, Powerhive had two financing plan options;

1. Purchase the EPCs through a cash option of Kshs. 6,520 or
2. Through hire purchase with an initial deposit of Kshs. 1,800 and 18 monthly installments of Kshs. 280.

However, at the moment, they only sell the EPCs through cash to save them the cost of collecting debts.

Challenges and Mitigation Measures

1. Readily available cost-free cooking options; firewood, hence unwilling to spend on e-cooking.
2. Hard to convince potential customers to shift from the traditional cultures of cooking to modern cooking solutions.
3. The capacity of the EPC is not enough to satisfy those with big families - planning to come up with bigger EPCs.
4. The poor economic status of most customers, hence difficult to raise even the deposit - is out of their control.
5. For customers who have purchased an EPC, a lot of time is required to train them before they can become routine users - continuous training.

Way Forward

PowerHive plans to sell EPCs to at least 75% of their customers for cooking considering that they have approximately 4,800 customers connected across their mini-grids. In so doing, they will be able to eventually eliminate carbon-related emissions.

Developing a Market for Electric Pressure Cookers in Kalobeyei by Karlijn Groen and Mbithi Ndunda

Overview

SNV piloted the use of electric pressure cookers in 75 households and 25 SMEs connected to the solar mini-grids in Kalobeyei integrated settlement (Kenya) using a market-based approach.

The pilot project aimed to help them gain insights in:

1. The potential for cooking with EPCs for mini-grid users for household and commercial use in a refugee/very low-income setting.
2. The requirements and potential barriers to developing a market for EPCs in a refugee settlement and other very low-income mini-grid settings.

Market Assessment

Before the introduction of EPCs,

1. The residents of Kalobeyei spent a lot of expenditure on charcoal/firewood (and water). Households and SMEs paid Ksh. 2,800 and 7,800 respectively per month for fuel.

2. Less electricity was consumed despite low tariffs. Households and SMEs spent Ksh. 180 and 700 respectively per month on electricity.

3. They showed a high willingness to cook with electricity and pay a portion of their (limited) income to purchase and use an EPC.

Results

SNV tested EPCs from 4 different brands available in the Kenyan market in 15 households and 5 eateries. All the participants were satisfied with the EPCs and cook with them on average 1-2 times a day depending on if electricity is available. When there is no electricity, people resort to cooking with firewood or charcoal. Early findings indicate that primary fuel use is reduced by 1-2 times. Savings in water was also recorded because the pot is heavily insulated. Water being a scarce resource in the area, this presented itself as a major benefit that the participants did not necessarily think of when starting the project. Surprisingly, there was no indication of a significant increase in electricity expenditure, something that underscores the energy efficiency of the technology.

Distribution

The commercial distribution of EPCs is led by Solaria Enterprises. Solaria was selected as a partner to help in the distribution of EPCs as it offers support in end-users training and after-sale services, which is quite key when setting up a new product in the market.

Payment plans: earlier research findings indicated that people wanted the EPCs but were unable to procure them due to a lack of finances. The distributors hence came up with a reliable credit scheme that could accommodate all the people who wanted to purchase the product. As such, the EPCs could be sold in cash and 3 payment plans (Deposit + 4 weeks, 12 weeks, and 20 weeks repayment periods) to mini-grid customers. To break it down further, the payment plan had 4 tiers with the first tier being the cash option, the second tier with a high deposit meant for SMEs, the third tier having an initial deposit of Ksh. 2,400, and the fourth one had an initial deposit of Ksh. 1,500.

Marketing activities: roadshows, radio, cooking demonstrations, door-to-door marketing, end-user (safety) training, and - sales services.

Outcome and Learning

1. Good uptake among households connected to the mini-grid. So far, 55 units have been sold in less than 2 months. The initial plan was to sell 80 units within 4 months, something that implies that the demand for the technology is high.
2. Product demonstrations are time-intensive but impactful for marketing. Helps in creating demand for EPCs.
3. The 20-week payment plan is most preferred. Use of saving groups/guarantors very effective
4. Broad demand from a wider area.

