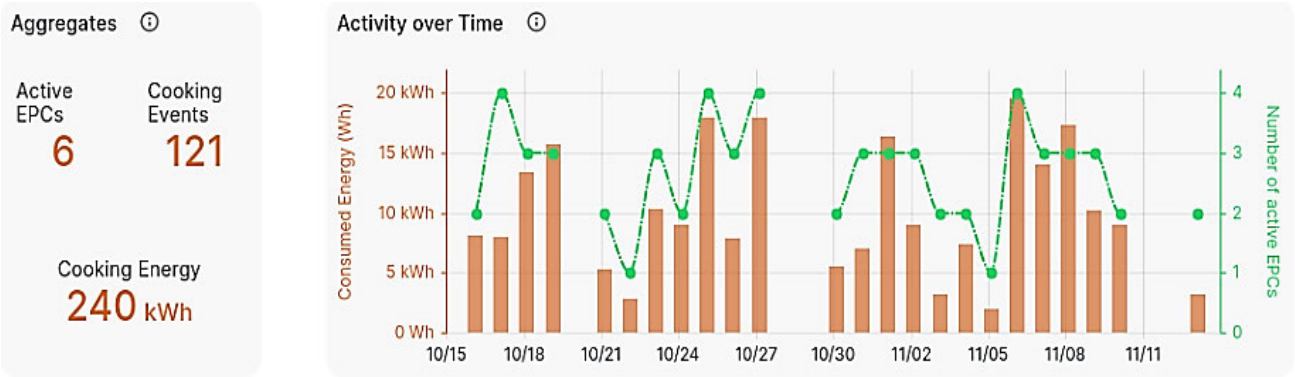
SCALABLE FEEDBACK MECHANISM



Institute of Energy Studies and Research (IESR)

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The Institute of Energy Studies and Research (IESR) is pleased with the successful completion of the Scalable Feedback Mechanisms Project, which would not have been possible without the collective support provided by the Scalable Feedback Mechanism project implementation committee – Daniel Gombe (Project Lead and Author of the report), Dr. Jeremiah Kiplagat, Dr. Patrick Karimi, Samson Ondiek, Agustine Amboka, Oscar Avukuse, Irene Wanjohi, and a team of interns attached to the Research and Consultancy sections at IESR. In addition, we would like to appreciate the team from The Access to Energy Institute (A2EI) - Elliot Avilla and Bastian Herzog for their assistance in developing the Appliance Demand Platform (ADP) and providing smart energy meters for energy consumption measurement at the pilot institutional electric cooking site at IESR Kitchen. Finally, we would like to thank MECS team members, in particular, Dr. Jonathan Leary, Jane Spencer, and Beryl Onjala for their guidance and support in developing and reviewing this project report.

eCooking Capacity Building & Market Development Programme (eCAP)

The eCooking Capacity Building & Market Development programme (eCAP) was implemented in 2023 as a partnership between Kenya Power and two UK-Aid-funded programmes, MECS and UK PACT. eCAP was managed collaboratively by Kenya Power and MECS via the STEER (Sustainable Transitions in Energy, Environment and Resilience) Centre at Loughborough University, UK and Gamos East Africa, Kenya.

Kenya Power owns and operates most of the electricity transmission and distribution system in the country and sells electricity to over 9 million customers. Kenya Power's Pika na Power (Cook with Electricity) campaign aims to stimulate demand for electricity and increase the social and environmental impacts of electricity access.

Modern Energy Cooking Services (MECS) and United Kingdom Partnering for Accelerated Climate Transitions (UK PACT) are UKAid-funded programmes with the shared vision of supporting Kenya to transition from unsustainably harvested biomass to renewably-generated electricity.

eCAP aims to accelerate the uptake of eCooking in Kenya by building the capacity of key market actors and driving forward the development of a sustainable eCooking sector by:

- Developing institutional capacity within Kenya Power
- Designing and implementing a pipeline of scalable activities in parallel with the Kenya National eCooking Strategy (KNeCS)
- Identifying pathways for scaling up the Pika na Power campaign
- Bringing together Kenya's clean cooking and electricity access sectors to empower a network of eCooking Champions
- Generating evidence on the role of eCooking as a tool for stimulating demand and increasing the social impact of electricity access to inform decision-making by Kenya Power's Board of Directors

For more information on eCAP, visit www.MECS.org.uk.

EXECUTIVE SUMMARY

Kenya Power and Lighting Company (KPLC) aims to leverage the potential of electric cooking adoption to boost electricity sales. With 9.2 million customers, the MD & CEO Joseph Siror recently announced the utility's goal of increasing the number of electric cooking users from 90,000 in 2023 to 500,000 by 2026. The previous year (2022) witnessed a 4.4% rise in energy demand, reaching 9,567 GWh, attributed to factors like increased customer numbers [1]. Meanwhile, the eCooking sector has continued to grow, but it is unclear what its contribution has been to the observed demand growth. Understanding demand growth trends is important for revenue modelling and infrastructure planning to ensure the delivery of affordable and reliable power to customers. This in turn will enable cooking with electricity to become an increasing attractive alternative to popular cooking fuels such as charcoal, LPG, kerosene and firewood.

The Baseline Study carried out for the National eCooking Strategy [2] revealed that 24% of Kenyan households already own an electric appliance that can be used for cooking. However, the majority of these appliances are task-specific appliances, in particular water heaters, kettles and microwaves. As a result, the study also showed that less than 1% of households use electricity as their primary cooking fuel. Consequently, the eCooking Strategy aims to increase the adoption and sustained use of two key appliances: Electric Pressure Cookers (EPCs) and induction stoves. These two energy-efficient appliances balance versatility with energy-efficiency, offering cooks an affordable, convenient and modern cooking solution that is well matched to Kenyan cooking practices. As a result, the majority of demand growth from eCooking over the next 5 years is expected to come from the growth in adoption of these two appliances.

Aim

This project aims to establish feedback mechanisms within Kenya Power to understand the contribution of eCooking to demand stimulation. These mechanisms should be scalable as the uptake of eCooking accelerates and should enable Kenya Power to make evidence-based decisions and adapt its approach accordingly.

Methodology

The Institute of Energy Studies and Research (IESR) conducted empirical analysis to understand the correlation between electric cooking appliance acquisition and energy demand. This study used the following methods to understand demand growth from eCooking and pilot innovative mechanisms to

streamline and scale data collection. Data was collected on both electricity consumption and appliance sales volumes, as the two key variables that govern demand growth from eCooking. Data collection focused on EPCs and induction stoves.

Electricity consumption:

- Existing datasets were collated from previous pilot projects across the country to quantify the amount of electricity used for cooking. For selected customers, KPLC meter numbers were obtained to permit interrogation of the utility's customer billing data.
- A collaboration with A2EI enabled an Appliance Demand Platform (ADP) to be established to monitor the consumption of a series of eCooking appliances connected to smart meters in real time.
- PowerPay demonstrated their data dashboard developed during the Consumer Financing eCAP project [3] to showcase the real time data feed from their IoT-enabled EPCs.

Appliance sales volumes:

- Secondary data on appliance ownership and appliance import volumes was reviewed to understand the type of data available and key trends.
- Attempts were made to establish relationships with KEBS (Kenya Bureau of Standards), KRA (Kenya Revenue Authority) and KNCC (Kenya National Chamber of Commerce) to enable access to more comprehensive and current import data.
- An appliance availability survey was implemented with online retailers and selected outlets in Nairobi to understand the range of EPCs and induction stoves available across the country.
- Attempts were made to establish relationships with appliance wholesalers to track sales volumes of specific brands of eCooking appliances.

Key Findings on electricity consumption and appliance sales volumes

Electricity consumption

- The Institute of Energy Studies and Research (IESR) conducted empirical analysis to understand the correlation between electric cooking appliance acquisition and energy demand. This analysis of both primary and secondary data concludes that households adopting EPCs or induction stoves are likely to increase their electricity consumption by 20-80 kWh/month. This broad range encompasses the different household sizes, cooking patterns and stacking of the

electric appliances with other cooking fuels, as well as the different efficiencies of each appliance.

- Compared to the national average consumption of domestic customers of 35 kWh/month, eCooking therefore presents an important opportunity for demand stimulation.
- If the eCooking sector grows to reach the target of 500,000 customers from the current level of 90,000, this would indicate an increase in demand of between 8.2 and 32.8 GWh every month, or between 98.4 and 393 GWh every year. This corresponds to an estimated additional revenue of 1.6-6.5 billion KSh each year. Compared to 2023 sales data presented in the KPLC annual report [1], this represents an increase of between 1 and 4% for the company as a whole.
- However, it's important to note that much of this additional demand will be stimulated during peak time, highlighting the need to investigate mechanisms for time shifting demand for electricity for cooking, such as household energy storage and time-of-use tariffs.
- The Appliance Demand Platform (ADP) created for this project presents metrics for individual appliances and aggregated performance. While the current ADP model fetches its data from electric cooking activities at the IESR kitchen, its design allows seamless integration with existing and future electric cooking appliances nationwide. As such, it is capable of adapting to the evolving electric cooking landscape and contributing to a holistic understanding of its impact on the national energy demand matrix. The ADP provides insights into energy consumption, cost savings and carbon emission reduction by electric cooking appliances, enhancing Kenya Power's data collection, processing, and analysis capabilities, aiding informed decision-making and contributing to national goals of demand stimulation, energy efficiency and environmental protection.

