

# **ELECTRIC PRESSURE COOKING: ACCELERATING MICROGRID E-COOKING THROUGH BUSINESS & DELIVERY MODEL INNOVATIONS**

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**POWERGEN RENEWABLE ENERGY & THE EFFICIENCY FOR ACCESS COALITION**



**This report was developed by PowerGen Renewable Energy and CLASP, the Efficiency for Access Coalition Co-Secretariat, as a component of the MECS-TRIID project, supported by Modern Energy Cooking Services (MECS).**

**Efficiency for Access** is a global coalition promoting energy efficiency as a potent catalyst in clean energy access efforts. Since its founding in 2015, Efficiency for Access has grown from a year-long call to action and collaborative effort by Global LEAP and Sustainable Energy for All to a coalition of 15 donor organizations. Coalition programmes aim to scale up markets and reduce prices for super-efficient, off- and weak-grid appropriate products, support technological innovation, and improve sector coordination. Current Efficiency for Access Coalition members lead 12 programmes and initiatives spanning three continents, 44 countries, and 22 key technologies.

**CLASP** is a non-profit organization which is an epicentre of ambitious and collaborative efforts to prevent catastrophic climate change and make the world sustainable for all. CLASP works together with policymakers, governments, technical experts, industry and others in the supply chain, donor organizations, consumers and consumer groups, and other stakeholders to develop and lead markets towards the highest-quality, lowest resource-intensive products. CLASP envisions a world in which appliances and other products are life-changing, low-impact, and environmentally responsible.

**PowerGen Renewable Energy** is a leading African mini-grid and C&I solar developer, implementer and operator. Over the past eight years, PowerGen has installed more than 200 solar power systems in seven countries throughout the region, from Somaliland to Mozambique. PowerGen’s overarching mission is to leverage the latest technologies in a pragmatic way to fulfill an ambitious two-part objective:

- Build the energy system of the future in Africa: as the global energy system evolves to be cleaner, smarter, and more distributed, let’s build that system in Africa first
- Transform lives through smart power: connect the 500m unelectrified people in Africa to reliable power services

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Open fires and inefficient stoves cause a range of harmful impacts that impede economic and social development, leading to significant loss of life in rural, off- and weak-grid communities.<sup>1</sup> Households connected to microgrids, or mini-grids, are no different. Across East Africa, many microgrid customers still rely on costly, time-intensive and unsafe biomass fuels to cook daily meals. Electric cooking is often perceived to be prohibitively expensive given the high tariff rates charged by most minigrids. Electric pressure cookers (EPC) have the potential to change this paradigm and offer a unique opportunity for customers to use microgrid electricity to easily, safely and affordably cook many energy-intensive dishes common across East Africa.

Electric pressure cookers represent a strong market fit for microgrid consumers due to their high cooking efficiency. In an effort to better understand the potential impact of EPC use, PowerGen Renewable Energy, with support from Modern Energy Cooking Services (MECS), conducted a small-scale pilot in central Tanzania. The sites selected offered significantly lower electricity rates (\$0.35 per kWh) compared to most rural microgrids, thereby making the EPCs cost-competitive with relatively inexpensive and ubiquitous charcoal.

To better understand consumer experiences with the EPCs, Efficiency for Access conducted research alongside this pilot with participating households. The research included:

- Baseline surveys on cooking practices, fuel usage and expenditure prior to EPC adoption
- Follow-up in-person surveys with 22 of the 25 initial EPC customers on product usage, impacts and challenges after one month of use
- Comparison of smart data on household electricity consumption pre- and post- EPC adoption

Efficiency for Access found that EPCs had a positive impact on consumer quality of life and required a minimal shift in behavior. Customers appreciated that cooking with the EPCs saved time, while minimally impacting electricity consumption and cooking costs. Users reported that the appliance was easy to use and produced the same quality of food as their

<sup>1</sup> WHO, 2016: [https://www.who.int/gho/phe/indoor\\_air\\_pollution/burden/en/](https://www.who.int/gho/phe/indoor_air_pollution/burden/en/)

alternative option. Customers' main complaint was that the pot size (6lts) was not big enough to accommodate meals for large families. Additionally, customers wanted more than one inner pot so they could more easily exchange food contents.