Challenges

1. The inability of customers to buy the EPCs in cash.
2. Small pot size (6-8L). An average family in Kalobeyei has 5 to 7 children
3. The EPC only comes with one pot which may not be ideal for commercial purposes.
4. Many of the people in the integrated settlements are refugees hence it may be difficult to track them when they move to another area for them to settle their dues. As a result, the 20-week repayment plan was eliminated.

Recommendations

There is a need to:

1. Have EPC payment models that tap into the limited income levels and (informal) community-based saving groups (SACCOs, chamas, and VSLAs).
2. A consistent and sufficient supply of electricity.
3. Introduce EPCs with bigger capacities.

E-cooking in PowerGen Mini-grids by Anderson Bett

Overview

PowerGen won a grant from MECS in 2019 for a demand stimulation study entitled "Accelerating uptake of electric cooking on AC micro-grids through business and delivery model innovations." Electric pressure cookers (EPCs) were selected for the study due to good product-market fit, both with how their customers cook and extremely high energy efficiency. Customers

at their sites are in peri-urban areas and therefore depend more on charcoal than firewood, which they are dearly paying for. To encourage the shift from biomass, PowerGen partnered with a local NGO TaTEDO, which has experience in women empowerment, customer engagement, and training on e-cooking in Tanzania, to deliver the EPCs to customers at 2 of their sites where they managed to sell 25 units.

Payment Plans

Initially, PowerGen had 2 payment plans: cash and hire purchase. For the customers who bought the EPCs through hire purchase, their repayments rates were very low at 60%. Based on lessons learned, they deployed an innovative payment plan known as On Bill in their pilot project in Sierra Leone where every amount topped up goes towards the repayment of the EPCs. Specifically, 10-30% of every amount that customers prepay for their energy credits is deducted, something that has seen good repayment rates.

Preliminary Survey

Earlier this year, PowerGen managed to sell 50 units to their customers in their ongoing pilot project in Sierra Leone. After 3 months, they surveyed their customers to gauge the experience of their customers. From the survey, a majority of the participants, 51%, responded by saying that EPCs improved their respiratory health while 34.7% of them indicated that the cost of cooking was reduced. 87% loved the EPCs because they reduced cooking time from a reported time of >2 hours to 1-1.5 hours.

Areas of Improvement

During the pilot project duration, they did in-person hands-on training to the customers and left without leaving any user training manuals or training some local champions to take over and help out with after-sales services. To address the problem, they hired 2 local staff and enhanced their capacity for them to be better positioned to help out with the much-needed continuous training and after-sale service support. One of them was to assist with energy sales whereas the other one was to support the resolution of technical issues that might arise. Likewise, they developed user manuals to leave with the customers.

Lessons Learned

1. In-person training, demonstrations, and marketing are crucial for uptake.
2. It is important to have a strong presence on the ground for sales, training, and follow-up.
3. EPCs empower women by freeing up their time and energy for other activities as well as reducing indoor pollution.
4. EPCs are a good fit for customers' preferred dishes.
5. Cooking is a favorable use case because EPCs are mini-grid-compatible right off the shelf and provide a daytime-primary load.
6. Cooking energy consumption and revenues can indeed be captured on a mini-grid.

E-cooking in RVE Sol Mini-grids by Lorna Nyandat

Overview

RVE SOL installed its first privately financed mini-grid in Sidonge, Western Kenya in 2011. So far, the same has been extended to 13 more sites both in Busia and Kajiado counties. Many new appliances are normally introduced to customers through SME agents.

Market Assessment

Before the introduction of new appliances into the market, they are usually piloted for 3-6 months per site before a rollout. The aim is to get trends and the perception of the customers to determine if they find the new products usable and affordable given that they serve the rural poor. After getting all the pertinent information, market surveys are conducted to increase community buy-in of the gadgets that are normally procured through Acumen Funding.

Distribution Channels

EPCs are sold at subsidized rates and distributed by SME agents upon payment of a deposit by customers. The main payment method is through higher purchases where a deposit of Ksh. 300 is paid for an EPC that retails at Ksh. 2,500. The balance is then recovered through installments when the customers purchase tokens where half of the amount bought goes towards the token and the other half towards repayment of the EPC.