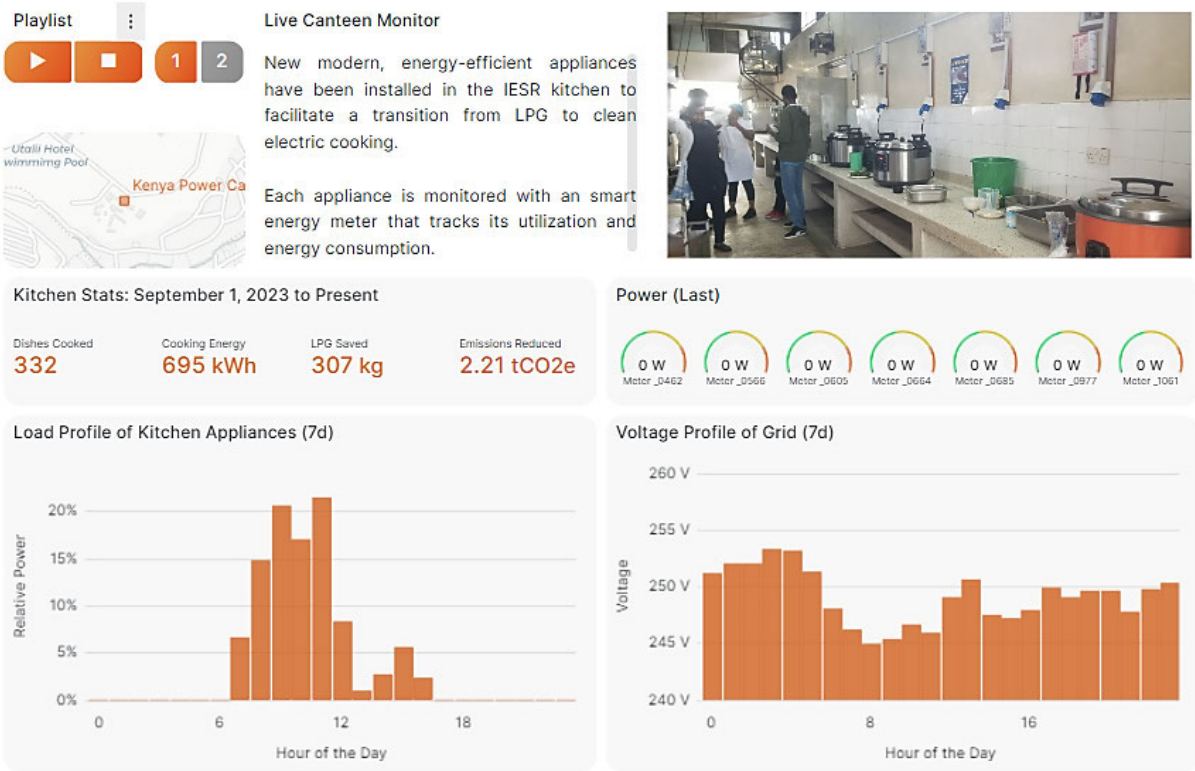

Figure 1 – ADP dashboard for the IESR canteen showing metrics for individual EPCs and the energy used to prepare the meal being served.

Appliance sales volumes

- The Baseline Study for the National eCooking Strategy [2] carried out in February 2023 indicated that 1.3% and 0.1% of Kenyan households already own an EPC or an induction stove (respectively), which corresponds to approximately 174,000 and 13,000 units respectively.
- IESR conducted an online survey in October 2023, targeting seven major e-commerce platforms. The survey revealed 292,664 electric cooking appliances in stock, including 287,122 electric pressure cookers and 5,542 induction cook stoves. Prices ranged from Ksh 2,999 to Ksh 31,500. Jumia online shop emerged as the leading seller, reflecting the popularity of electric cooking appliances among urban and middle-class consumers.
- An appliance availability survey conducted by IESR covering 13 outlet stores in Nairobi indicated the ready availability of electric cooking appliances, with four times more Electric Pressure Cookers (EPCs) available than induction stoves. Ramtons emerged as the dominant brand, especially for EPCs. Additionally, the majority of EPCs observed were of the 6-liter variant with a power rating of 1000 Watts, suggesting that this size and power rating combination appeals to a significant portion of consumers.

- IESR has initiated strategic partnerships with key organizations such as the Kenya Bureau of Standards (KEBS), the Kenya Revenue Authority (KRA), the Kenya National Chamber of Commerce, as well as appliance distributors and retailers in the country. These partnerships will enable KPLC to monitor electric cooking appliance availability and sales through the continuous collection of import and retail data, offering valuable insights into the eCooking market. However, at the time of writing, it had not yet been possible to obtain relevant data through any of these channels.
- To address data gaps in the volumes of imported electric cooking appliances in the country, IESR reviewed a study previously conducted by MECS [4] on import data for several countries, including Kenya. The study revealed that during the period of July-December 2019 a total of 5,600 imported Electric Pressure Cookers (EPCs), valued at approximately US $60,000. Prominent brands such as Von Hotpoint and Sunbeam underscore the demand for electric cooking appliances in the market. It's important to note that this data is now 5 years old and at this point in time the market for EPCs in Kenya was in its infancy. Current sales volumes are expected to be many times higher.

Conclusion and Recommendations

The Scalable Feedback Mechanisms project has yielded crucial insights into the nexus between electric cooking appliance adoption and energy demand stimulation in Kenya. Collaboration with key organizations and comprehensive surveys provided rich insights into the electric cooking landscape, including availability, pricing, and consumer preferences for electric pressure cookers and induction stoves. The empirical analyses revealed a significant increase in household electricity consumption after acquisition of electric cooking appliances, aligning with the company's stated goals for the promotion of electric cooking.

Table 1 details specific recommendations for the further development of each feedback mechanism tested during this project, whilst the list below offers more general recommendations that can facilitate the collection, analysis and utilization of data on the contribution of eCooking to demand stimulation:

- Align future data collection efforts with the timeline of the demand growth forecasting carried out within Kenya Power as part of the Least Cost Power Development Plan (LCPDP).

- Leverage the increasing integration of smart-metering capabilities into eCooking appliances by private sector appliance distribution companies to enhance data collection on demand stimulation.
- Formalise strategic partnerships with national institutions and appliance distribution companies to enable regular access to data held by each organization on the growth of the market.

Table 1: Evaluation of key mechanisms for monitoring the growth of the eCooking sector explored during this study

Mechanism	***Progress made during this study***	***Challenges encountered***	***Recommendations***
Data dashboards connected to IoT-enabled eCooking appliances	IESR partnered with A2EI to set up an Appliance Demand Platform (ADP) to monitor the additional electricity demand created by 7 new eCooking appliances installed in the IESR institutional kitchen during eCAP. Plans were made to display the pilot ADP dashboard, at strategic locations within IESR, including the reception, kitchen cooking space, and the kitchen serving station.	Data privacy concerns prevented the connection of the ADP with KPLC's customer billing database and private sector appliance distributors' IoT-enabled appliances. Procurement delays prevented the acquisition of the TV screens to display the ADP in strategic locations.	- Pilot ADP with EnDev in the upcoming Higher Tier Cooking Results Based Financing (HTC RBF) eCooking component, which KPLC is collaborating on. - Establish MoUs with private sector appliance distributors to connect data streams from IoT-enabled appliances via an API. - Raise awareness of the value of establishing an ADP within KPLC IT department highlighting the data security measures that can be built into its design. - Explore the viability of developing a carbon project using ADP to collect data on appliance usage. - Complete procurement of TV screens to enable display of real time data in strategic locations within IESR. - Consider displaying dashboard at other strategic locations outside IESR, including Stima Plaza and KPLC E-houses and demonstration centers across the country, to inform a broader audience and promote awareness of electric cooking.
Interrogating the customer billing database	36 records of customers who recently acquired eCooking appliances were reviewed in the customer billing database. Demand growth after appliance	Many customers reluctant to share meter number. Long delays in responding to requests for data from to customer billing database.	- Utilize the upcoming opportunity to collaborate on the HTC RBF to develop a streamlined process for acquiring meter numbers, customer consent and access to the corresponding data.

	acquisition was estimated at 93% (70 kWh per customer per month).		
Strategic partnerships with national institutions	IESR has laid the groundwork for strategic partnerships with KEBS, KRA, and KNCC for sustainable electric appliance import and export data collection.	Institutions were either not responsive or sent data that could not be accessed or did not meet the requirements.	- Follow up with KRA, KEBS & KNCC to build relationships with key contacts and gain access to import data.
Strategic partnerships with appliance wholesalers	A streamlined questionnaire was designed to ask appliance wholesalers about past, current and predicted sales volumes for selected eCooking appliances.	Appliance wholesalers were reluctant to share data on sales volumes due to the sensitivity of this data.	- Strategic partnerships with CEOs of appliance wholesale companies with assurance of confidentiality could unlock access to sales volume data from appliance wholesalers, however these relationships would have to be developed with each company active in the market. - The strategic partnership with KRA could also enable insight into the sales volumes of each company through VAT records.
Appliance availability survey with appliance retailers	An appliance availability survey was carried out with online retailers and selected retail outlets in Nairobi.	Good quality data on appliance brand and price was obtained from all surveyed retailers, however data on available stock was only available at selected online retailers and presented significant variation. Sales agents at physical retail outlets were unwilling/unable to share information on sales volumes.	- Repeat the appliance availability survey annually to track the growth in the appliance market, with a focus on the range and affordability of specific appliances rather than sales volumes. - Implement the appliance availability survey in locations where awareness campaigns are being targeted to ensure the supply chain is expanding to meet the growing demand.

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CHAPTER ONE: INTRODUCTION

Kenya, a nation renowned for its rich culinary heritage, is currently undergoing a gradual transformation in its cooking methods and kitchen appliances. With increasing urbanization, busy lifestyles, and a growing emphasis on energy efficiency, electric cooking is becoming an enticing choice for Kenyan households seeking more convenient and cost-effective meal preparation.

Kenya Power and Lighting Company (KPLC) is currently exploring initiatives to enhance electricity sales, anticipating significant growth potential through the widespread adoption of electric mobility and electric cooking among its customer bases. With 9.2 million customers across the country, KPLC aims to increase the number of those using electricity for cooking from 90,000 to 500,000 within the next three years to further augment its revenue from electricity sales. In the previous financial year – 2021/2022 [1], the company recorded a 4.4% increase in electricity demand, reaching 9,567 GWh, up from 9,163 GWh the previous year, resulting in a 21% corresponding increase in revenue from electricity sales. The growth in energy and revenues was attributed to various factors, including an increase in the number of customers.