The study found that the majority of purchasers were men who bought the appliance either to ease the labor of cooking for themselves or for a female household member. When asked if a man or woman was the head of the household, all respondents with a male family member indicated the man was responsible for decision-making. These gender dynamics and responses indicate that EPC marketing and communications strategies should perhaps emphasize the benefits of the EPC for all family members, not just women.

Smart data collected through the microgrid household meters showed that EPC customer's **electricity consumption increased by almost 20% after purchasing the product.** The data demonstrates that EPCs were actively used in the households and created demand for more microgrid electricity consumption.

Another take-away from the pilot was the importance of **in-person training** to close EPC sales and ensure greater use. The EPCs were introduced to the community through an in-person demonstration that showed participants how to cook basic meals with the appliance. The majority of sales were made by attendees who were offered a discount for attending the training. Community members regarded the trainings as a valuable skill-building opportunity. Training was found to greatly enhance pilot outcomes for first-time EPC users.

**Financial assistance** was also a critical component of EPC uptake. The microgrid EPC customers were offered the option of a financial mechanism to purchase the appliance. The majority of consumers (86%) participated in a loan facility which allowed them to pay off the product over a nine-month period.

The study was limited by a short duration and a small and geographically specific sample size. Future studies should evaluate EPCs across a wider variety of microgrid customers to confirm product-market fit and evaluate the long-term impacts of EPCs on customer consumption and revenues.



## BACKGROUND



**Three billion people around the world depend on food cooked over polluting, open fires or inefficient stoves.<sup>1</sup>**

However, the expansion of microgrids across the African continent as a rural electrification solution has unlocked the opportunity to transition rural communities from biomass cooking directly to modern energy cooking services. A 2018 report identified EPCs as a best fit off-the-shelf electric cooking solution for the Tanzanian market<sup>2</sup>, due to its energy efficiency, affordability, usability, and compatibility with commonly cooked staple meals.

**To test the impact and utility of EPCs in a microgrid context, PowerGen, with support from the Modern Energy Cooking Services (MECS) programme, conducted a first-of-its-kind, real-world test of electric cooking in the context of a rural African microgrid.** PowerGen introduced EPCs into two microgrid sites in central Tanzania, utilizing an in-person training and loan facility to encourage uptake. The sites selected offered lower electricity rates compared to most rural microgrids. The off-the-shelf EPCs deployed are plug-and-play with 240V AC power provided by the minigrd.

Prior to the project launch, the team conducted a feasibility study to determine the fuels and cooking profiles of its customers at sites in central Tanzania. The data revealed that all customers surveyed pay for cooking fuel. Monthly expenditure ranged from TZS 10,000 (\$4 USD) per month for the smallest user, up to TZS 64,000 (\$28 USD) per month for one customer operating a restaurant business. Across those customers, the average cost was 42,000TZS (\$18 USD) per month.

For the villages surveyed, charcoal is sold in sacks costing about TZS 5,000 per bag (\$2), with each bag estimated to contain 30+ kg of charcoal. There has been a gradual increase in the cost (about 500-1000TZS/ \$0.22cts- 0.5cts) annually, but charcoal still remains affordable and easily available compared to other alternatives such as LPG.

<sup>1</sup> Robbel, N. Health co-benefits of climate change mitigation- Housing sector, 2011

<sup>2</sup> Batchelor et al. Solar electric cooking in Africa: Where will the transition happen first? 2018.

**In PowerGen's existing Tanzanian microgrid communities, charcoal remains the fuel of choice, with little to no adoption of electric cooking.** This is largely because:

- Charcoal remains inexpensive in rural Tanzania
- By necessity, microgrid electricity rates are reflective of installation costs, and are therefore significantly more expensive than nationally-subsidized utilities
- Microgrid customers lack access to electric cooking appliances
- There is low awareness of electric cooking, and those who are aware often assume that electric cooking appliances and their operating costs are prohibitively expensive
- Biomass cooking is ingrained in Tanzania culture, and cooking with electricity is thought to require significant behavior change

**Most customers indicated that they would be willing to transition to more modern cooking services,** but their greatest concerns remain the price of microgrid electricity (in comparison to charcoal) and access to and awareness of e-cooking appliances.