Challenges

1. Delinquencies
2. A high tariff on energy tokens.
3. Duration of EPC deployment for impact measurement.

Opportunities

1. To Pilot any new appliance 3-6 months per site before any rollout.
2. Subsidize energy tokens within the project duration for customers who have purchased the appliance to increase uptake.
3. Conduct surveys before deploying appliances.

Roundtable Discussions

1. The future outlook for electric cooking in mini-grids

E-cooking in mini-grids has a great future. The main challenge, however, has to do with the issue of high tariffs due to the lack of subsidies from private utilities. Tariff subsidies may help facilitate the uptake of EPCs in Mini-grids. To address the problem, PowerHive is currently using promotional bundles to enable its customers to use EPCs. So before the tariffs are lowered, they can implement promotional bundles to encourage e-cooking.

2. Will Mini-grids include cooking loads by 2050?

Yes. According to Elliot Avila, Research director at Access to Energy Institute, some of the research they have done in Tanzania showed that when the electricity tariff was extremely low, households used twice as much energy on EPCs. As such, going forward

mini-grids should include cooking loads besides lighting. Supporting the assertion is Lorna of RVE SOL who claims that with tokens regulation, there will be a higher uptake of EPCs.

3. Is it better to stimulate demand on existing grids or to design new MGs with cooking loads?

Doing both will be good, stimulating demand for existing and new mini-grids. Currently, there are still gaps in the level of electrification. Mini-grid loads may only accommodate lighting effectively and may not allow for charging of heavy appliances like fridges and EPCs for extended periods. The capacity of mini-grids needs to sustain cooking loads to increase EPC demand, which will likewise increase the viability of new grids.

4. Appliances that the mini-grid developers are most interested in.

For now, the EPC appears to be the appliance of interest according to Penny-Jane of ARC Power. Developers have to do whatever can be done to increase power usage for economic sustainability. There will be, therefore, a need to have cooking tariffs that encourage cooking during the day.

5. Is anyone promoting e-cooking and other clean fuels like LPG to their customers to encourage them to shift completely away from biomass?

Most mini-grid developers are mainly promoting the use of EPCs considering that it is more efficient and easier to deal with when it comes to the cost of cooking. It presents a new paradigm shift because of the way people cook and the food items they cook. To

facilitate its uptake on a wider scale, it needs advocacy and demonstrations. Person-to-person exchange of experiences may similarly be a good approach that may help people embrace the technology and shift from the use of biomass.

While SNV does not promote LPG, it makes choices available to people. Since individuals have different cooking needs, it may be proper to explore the fuels that would be ideal and accessible to the various categories of consumers. For example, EPCs may only be convenient for households and not for schools and businesses.

6. What appliance financing mechanisms have proven effective for developers?

The On Bill financing mechanism. Though it takes a longer time, 1 to 2 years, the EPC repayment is 100% assured.

Conclusion

For years, the approach used by the Kenyan government to increase the rate of electrification within the country has mainly focused on the extension of the national grid. However, some regions may not be easily accessed through the national grid, especially those in remote areas. Moreover, should that option be considered, it may not be economically viable due to the high cost that will be incurred in connecting households in those areas to the grid. Venturing in mini-grids may thus be the best option for rural and peri-urban areas with no access to grid electricity.

Conclusion Cont...

It is apparent that for e-cooking to be adopted and sustained, electricity has to be accessible and reliable. As such, mini-grid electricity may help towards strengthening the national grid to ensure that Kenya realizes its so desired 100% electrification rate. In so doing, it will be easier to advocate for clean cooking technologies with a focus being centered on e-cooking, something that may help shift the majority of the population who are still using biomass for cooking to electric cooking.

Considering that many people in rural houses have inadequate sources of income, mini-grid developers have to invent an effective financial plan that will encourage the uptake of the technology. They may also have to design new mini-grids with loads that can sustain cooking to prevent those who have already embraced the technology from having to revert to the use of biomass. Finally, given that the current EPCs in the market are ideal for households with smaller family sizes, technology providers should consider developing EPCs with bigger capacities that may sustain schools and businesses.

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