In the pursuit of understanding the correlation between the acquisition of electric cooking appliances and the stimulation of energy demand in the country, the Institute of Energy Studies and Research IESR) employed empirical analysis to establish energy demand trends among customers who had shifted to electric cooking.

The latest census data [5] showed that the number of households in Kenya cooking primarily with electricity was still below 1%. Since then, commercial sales of eCooking devices have increased considerably, with nationwide campaigns airing on prime-time TV, numerous pilot projects and Results-Based Financing (RBF) programs supporting the sale of over 20,000 Electric Pressure Cookers (EPCs) rolling out modern energy-efficient appliances across the country. Several pilots have collected detailed data from consumers, but this data is often not made available to Kenya Power and if it is, it is normally not possible to cross-reference with their customer billing data as the meter numbers of participants are usually not recorded.

The Baseline Study carried out in 2023 for the National eCooking Strategy [2] revealed that 24% of Kenyan households already own an electric appliance that can be used for cooking. However, the majority of these appliances are task-specific appliances, in particular water heaters, kettles and microwaves. As a result, the study also showed that less than 1% of households use electricity as their

primary cooking fuel. Consequently, the eCooking Strategy aims to increase the adoption and sustained use of two key appliances: Electric Pressure Cookers (EPCs) and induction stoves (Table 2). These two energy-efficient appliances balance versatility with energy-efficiency, offering cooks an affordable, convenient and modern cooking solution that is well matched to Kenyan cooking practices. As a result, the majority of demand growth from eCooking over the next 5 years is expected to come from the growth in adoption of these two appliances.

Table 2: Key characteristics of Electric Pressure Cookers (EPCs) and induction stoves from the Appliance Comparisons eCAP project.

Appliance	***Key Findings***
EPC 	**Most efficient, user-friendly, and cost-effective appliance: combines pressurization, automation & insulation.** + Most efficient and cost-effective way to cook beans, rice, and spinach. + Highest score for ease of use + The quickest way to cook rice and beans. + Automation enables multitasking. – High upfront cost. – Could only cook 3 of 5 meal types.
Induction 	**Balances energy-efficiency with versatility & usability.** + 3rd most energy-efficient & cost-effective appliance: heats pot directly using electromagnetic radiation. + Quick and responsive high-power cooking. + Cooks all 5 meal types. + Used the least amount of energy, cost the least, and took the shortest amount of time to cook chapati and chips. – Moderate upfront costs, but also need to purchase compatible steel cookware. – 2nd the most energy and time-efficient appliance after the EPC when cooking beans, but still took twice as long as the EPC to cook beans.

1.1 Kenya Power's role in facilitating the growth of the eCooking sector

Under the guidance of the Ministry of Energy and Petroleum (MoEP) and in collaboration with various sector players, Kenya Power is exploring the following interventions that could boost the electrification of cooking in Kenya. When implemented cohesively, these measures will not only help stimulate energy demand growth among the electric cooking customer base in Kenya but also address the challenges posed by the adoption of electric cooking appliances in Kenya. Additionally, they will

contribute to the sustainable development of the energy sector by optimizing the utilization of power from renewable energy sources in the country.

1.1.1 Incentivizing Appliance Acquisition and Financing Schemes

To boost the adoption of electric cooking appliances and effectively enhance energy demand growth in the country, incentives and innovative financing schemes for electric cookers are being implemented both by Kenya Power and its partners. These initiatives include tax credits, subsidies, or low-interest financing options, making energy-efficient appliances more accessible to consumers. Realizing these measures could involve multi-stakeholder engagement and partnerships with relevant players across the electric cooking value chain. Additionally, electric cooking appliances could be provided as part of an electricity connection package by the utility company.

1.1.2 Continuous Data Collection Systems

To ensure a comprehensive understanding of evolving energy demand patterns in Kenya resulting from the acquisition of electric cooking appliances, a robust system for continuous data collection from households using such appliances is needed. This system should include automatic meter data collection for all clients upon acquiring electric cooking appliances in the country, followed by real-time, appliance-specific energy consumption monitoring and analysis. This approach will facilitate the prompt and effective adaptation of strategies by the utility company. In the last year, several private sector appliance distribution companies have begun to integrate smart-metering capabilities into their appliances (see Figure 1). There are several motivations for this, including being able to sell appliances using PayGo business models, monitoring usage patterns for verification of carbon finance projects and understanding customer behavior. However, this also presents a strategic opportunity for Kenya Power to gather real time data on electricity consumption specifically for cooking.

Figure 1: Snapshot of the leading companies offering digitized eCooking appliances in the Kenyan market.

1.1.3 Affordable Electric Cooking tariffs

Establishing special electric cooking tariffs has the potential to influence customer decisions in prioritizing electricity as the primary cooking fuel, thereby building the electric cooking energy demand base in the country. Although it is difficult to disaggregate cooking from other household loads with a single household meter, smart-metered appliances offer a new opportunity to pinpoint electricity consumption specifically for cooking and potentially offer alternative pricing for these units.

1.1.4 Grid Reliability Enhancement for Customer Confidence

Grid reliability is crucial for building customer confidence in the electric cooking concept and reducing downtimes in electric power supply. Enhancing network maintenance and investing in technologies to ensure a stable and resilient grid will enable Kenya Power not only to meet current demand but also to realize more cumulative energy demand from households using electric cooking appliances due to the improved Customer Average Interruption Duration Index (CAIDI), currently at 2.24, and the reduced System Average Interruption Frequency Index (SAIFI), currently at 44.9.

1.1.5 Infrastructure Investment for Future Energy Demand Growth

Anticipating potential strain on the existing infrastructure due to increasing demand, strategic investments in energy infrastructure are essential. Upgrading the Kenyan power grids, expanding distribution networks, and incorporating grid-level energy storage systems will contribute to meeting growing demand sustainably.

1.2 Demand growth forecasting

Kenya Power carries out demand forecasting on a biennial basis as part of the Least Cost Power Development Plan (LCPDP) process. The forecasts are important for both revenue predictions and infrastructure planning. As a result, there is a need to monitor and predict demand growth accurately to enable effectively financial and technical planning for Kenya's electricity infrastructure. Demand for electricity for cooking can be estimated with knowledge of the following 2 variables:

- Electricity consumption per appliance
- Number of appliances in the market (and expected rate of growth)

This report is structured around these two variables, with a series of methodologies presented alongside an analysis of the data collected by applying them. Finally, a reflection on the efficacy of each approach is presented, enabling key decision makers to select the most viable techniques to carry forward.

CHAPTER TWO: UNDERSTANDING ELECTRICITY CONSUMPTION FOR COOKING

To comprehend the dynamics of household electricity usage in Kenya, it is essential to investigate the patterns and trends shaping the average consumption of electricity in Kenyan homes, drawing insights from a variety of research studies. While the estimated national average monthly electricity usage per household stands at 35 kWh, as reported by KPLC, a significant majority of Kenyan households consume less than 15 kWh of energy each month. This discrepancy underscores the diverse energy needs prevalent across the various customer clusters.

2.1 Literature review

Various studies (summarized in Table 3) present a detailed analysis of monthly electricity consumption for cooking in Kenya showing that households cooking with energy efficiency appliances are likely to increase their electricity consumption by 20-80 kWh/month. These studies offer insights into the varied patterns and factors associated with electric cooking appliances. Table 3 summarizes the findings of related studies on household energy consumption in Kenya. The analysis highlights the critical importance of considering both the economic benefits and potential challenges associated with increased electricity usage, especially in the context of transitioning to more energy-efficient technologies.

Table 3. Energy consumption for electric cooking across different studies in Kenya [6]

Source	**Methodology**	**Appliances tested**	**Findings on Energy Consumption (mean monthly)**
ESMAP	Techno-economic numerical simulation	Electric pressure cooker, hot plate	• 57.6 kWh/month (100% eCooking), • 19.2 kWh/month (50% eCooking)
EED Advisory	Univariate linear least square regression	Electric pressure cooker, hot plate, air fryer	• 29.82 - 59.65 kWh monthly

Kenya Cooking Diaries	Comprehensive study using Cooking Diaries	Rice Cooker, EPC, Electric Hot Plate	• 42 kWh/month
Burn Manufacturing	CCTs and KPTs among urban households in Kiambu and Nairobi	Burn induction cooker	• 69 - 75kWh/month (all meals) • 46.8kWh/month (1-2 meals)
Village Infrastructure Angels	Fuel comparison	Normal and efficient electric cooking pots	• 54 – 75kWh/month

2.2 Customer billing data analysis

Offering a more detailed perspective, the data from the Kitchen Performance Test (KPT) carried out over three-days, presented in [7], indicated that households acquiring EPCs exhibit an average daily electricity usage of 1.16 kWh. This daily average translates to around 35 kWh per month, which aligns closely with the broader KPLC average, implying that EPCs have the potential to double electricity consumption for a typical customer (i.e. a household consuming 35 kWh/month). However, it is noteworthy that the resulting increase in expenditure remains lower than the savings achieved through traditional cooking fuel. Figure 2 illustrates the trends in total household electricity consumption - 3-month rolling average across 25 pilot customers, depicting a 44% increase in consumption over the period after the acquisition of EPC, rising from an average consumption of 43 to 64 kWh/month.

Figure 2: Trends in household energy consumption before and after acquisition of EPCs [7]

Data was obtained from key private sector appliance distributors, PowerPay and Burn manufacturing indicating the meter number of the customer and the date of acquisition of either an EPC or an induction stove. While a general hypothesis suggests that obtaining electric cooking appliances would inherently lead to a corresponding increase in household energy demand, this study employed empirical analysis to understand if this is truly the case and if so, by how much. The primary objective was to compare the energy consumption for a sample of customers who acquired electric cooking appliances one year before and after the acquisition, providing concrete evidence of energy demand growth. KPLC customer billing data was analyzed to identify and discernible increases in customer energy demand patterns following the acquisition of electric cooking appliances. The analysis compared electricity consumption twelve months' pre and post-acquisition of the appliance, with the findings presented in Figure 2.