**Under the scope of this project, EPCs were delivered to customers at two microgrid sites in the Singida region of central Tanzania** (figure 1). These sites were selected because they offered significantly lower electricity rates (\$0.35 per kWh) compared to most rural microgrids, thereby making the EPCs cost-competitive with relatively inexpensive and ubiquitous charcoal. The off-the-shelf EPCs deployed are plug-and-play with 240V AC power provided by the minigrd.

Under the scope of the project, the team procured and tested products for quality, market fit and compatibility with microgrid consumers. Once an appropriate model was selected, the team traveled to the sites to conduct marketing, sales and end-user trainings.

A loan facility was provided to improve affordability of the products, allowing customers to pay off the products over nine months. The majority of customers participated in the loan facility and indicated that they would not have purchased the product without financial assistance.

Due to the nascency of EPCs in Sub-Saharan Africa, there is little documented evidence on the capacity and impacts of EPC substitution. This project is the first to gather data on EPC usage in a microgrid context for further study to inform rollout of EPCs on microgrids and other appropriate energy contexts.

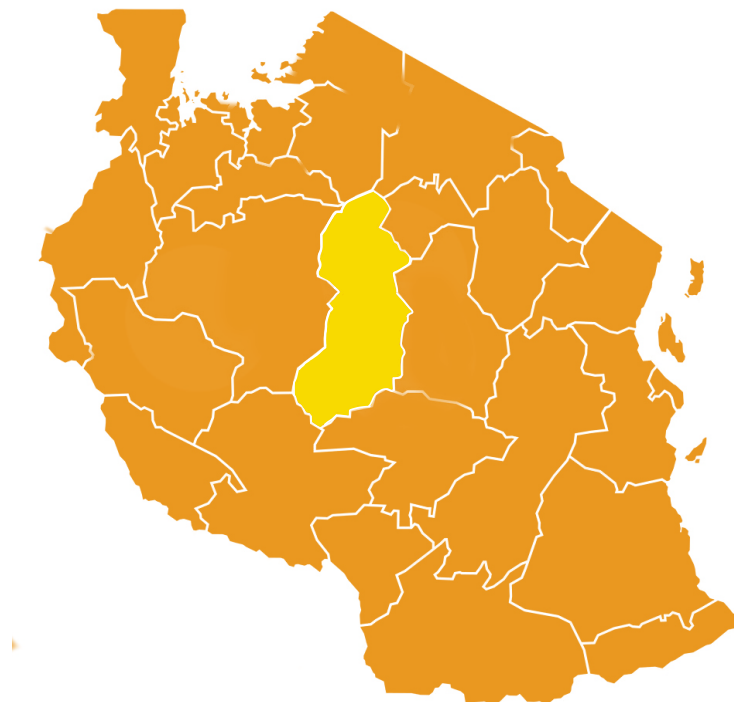
The small-scale study sought to:

1. To test and deliver business model innovations that enable rapid uptake of electric cooking among customers of AC microgrids
2. To develop an understanding of the use case for EPCs in a microgrid context and how distribution of EPCs to microgrid customers affect their ability to consume electricity

The greater aim of the project was to address a modern energy cooking problem:

- Due to their high energy efficiency, EPCs can displace charcoal and/or firewood with associated reductions in greenhouse gasses and indoor air pollution, thus avoiding adverse climate and health impacts.
- EPCs shorten the duration of cooking many staple foods and do not require supervision, thereby reducing overall time spent in fuel procurement and food preparation. This allows those responsible for cooking, predominantly women, to participate in other household or income generating activities.

**Figure 1: Map of Tanzania with Singida Region highlighted**





This project deployed electric pressure cookers to two PowerGen microgrids sites in the Singida region of central Tanzania. The sites were specifically selected due to their lower-than normal tariffs for microgrids, making electric cooking more cost-competitive with charcoal.

Community	Region	Population	Microgrid Customers	Microgrid Installation Date	Solar Capacity (kWp)
Londoni	Singida	8858	203	30 October, 2016	19.08
Saranda	Singida	1735	95	2 February, 2018	6.36

**Data Collection**

Project monitoring and evaluation leveraged remote monitoring data and direct follow-up with 22 of the 25 customers who initially purchased an EPC. The activities included:

- Initial baseline SMS customer survey carried the last week of October 2019 (Appendix A)
- In-person EPC customer survey conducted in two parts in December 2019 to understand consumer experience and impressions of the service; the customers first answered the initial baseline SMS questions (Appendix A) and then a post usage survey (Appendix B)
- Household level smart meter data was collected for the first 25 EPC purchasers, and included their microgrid electricity consumption pre- and post EPC use through January 2020.

The study made the following assumptions:

- One “sack” of charcoal is 30-50 kgs
- Increase in customer load at the meter level is primarily due to use of EPCs

As the study considers a small sample in a very specific context, it is not intended to be a representative sample. Further research is required to bear out the directional results and conclusions discussed in this report.

**Preparation**

To supply technology and provide consumer training, the team partnered with a local EPC distributor, TATEDO. TATEDO is a Clean Cooking Alliance partner that has been working with communities, entrepreneurs and other stakeholders for over 20 years to increase access to sustainable energy technologies and services.

The Nikai Model of EPC was tested for quality assurance, product-market fit and mini-grid compatibility and selected for this project due to its high efficiency and compatibility with the local cooking practices.

Nikai EPC Specifications	
Capacity	6 litres
Operation	Manual
Material Composition	Teflon inner pot
Power Rating	1000W
Safety Features	Locking mechanism, pressure release valve

A consumer financing model for the EPC allowed for payment in installments and potentially improved appliance affordability. The payment plan entailed a down payment of TZS 50,000 (\$21 USD) and monthly instalments of TZS 22,000 (\$9.50 USD) for nine months.

**Sales, delivery and training**

Staff carried out marketing, sales, and delivery to customers at two active microgrid projects in central Tanzania. The team from PowerGen and TaTEDO together spent 2 full days at each site conducting these activities. The schedule followed for each day is outlined below:

**Day 1 Schedule**

- Door to door sensitization of women of the community
- Megaphone announcement to rally customers to the meeting place
- Setup and wiring of EPCs, procuring meal ingredients, arranging space for demonstration, etc.
- PowerGen and TaTEDO team member introductions
- TaTEDO-led demonstration of EPCs for local dishes
- Sharing a meal of rice, beans, goat stew, vegetable stew
- Handout of marketing flyers with the financing offer
- Announcement that anyone who completed the two-day training would receive a TZS 20,000 discount on the initial deposit

**Day 2 Schedule**

- Megaphone announcement to rally customers to the meeting place
- Setup and wiring of EPCs and arranging space for demonstrations

Figure 2: The Nikai EPC and associated information

**Ofa Bei Tsh 230,000**



	Price	Downpayment	Payment	Months
<b>Price</b> 💰	50,000	+	22,000	X 9
<b>Warranty</b> ⌚	One Year			
<b>Energy</b> ⚡	1000 W			
<b>Information</b> ⓘ	Save time, no smoke			

- TaTEDO-led hands on practical training with the women of the community directly involved in preparing the meals
- Sharing a meal of ugali, chicken stew, vegetable stew, and beans.
- Ceremony for handing out certificates of participation to those who attended both days
- EPC sales and delivery out of the back of the PowerGen vehicle

**Outcomes**

- Energy consumption ranged between 1 – 1.2 kWh each day of the training across five to six EPCs used in the demonstration
- 65 men and women received certificates of participation in the training
- 25 EPCs were successfully deployed to PowerGen customers



Demographics

The surveys found the following demographic information on the electric pressure cooker customers:

- **Household size:** the average household size was 5 people, but ranged from 3 - 9 people.
- **Age of consumers:** the average age ranged between 28-58 years, with about 36% of the users above 50 years.
- **Economic activities:** common activities included hotel/restaurant businesses, shops, entertainment centers, butcheries, agriculture and mining.
- **Appliance ownership:** 19 of 22 homes owned at least 2 appliances, primarily subwoofers or televisions (see figure 3)

40% (9 out of 22) interviewees had refrigerators/freezers and a majority were used for commercial purposes, such as hotels and shops. Refrigerator penetration in Africa currently stands around 3%<sup>1</sup>.

Appliance ownership amongst the customers is progressive; generally customers purchase one appliance at a time and complete repayment before making the decision to buy another appliance.