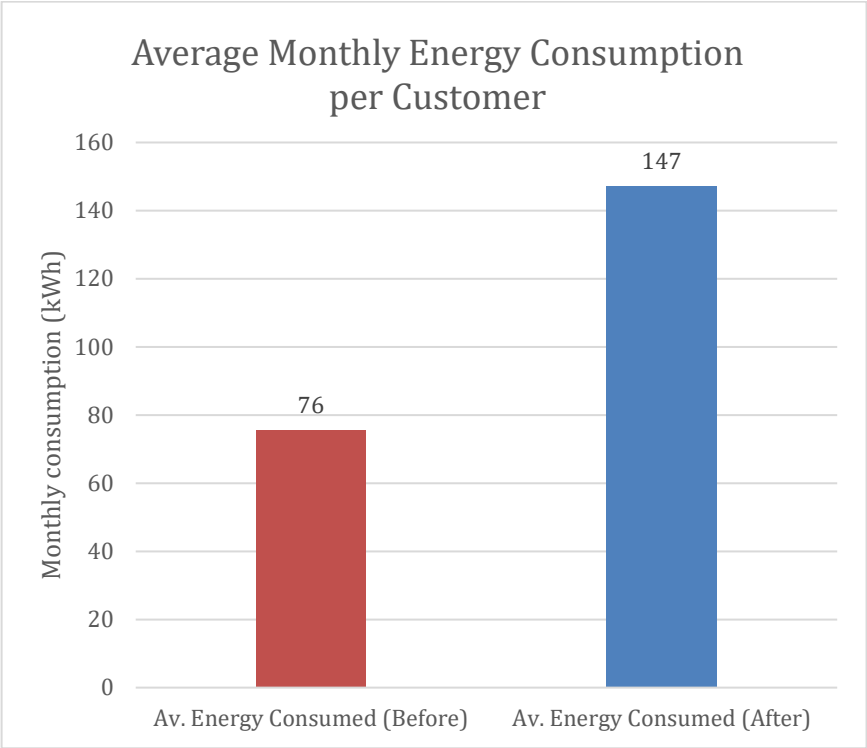

Figure 2: Energy Demand Profile - Monthly Average from Twelve Months Before (left) and Twelve Months After (right) Purchasing an Electric Cooking Appliance.

The analysis reveals a notable increase in household electricity consumption, rising from a monthly average of 76 kWh per customer before the acquisition of an electric cooking appliance to an average of 147 kWh one year after the acquisition of electric cooking appliances across the 36 meters for which billing data was accessed. This results in an average additional electricity demand of 71 kWh per household per month and represents an average increase in energy demand of 93%.

2.3 Cooking load profile analysis

While these studies indicate the approximate monthly energy consumptions, a separate analysis by the Access to Energy Institute (A2EI) and CLASP plotted the daily load profiles for EPC users for various days of the week. Figure 3 presents the daily energy consumption patterns of households using electric pressure cookers.

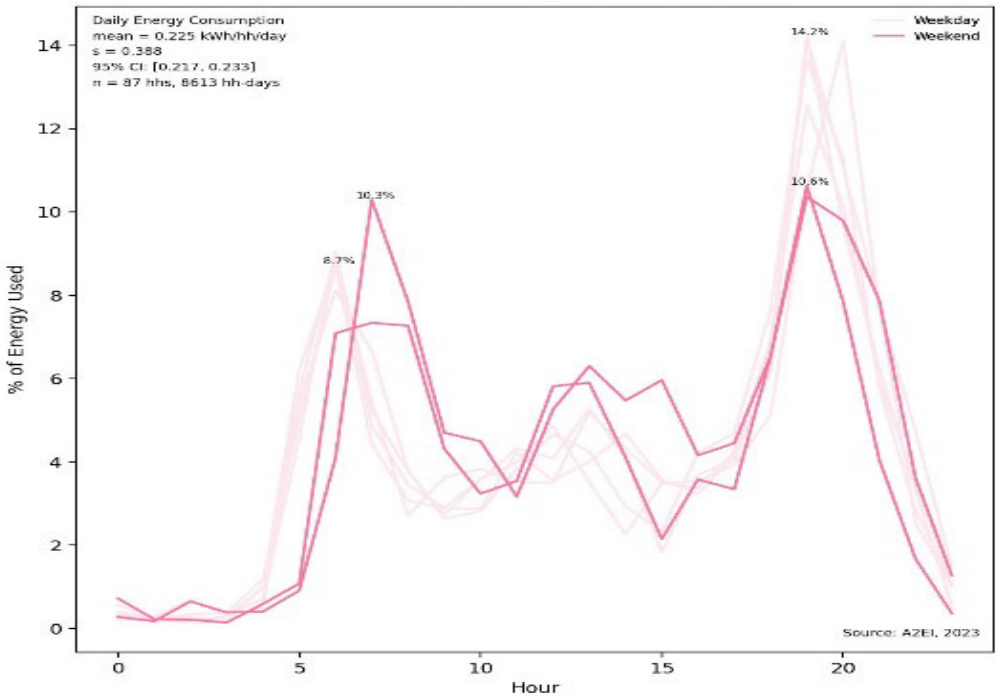

Figure 3: Daily Load Profile of EPC users in Kenya. (Source: A2EI/CLASP)

The energy consumption plot for EPC users follows the normal grid load profile patterns (Figure 4), with corresponding peak - times. It portrays the highest percentage of energy used between 7 and 9 pm.

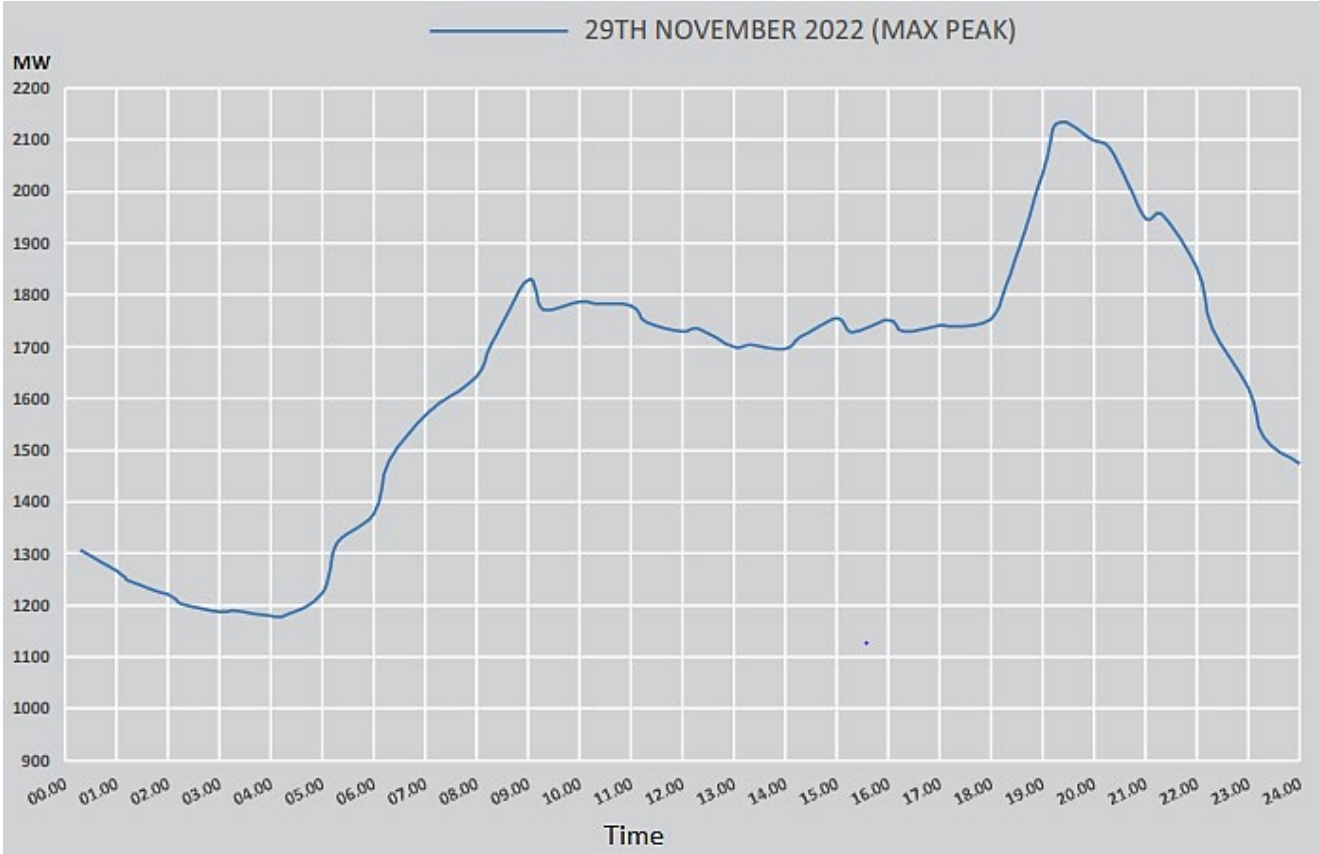

Figure 4: Load profile for the Kenyan grid (Source: KPLC E-mobility report).

If the demand due to electric cooking appliances is superimposed onto the national grid load profile, it has the potential to exacerbate the peak loading issue, particularly if the grid infrastructure is not expanded at the pace corresponding to the rate of adoption of electric cooking in the country.

2.4 Conclusions on electricity consumption from literature review and data analysis

This analysis of both primary and secondary data concludes that households adopting EPCs or induction stoves are likely to increase their electricity consumption by 20-80 kWh/month. This broad range encompasses the different household sizes, cooking patterns and stacking of the electric appliances with other cooking fuels, as well as the different efficiencies of each appliance. Compared to the national average consumption of domestic customers of 35 kWh/month, eCooking therefore presents an important opportunity for demand stimulation. Cooking is therefore likely to fall into middle band of the domestic tariff (30-100 kWh/month), which is currently charged at 16.58 KSh/kWh (exclusive of taxes and levies).