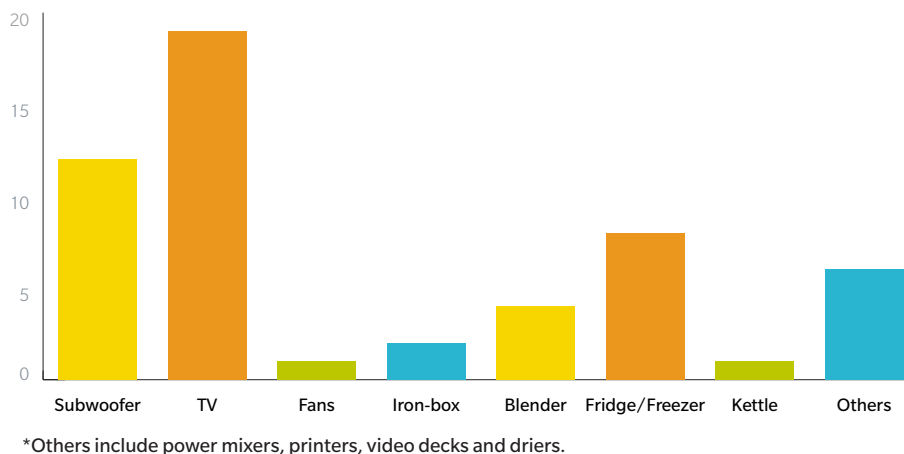
High rates of appliance ownership can be partly attributed to PowerGen’s business model, which includes provision of appliances on loan, as tested in this study.

Purchasing Decision

- Although 16 out of 22 households identified the man as the leader in the home, **the decision to purchase the EPC was made by the women in the majority of households, 17 of 22.**
- Four men decided to purchase the EPC in order to ease the cooking process for their wives.
- One man made the purchase in order to empower himself to be able to cook on his own and not depend on his wife.

<sup>1</sup> The State of the Off-Grid Appliance Market Report, 2019.

Figure 4: Survey results on appliance ownership among EPC customers



Impact of Cooking Demos

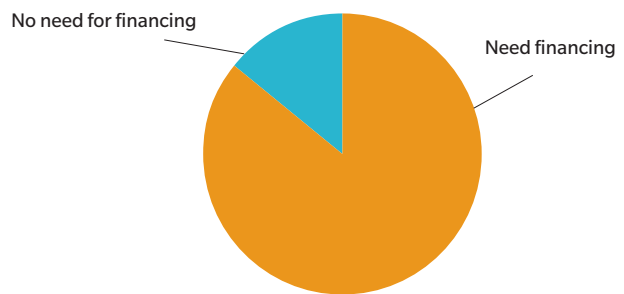
The demos were highly recommended and deemed instrumental in catalyzing purchasing decisions. Customers who participated reported that the training:

1. Made them aware of the advantages of EPCs
2. Allayed some fears/concerns about cooking with electricity
3. Built confidence by allowing customers to practice cooking directly with EPCs
4. Encouraged men to become more independent of their wives in cooking activities
5. Conferred the sense that EPC knowledge is considered a valued skill

Impact of the Loan Facility

The majority of customers interviewed (86%) reported they could not have afforded the EPC without the loan facility (figure 5). However, consumers indicated that with the loan facility the cost of the appliance was reasonable.