If the eCooking sector grows to reach the target of 500,000 customers from the current level of 90,000, this would indicate an increase in demand of between 8.2 and 32.8 GWh every month, or between 98.4 and 393 GWh every year. This corresponds to an estimated additional revenue of 1.6-6.5 billion KSh each year. Compared to 2023 sales data, this represents an increase of between 1 and 4% [1].

However, it's important to note that much of this additional demand will be stimulated during peak time, highlighting the need to investigate mechanisms for time shifting demand for electricity for cooking, such as household energy storage and time-of-use tariffs.

2.5 Appliance Demand Platform (ADP)

Data dashboards connected to data feeds from smart meters can automate the process of data collection and analysis described above, streamlining the acquisition and utilization of data on electricity consumption for cooking. While there already exists a platform that shows the total energy demand and generation matrices at the national level in Kenya at the National Control Centre (NCC), it is imperative to also understand the portion of the demand created specifically by electric cooking in the country. IESR piloted an Appliance Demand Platform (ADP) to show key electric cooking metrics, including specific electricity demand created by electric cooking appliances and the corresponding emission reductions. The platform can be used for displaying electric cooking metrics in the country that can inform decision-making within Kenya Power in addition to carbon trading purposes.

2.5.1 ADP deployment

IESR, in collaboration with the Access to Energy Institute (A2EI), has developed an Appliance Demand Platform (ADP) that displays crucial metrics related to electric cooking, including the aggregate energy consumed by electric cooking appliances. The ADP offers a comprehensive overview of eCooking's contribution to the overall energy demand mix and underscores the carbon emission reductions achieved through e-cooking, presenting an opportunity for carbon trading. The pilot ADP displays cooking metrics from the electric cooking pilot at the IESR kitchen, featuring a total of seven cookers, each fitted with a smart energy meter to measure and transmit the energy consumption data to a database. Figure 5 and Figure 6 present the layout of the ADP, also accessible via https://adp.energy/ [8] for registered users.

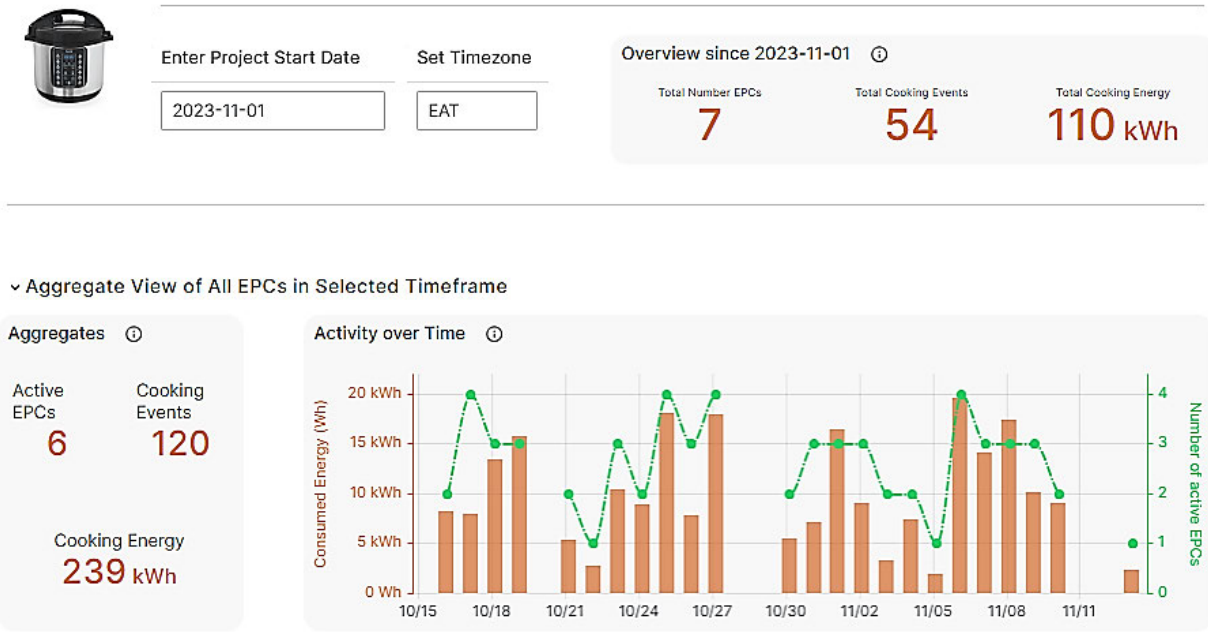

Figure 5 – ADP dashboard showing aggregate metrics for all eCooking appliances.

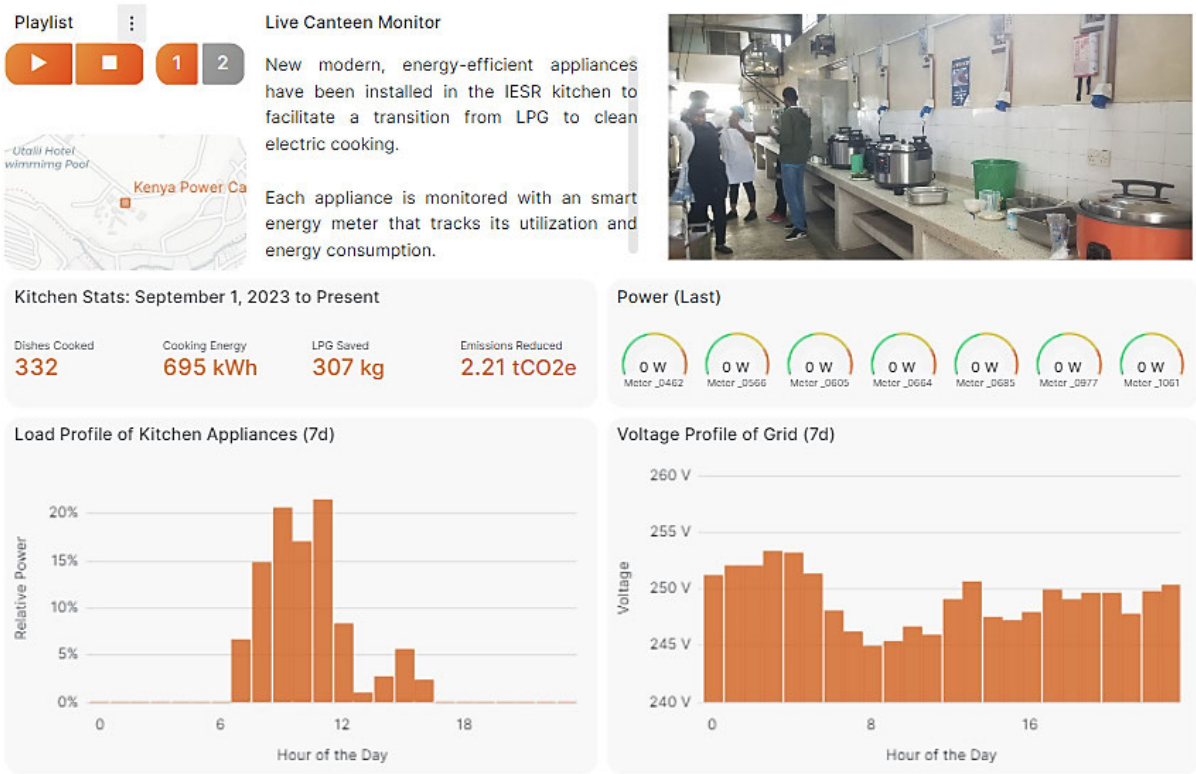

Figure 6 – ADP dashboard for the IESR canteen showing metrics for individual EPCs and the energy used to prepare the meal being served.

To effectively convey the significance of the ADP in modern energy and power systems planning and management to potential stakeholders, the dashboard will be prominently displayed at three strategic locations within the IESR as highlighted below:

a) IESR Reception

The ADP will also be showcased at the IESR reception area, with a focus on high-profile guests visiting the administration offices. This strategic placement ensures that influential individuals and decision-makers are exposed to valuable eCooking insights and the potential for carbon trading presented by the ADP.

b) Cooking Station

This dedicated station will be set up to provide comprehensive demonstrations to stakeholders interested in understanding how the ADP works and the benefits it offers in terms of energy efficiency and carbon footprint reduction. They will be able to see the real-time contribution of an eCooking event during demonstration sessions when they visit.

c) Kitchen Serving Station

Here, the ADP will be readily accessible to guests who serve various meals at the IESR kitchen, typically over a hundred, including Kenya Power staff and trainees from various sectors across the country. The dashboard will display electric cooking metrics, including cost, LPG savings, and carbon savings for the menu being served on the day.

In doing so, the ADP aims to raise awareness and underscore the importance of eco-friendly cooking practices in the context of energy consumption and carbon reduction, ultimately contributing to a more sustainable and environmentally conscious approach to energy management.

2.5.2 Conclusion & recommendations for further development of the ADP

The Appliance Demand Platform (ADP) serves as a comprehensive tool, showcasing vital metrics related to electric cooking appliances. These metrics include the total energy consumption by electric cooking appliances, energy savings, and the quantification of carbon emission reduction. The insights provided by the ADP offer Kenya Power the ability to monitor the impact of eCooking on energy demand stimulation and aggregate valuable data for potential carbon trading initiatives.

The implementation process of the ADP has significantly enhanced Kenya Power's capacity to collect, process, and analyze data pertaining to the widespread adoption and usage of eCooking. By leveraging the ADP, Kenya Power can make informed decisions, develop strategies for sustainable energy management, and contribute to the broader national goals of energy efficiency and carbon reduction. The ADP stands as an asset in the ongoing efforts to understand and optimize the integration of electric cooking appliances into the country's energy landscape.

To fully harness the potential of the Appliance Demand Platform (ADP) within the Scalable Feedback Mechanisms project, the following recommendations are made. Implementing these recommendations will not only optimize the functionality of the ADP but also contribute to a more robust and integrated approach to understanding and managing energy demand in the context of electric cooking appliances.