Figure 5: Survey results on customers need of financing options



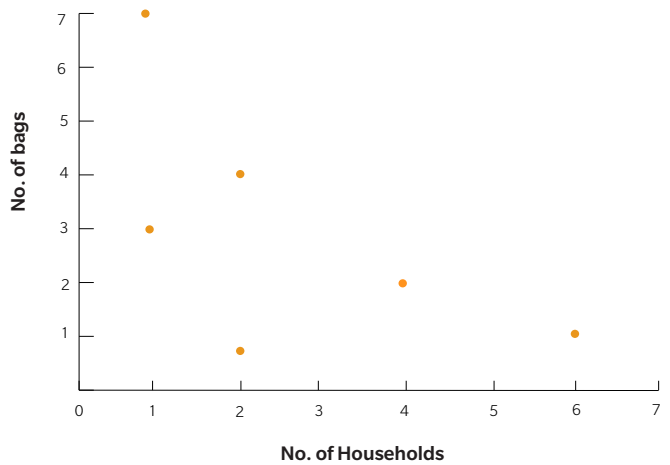


**Fuel Sources Prior to EPC adoption**

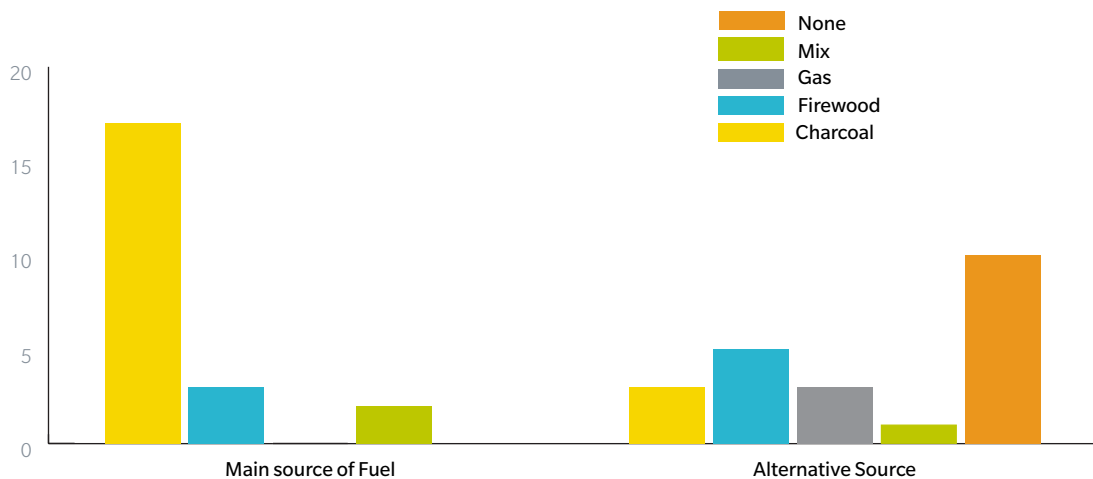
The majority of users cooked entirely on charcoal before purchasing the EPC (see figure 6). Households, on average, use one to two bags (30-50 kg/bag) of charcoal per month while hotel businesses used between three to eight bags (figure 7). The average price of a bag is about TZS 8,000 (about \$3 USD) therefore the average expenditure on fuel ranged between \$10-32 USD.

Firewood was preferred for fast cooking, whereas gas was used for light cooking, e.g. evening meals. Two out of the three customers who use charcoal as an alternative to firewood use less than a bag every month. It was noted that changes in seasons affect both availability (decrease) and cost (increase), to about TZS 10,000 (\$5 USD) per bag.

**Figure 7: Monthly consumption of charcoal prior to EPC purchase**



**Figure 6: Average monthly household fuel expenditure (USD)**



### EPC Use Case

The overwhelming majority of EPCs are being used in the home. Four customers had hotel businesses but only one used the EPC within the business. Types of foods cooked included: rice, maize and beans, beans, bananas, porridge, tea, meat etc. The consumers confirmed that they cooked at least one meal everyday on the EPC; either breakfast or dinner, meals that are susceptible to time constraints.

### Design Wins

Through the surveys, customers reported that they liked various aspects of the product design, including:

- Compact, portable and robust design. The customers are happy that the appliance is not fragile and that it is not too large; it is possible to pack and carry the EPC during travels.
- Sufficient safety features
- Moderate consumption
- Ease of use: the EPC is very easy to operate.
- Sleek/attractive design.

### Newly Realized Advantages

All the users confirmed that the EPC created more time for them to spend in their businesses, farms and other activities.

The EPC freed up nearly two hours per household, primarily by women and children, because of by following reasons:

- Unlike open fires and jikos which require constant attention, the EPC requires no supervision
- EPC operation is quite straightforward and as a result, consumers can carry out multiple tasks simultaneously
- EPCs require very little preparation to carry out cooking
- Heavy foods cook much faster

One customer said that with this additional time, she is able to spend more time on her farm, finishing tasks such as weeding in time for the planting season. **Another recommended it as 'the go-to appliance for the empowered woman.'**

**Cost savings were another reported benefit.** The customers enjoy using the EPC for pre-cooking and boiling activities. Previously, pre-cooking foods such as beans could take up to three hours and consume a huge amount of wood or charcoal. The EPC had halved pre-cooking time, therefore cutting down the firewood/charcoal consumption. A deeper cost benefit analysis could be done later once the customers have used the EPC for a longer time

**The customers also reported that the EPC had no negative health impacts, like their alternative cooking mechanisms.** Customers said that health issues that would arise from smoke were less of a problem. Although they continued to use charcoal and other biomass cooking methods, EPCs did reduce some exposure to household air pollution. Further research is needed to quantify the reduction in exposure and explore strategies to further shift behaviors towards cleaner cooking methods.

## CONSUMER VOICES

*"The best thing about this [EPC] is having more time. I used to sit inside for two or three hours to prepare each meal [lunch and dinner], but now I can put the food inside the cooker and just leave. I go to my farm and can work there all day. It is especially helpful during the harvest season when we have so much to do. Now I come home and the food is ready."*

Figure 8: EPC customer cooks with her daughter



*"The [EPC] is so easy to use, I even let my children cook in it. Now that they can cook, I have more time and know that they are safe. Coal and fire can be dangerous, but the [EPC] is easy and safe."*

Figure 9: EPC customer cooks rice in Saranda, Tanzania





**Impact on Household Energy Consumption**

**Smart meter data recorded before and after the introduction of the electric pressure cookers into microgrid households found that there was an almost 20% increase in energy usage by EPC-users.**

The change in energy consumption presents a strong case for introducing EPCs into microgrid communities. Increasing energy consumption positively benefits microgrid business models and ensures consumer buy-in and long-term sustainability.

Smart Meter Data Analysis for first 25 EPC Customers		
	Date Range (before)	Date range (after)
<b>Number of Days</b>	84	84
<b>Start Date</b>	15 August, 2019	8 November, 2020
<b>End Date</b>	7 November, 2019	31 January, 2020
<b>Total Consumption</b>	914 kWh	1092 kWh
<b>Average Consumption Per User</b>	13.6 kWh/month	16.2 kWh/month
<b>Change</b>	<b>+2.6 KWh/month / 19.50% increase</b>	





## Conclusion

**While the data is preliminary, early results indicate off-the-shelf EPCs are strongly compatible with microgrids and meet customer needs.** The pilot demonstrates that through relatively straightforward and inexpensive interventions, microgrid customers have the capacity to quickly move up the energy ladder, from 3 stone fires and charcoal stoves to one of the cleanest, most efficient modern cooking services.

The primary take-aways from the study include:

- **Financial facilities and in-person training are important to EPC ensure uptake and retention.** The training engagement should be a core component of any program design to deploy electric cooking appliances for first-time users.
- **EPC adoption resulted in an increase in microgrid electricity consumption.** After receiving EPCs, households in the study experienced an increase of 19.5% in electricity consumption, demonstrating a clear interest and need for power consumption among microgrid customers.
- **Electric pressure cooking resulted in consumer quality of life improvements.** Customers who purchased EPCs communicated time saving, cost-saving, safety and ease of use as primary benefits of the appliance. Saving up to 14 hours a week, women and girls had more time to spend with their families, on their farms, performing other domestic or educational activities.
- **Gender plays a role in marketing and uptake.** Men were attracted to and willing to purchase the appliance to save women in their household time and effort, as well as to reduce household exposure to harmful air pollution.

To better understand the usage patterns and impacts of EPCs, the team aims to conduct a follow-up analysis of customers after 6 -12 months, to allow customers time to get used to the EPCs, pay off their loans, and negotiate out any seasonal fluctuations in income and charcoal prices.

## Areas for Future Study

**Due to the small geographic scope and cultural sample, there is need for larger, more robust microgrid EPC projects.** Because only two communities were studied in close proximity to each other, a broader sample is needed to understand if the results are representative of other parts of East Africa.

**To gauge EPC-specific energy consumption, EPC should be metered separately from the rest of the household.** Without an extremely detailed analysis of instantaneous power vs. energy consumption at the household meter level, the claim cannot be made that the EPCs were the causation of the consumption increase. Deeper analysis is recommended to confirm to what degree EPCs were the source of the increase in consumption during the study period. It would also be valuable to study what times of day customers used the EPCs, and compare across usage patterns for customers without EPCs at the two study sites.