Integration of IoT-based Meters into eCooking Appliances

Manufacturers are encouraged to consider the integration of Internet of Things (IoT)-based meters into electric cooking appliances. This integration would facilitate easy access to energy consumption data, enhancing the functionality and efficiency of the ADP. The adoption of IoT technology in appliances contributes to a seamless flow of data, providing valuable insights for both users and energy management entities. It also opens the door to enabling customized electricity pricing for electricity used specifically for cooking.

Expand range of connected appliances

The current model of the Appliance Demand Platform (ADP) exclusively displays metrics for electric cookers at the IESR Kitchen. However, its design allows for scalability. Through the skills transfer and training provided to the project team, the model ADP can be seamlessly integrated with both existing and future electric cooking appliances across the country. This scalability feature enables the ADP to evolve beyond its current scope, accommodating a broader range of electric cooking devices. As the electric cooking landscape in the country advances, the ADP can adapt to include additional appliances, providing a holistic view of their energy consumption and contributing to the broader understanding of electric cooking's impact on the national energy demand matrix. This adaptability ensures that the ADP remains a valuable tool for monitoring and managing the energy landscape as it pertains to electric cooking in Kenya.

Expanded Display Locations

To ensure a wider reach and increased visibility, it is recommended that the ADP be prominently displayed on TV screens at strategic locations such as Stima Plaza and KPLC E-houses, as well as electric cooking demonstration centers across the country. This expanded visibility will not only inform a broader audience about electric cooking metrics but also promote awareness and understanding of the energy consumption patterns associated with such appliances.

Collaboration with eCooking Sector Players

KPLC should proactively engage in signing memoranda of understanding (MoUs) with eCooking sector players, including manufacturers and distributors of electric cooking appliances, as well as carbon credit market players. These collaborative agreements aim to facilitate seamless access to appliance data. By fostering partnerships with key stakeholders in the eCooking sector, KPLC can enhance its ability to collect and analyze comprehensive data and explore carbon trading.

Registration of carbon projects using ADP for verification of appliance usage

ADP could enable Kenya Power to register a carbon project for customers transitioning from biomass to renewable electricity. The new metered methodology for streamlined verification of carbon projects could connect directly to the ADP, which would enable real time transmission of data on appliance usage. Such a system would enable KPLC to work with any private sector appliance distributor that integrates smart-metering into their appliance and enables ADP to connect to the data feed remotely. Real time monitoring of usage would enable the generation of high integrity credits, which would sell for much higher prices on the global carbon market.

CHAPTER THREE: APPLIANCE SALES VOLUMES

To accurately forecast additional demand for eCooking appliances, it is important to know the expected sales volumes of key appliance types over the coming years. Therefore, the implementation of scalable data collection mechanisms for knowing how many consumers have acquired eCooking appliances is a critical component of the electric cooking landscape in Kenya. This analysis aimed to trace the volumes of electric appliances throughout the value chain, from international manufacturers to households in Kenya. The overarching goal was to uncover the flow of appliances at different points in the value chain, which can then enable an assessment of the capacity of existing power infrastructure (transmission, distribution, and generation, etc.) to accommodate these appliances in the pipeline. This information is crucial for making informed decisions in electric systems infrastructure planning.

3.1 Overview of Methodological Approaches Used to Estimate the Rate of Change of Electric Cooking Appliance Ownership in the Kenyan Market

While the Baseline Study for the Kenya National eCooking Strategy conducted previous research on appliance ownership through a household survey, our study focused on gathering data at three critical stages: point of imports, wholesale dealers, and at the point of sale. To achieve this objective, IESR employed various methodological approaches, including a literature review and an appliance availability survey targeting both online and physical appliance outlet shops in Kenya, with a specific focus on Nairobi. This has significantly enriched our understanding of the market landscape and consumer preferences. Additionally, stakeholder engagement and data requests were integral parts of our research methodology. Figure 7 shows the appliance flow in various levels within the value chain. To ensure scalable feedback mechanisms for collecting data on electric cooking appliances, IESR has established frameworks for strategic partnerships with key institutions in Kenya, such as KEBS, KRA, and KNCC, for sustainable data collection of electric appliance imports and exports.

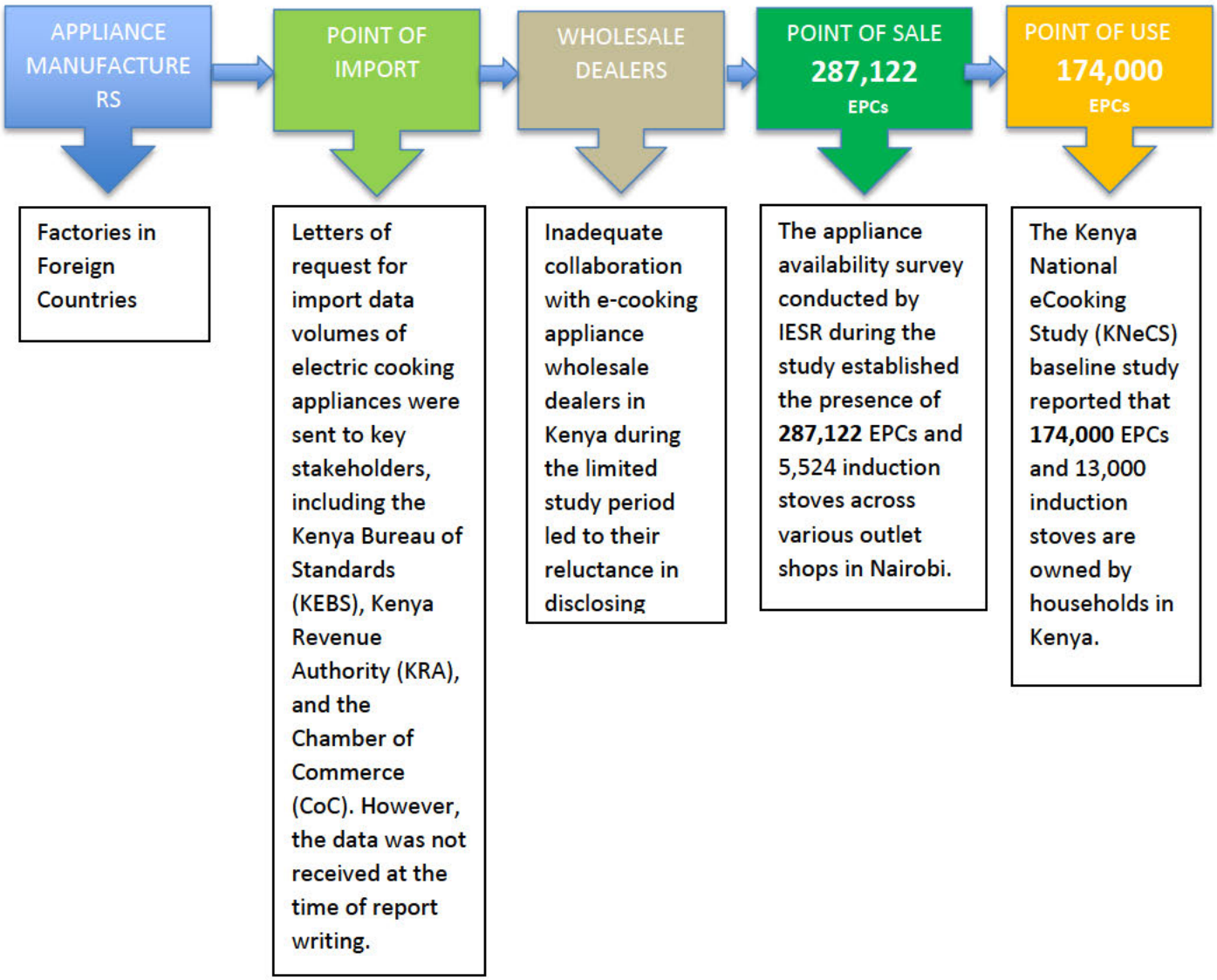

Figure 7: Rate of change of electric cooking appliances across the flow chain from the manufacturers to the households.

3.2 Findings - Point of Use

The Baseline Study for the National eCooking Strategy [2] carried out a comprehensive national survey, revealing the current rates of ownership of different eCooking appliances. The study used a broad definition and enquired about all electric appliances that can be used for cooking. The findings showed that with this broad definition, 24% of the Kenyan population already own an eCooking appliance. However, the majority of these appliances are task-specific appliances, in particular water heaters, kettles and microwaves. As a result, the study also showed that less than 1% of households use electricity as their primary cooking fuel. The study showed that ownership of EPCs and induction stoves was much lower, at 1.3% and 0.1% of Kenyan households already own an EPC or an induction

stove (respectively). However, when considering the total population of 13.4 million households [9], this corresponds to approximately 174,000 EPCs and 13,000 induction stoves.