To broaden the sector's understanding further, follow-up studies should look into:

1. Offering EPCs across a broader variety of microgrid customers to confirm product-market fit
2. Testing different kWh price points to more deeply understand willingness to pay
3. Studying the longer term impacts of EPCs on microgrid economics technical performance
4. Capturing the corresponding decrease in charcoal/other fuel use, to be sure that the financial and environmental benefits are realized
5. Studying the use of the redeemed time by women and girls to understand time savings and increased productivity

## Appendix A - Initial Survey Questions

Metric	Disaggregation
Village	
Household size	
Head of household	M/F
Age	
Primary source of income	
Who made the decision to purchase the EPC	
Ulitumia vifaa vipi, katika hivi vifuatavyo? Which appliances amongst these do you use?	kompyuta, pasi, subufa, televisheni, tchi, feni
Ulitumia vifaa vipi, katika hivi vifuatavyo? Which appliances amongst these do you use?	Blenda, friji/friza, birika la umeme, rice kuka, machine ya kusiaga
Je, unapika chakula cha idadi ya watu wangapi nyumbani kwako kwa siku? Ambie namba. How many people do you cook for on average in your home?	
Je, unapika chakula kwa ajili ya biashara? Do you have a cooking business?	Ndio, hapana
Je, kwa kawaida, unapika milo mingapi kwa siku? How many meals do you cook in a day?	
Ni njia gani kuu unayotumia kupika? What is your main mode/source of fuel for/of cooking?	la makaa, la kuni, la gesi, la mafiga matatu, la umeme, la mafuta taa
Kwa mwezi, unatumia kiasi gani ya pesa kwa matumizi yako ya kupika? Chagua mojawapo kati ya hivi. How much do you spend monthly on the above mode?	1. Situmii pesa 2. 2,000 TZS, 3. 2,000 – 5,000 TZS, 4. 5,000 – 10,000 TZS 5. 10,000 – 20,000 TZS, 6. More than 20,000 TZS
Ni njia gani nyingine unayoitumia kupikia zaidi ukiachilia njia ya awali? Which other mode/source of fuel do you use in your cooking?	la makaa, la kuni, la gesi, la mafiga matatu, la umeme, la mafuta taa
Kwa mwezi, unatumia kiasi gani ya pesa kwa matumizi yako ya kupika? Chagua mojawapo kati ya hivi. How much do you spend monthly on the above mode?	1. Situmii pesa 2. 2,000 TZS, 3. 2,000 – 5,000 TZS, 4. 5,000 – 10,000 TZS 5. 10,000 – 20,000 TZS, 6. More than 20,000 TZS
Unapika vyakula kipi zaidi, na unatumia njia vipi kuvipika? Which foods do you cook regularly and what mode do you use to cook them?	




## Appendix B - Post-Usage Survey Questions

Metric Number	Metric	Translation
<b>Output 1: User Acceptance</b>		
1.1	What impact had the EPC had on your quality of life; comparison to initial fuel	Ni mabadiliko gani jiko lenye presha limeleta kwenye ubora wa maisha yako, kulinganisha na njia ya awali?
1.2	What are the newly realized advantages?	Ni faida gani mpya umeziona baada ya matumizi ya jiko lenye presha?
1.3	What are some of the challenges that you have experienced?	Ni changamoto umeziona?
1.4	What are some of the concerns that you had at the start and maybe still have?	Ulikua na wasiwasi gani kabla na labda mpaka sasa unao?
1.5	Will you continue to use/recommend to others?	Utaendelea kutumia au kupendekeza kwa wenzako?
<b>Output 2: EPC Design Features</b>		
2.1	Comments on performance, time, and quality of food.	Maoni juu ya ufanisi, muda na ubora wa chakula?
2.2	What are some of your favorite features	Ni vitu gani kuhusu stovu unavyovipenda wewe?
2.3	Are there any features you do not like/understand?	Kuna vitu ambavyo huvipendi/ huvielewi?
2.4	What additional features would you recommend	Vitu gani ungependa viongezwe?
<b>Output 3: Economics</b>		
3.1	Was the loan facility extended by the company helpful? Would you purchase another EPC without the loan facility?	Je, mkopo uliopewa na kampuni umesaidia? Utanunua jiko lenye Presha bila mkopo?
3.2	Were the cooking demos helpful?	Je, mafunzo ya mapishi na matumizi yalikuwa na msaada wowote?
3.3	What are some of the foods that were cooked on the epc	Unapika vyakula vipi katika stovu yako
3.4	If business, is it being used in the business?	Je unatumia EPC katika biashara yako?
3.5	frequency of usage/ product stacking/time saving	

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