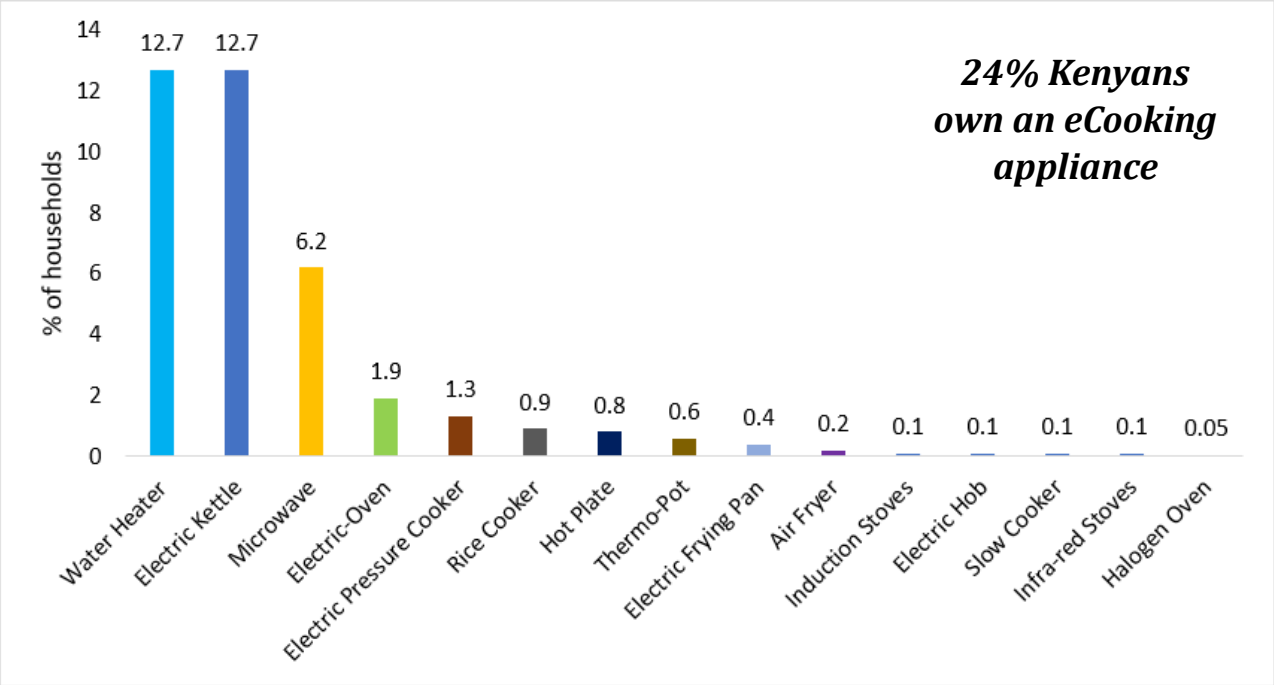

Figure 8: Ownership of eCooking appliances in 2013 as identified by the household survey carried out for the National eCooking Strategy.

3.3 Findings - Point of Retail

3.3.1 Appliance Availability Survey in Online Stores

IESR deployed an online survey to explore the availability of electric cooking appliances in Kenyan online retail stores (see Appendix 4). Electric cooking appliances are particularly popular among urban and middle-class consumers who prioritize attributes such as timesaving, quality, durability, convenience, speed, efficiency, and safety. Many of these consumers use online stores to purchase consumer goods such as electric appliances.

The primary objectives of this survey were:

1. Assessing the presence of electric pressure cookers in Kenyan online retail outlets.
2. Estimating the quantity of electric cooking appliances available in the online market.
3. Gathering insights on pricing, power ratings, and other features associated with electric pressure cookers and induction stoves available in the online stores in Kenya.

The appliance availability survey, conducted in October 2023, targeted prominent e-commerce platforms specializing in kitchen appliances in Kenya.

3.3.2 Availability of Electric Pressure Cookers (EPC) and Induction Stoves in Online Stores.

The survey revealed that there are seven prominent e-commerce platforms in Kenya that stock electric pressure cookers and induction cook stoves. These shops include Jumia, Kilimall, Carrefour, Copia, Naivas online shopping, Avechi Online Shop, and Jiji online shopping. During the survey, the online stores had a total stock of 292,664 electric cooking appliances, comprising 287,122 electric pressure cookers and 5,542 induction cook stoves. Figure 9 displays the volumes of EPCs and induction cook stoves available in various online shops.

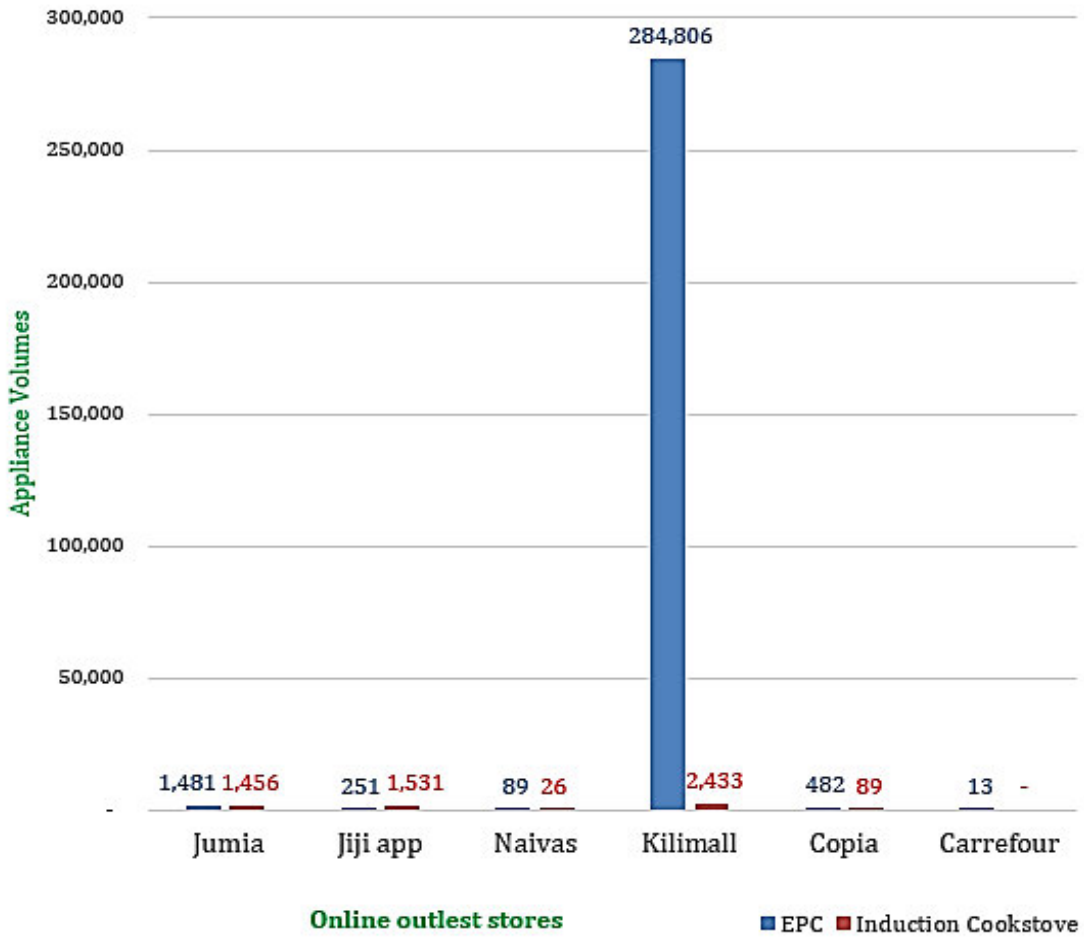

Figure 9: Available Electric Cooking Appliance Stock in Various Online Shops.

The distribution by brand for the available stock of electric cooking appliances in the Kenyan shops during the survey in October 2023 is presented in Figure 10. Figure 11 shows the volumes of induction cook stoves in the Kenyan market distributed by brand.

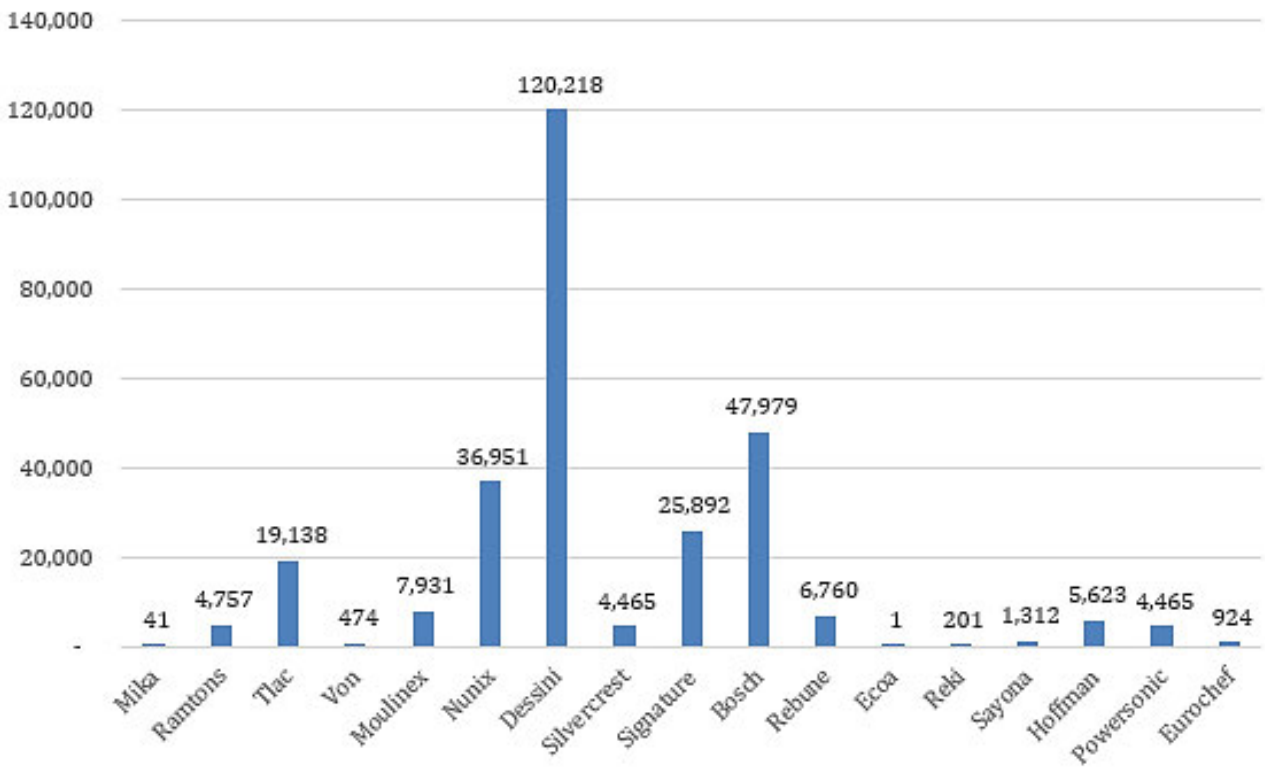

Figure 10 : EPC Volumes by brand in the Kenyan market

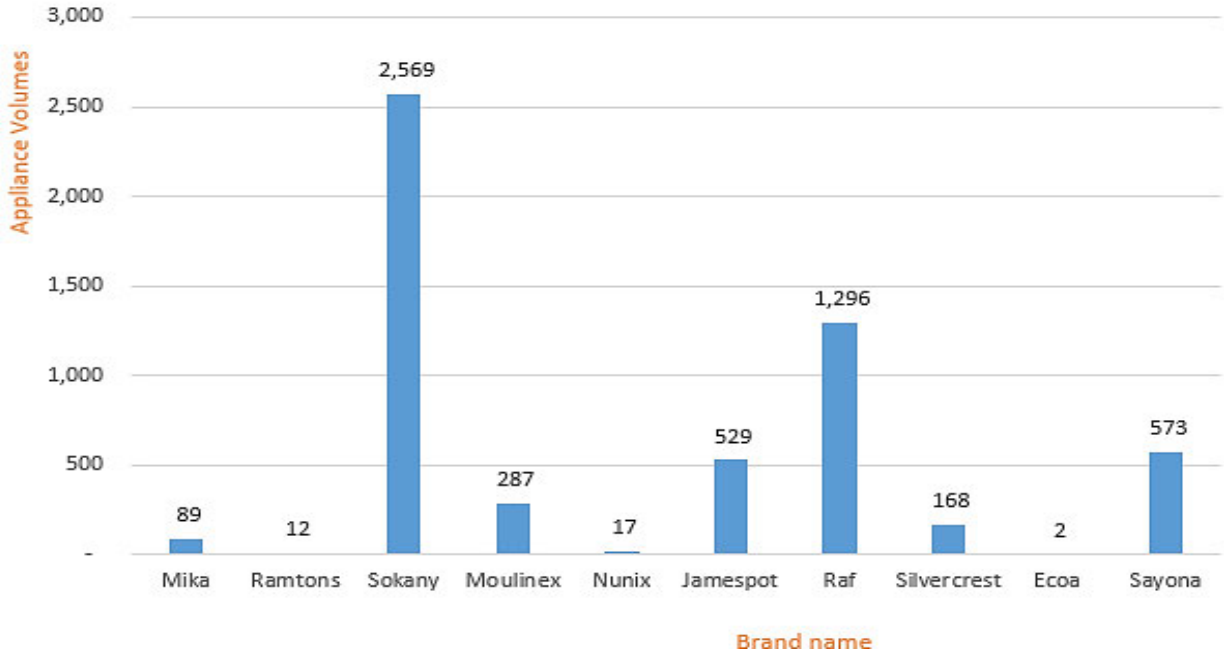

Figure 11: Induction Cook Stoves Volumes by brand

Further analysis revealed that EPCs and induction cook stoves were available at various price points, varying from one brand to another. For instance, the average price of the smallest electric pressure

cooker (1.5 liters) is KSh 3,499, while the average price of a single-burner induction stove is KSh 2,499. Prices differ across different online shops and brands, depending on factors such as availability, delivery options, coatings, and discounts. Some sites offer a wider variety of options and discounts for these appliances. Table 4 shows the price ranges for various EPC and induction cooker models.

Table 4: Price Ranges for Various EPCs and Induction Cook stove Brands.

Brand	EPC price range	Induction stove price range
Ramtons	5670-9500	4000-28630
Von	5995-24995	4567-8599
Rebune	3320-29999	5995-10000
Sokany	4350-8999	7150-14000
Nutricook	4200-20999	9999-18999
Signature	7899-16050	-
Dessini	6300-12000	-
Bosch	3499-17800	-
Silver crest	6788-9990	4426-9000
Nunix	4300-28000	2499-24999
Tlac	3499-18000	7200-18999
Sayona	3500-29999	7951-31500
Moulinex	6990-21994	4432-8864
Powersonic	3500-15000	10449-20999
Eurochef	9080-24000	2499-33290

The online survey revealed that there are 292,664 electric pressure cookers and induction stoves available in over 15 models across seven major online stores in Kenya, with prices ranging from Ksh 2,999 to Ksh 31,500. Among the online stores, Jumia sells the most electric pressure cookers and induction stoves, followed by the Jiji App and Naivas.

3.3.3 Appliance Availability Survey in Retail and Wholesale Stores

IESR also conducted a survey specifically focused on assessing the availability of induction cookers and EPCs in physical retail and outlets in Nairobi. The survey targeted supermarkets and distributors of electric cooking appliances in Nairobi, including large retail chains such as Naivas and Quickmart, as well as smaller stand-alone outlets, including distributor shops along Luthuli Avenue. It aimed to gauge the availability of these technologies from the point of sale to the consumer. Data was collected using a tailored appliance availability survey tool (found in Appendix 4), which sought details of interest, including brand name, model, power rating, price range, and sales volume in 2023.

3.3.4 Availability of EPCs and Induction Stoves in outlet shops and supermarkets.

The data collected after the deployment of the first round of the appliance availability surveys at 13 outlet shops in Nairobi revealed a total of 82 models of appliance, comprising 67 Electric Pressure Cookers (EPCs) and 15 induction stoves. Figure 12 shows the shops visited and the number of unique appliances, both induction stoves and EPCs, found at each of the stores.

```
Luthuli                                13
Thika Road mal carrefour (Roysambu)    11
RONGAI                                 11
Garden city mall (Hotpoint)             9
NAIVAS (MOI AVENUE)                     6
Carrefour Mega                          6
Naivas supermarket (Kasarani)           5
Quickmart (Roysambu)                    4
Naivas Mountain Mall                    4
Powerstar kasarani                      4
Quickmart, T-mall                       4
Naivas Thika Town                       4
Quickmart                               3
Naivas, Freedom Heights                 1
Name: STORE, dtype: int64
```

Figure 12: Stores visited, and number of appliances reported.

The results of the analysis indicate that electric pressure cookers are more prevalent in the market than induction stoves. Figure 12 shows the distribution of the various brands of electric cooking appliances.

```
BRAND NAME  APPLIANCE
RAMTONS     EPC          18
VON         EPC          17
MIKA        EPC          12
NUTRICOOK   EPC          10
DESSINI     EPC           2
EUROCHEF    EPC           2
TLAC        EPC           2
ARMCO       EPC           1
KENWOOD     EPC           1
MOULINEX    EPC           1
SAYONA      EPC           1
Name: APPLIANCE, dtype: int64
```

```
BRAND NAME  APPLIANCE
RAMTONS     INDUCTION STOVE    6
BOSCH       INDUCTION STOVE    3
ARISTON     INDUCTION STOVE    2
VON         INDUCTION STOVE    2
ARMCO       INDUCTION STOVE    1
SOKANY      INDUCTION STOVE    1
Name: APPLIANCE, dtype: int64
```

Figure 13: Appliance counts of EPCs and induction stoves

The analysis of the data collected from 13 outlets in Nairobi underscores the ready availability of various electric cooking appliances in the Kenyan market. Notably, Electric Pressure Cookers (EPCs) are much more prevalent in the market than induction stoves, constituting approximately 80% of the surveyed appliances, indicating their widespread popularity among consumers. Furthermore, the RAMTONS brand emerged as the most common choice for both EPCs and induction stoves, reflecting its strong presence and trustworthiness in the market. Additionally, the majority of EPCs observed were of the 6-liter variant with a power rating of 1000 Watts, suggesting that this size and power rating combination appeals to a significant portion of consumers. These findings provide valuable insights into the electric cooking appliance landscape in Nairobi and offer valuable data for market analysis and decision-making.

While the presented electric cooking appliance data represents volumes solely from selected points of sale within Nairobi, it is believed that the actual national volume could be significantly higher than the reported number. Therefore, it is prudent to conduct an assessment and make informed decisions regarding the planning of power systems to accommodate potential surges in demand from the rapidly growing electric appliance market.

3.4 Findings - Point of Wholesale

Attempts were made by the IESR team to establish strategic partnerships with appliance wholesalers, who import specific brands of EPCs and/or induction stove and sell to retail outlets across the country. A streamlined questionnaire (Appendix 5) was designed to ask appliance wholesalers about past, current and predicted sales volumes for selected eCooking appliances. However, appliance wholesalers were reluctant to share data on sales volumes due to the sensitivity of this data. At the time of writing, no usable data had been obtained.

3.5 Findings - Point of Importation

To address gaps in data regarding the volumes of electric cooking appliances in the country, IESR conducted a review of relevant studies to establish available import volumes of electric appliances in Kenya. Typically, the availability and demand for electric cooking devices in a country can be inferred from the type, brand, and volume of such devices being imported. This information allows for the creation of a demand profile for the different types of electric cooking devices to measure which devices the most are sought after in the market, with a quantification of the same based on the volume of imports by key wholesaler brands.

In 2021, MECS conducted a study on the statistics regarding target markets for electric cooking devices using data obtained for several countries for the period July-December 2019 [2], of which Kenya was a part. This study highlighted the importers of these electric cooking appliances, types, and brands, with a focus on electric pressure cookers, aligning with the focus of this study on electric pressure cookers and induction stoves. Although there was confusion in the data obtained between conventional stove-top pressure cookers and the standalone Electric Pressure Cooking (EPC), based on the valid records of the total number of EPCs imported, those believed to be electric and not stovetop, were 5,600, with a total approximate value of US $60,000, giving a mean unit value of US $11 per appliance (which seems significantly lower than typical retail prices and may imply the true value was understated to reduce the import tax payable) [2]. Among the brands imported, Von Hotpoint was the market leader, with 680 units with a total value of 21,500 USD, but Supor, Sunbeam, TCL, Sayona and TLAC were also present [2].

3.5.1 Partnerships with Key Organizations for Scalable Data Collection

IESR has initiated strategic partnerships with key organizations such as the Kenya Bureau of Standards (KEBS), the Kenya Revenue Authority (KRA), the Kenya National Chamber of Commerce, as well as appliance distributors and retailers in the country. These partnerships will enable KPLC to monitor electric cooking appliance availability and sales through the continuous collection of import and retail data, offering valuable insights into the eCooking market. In pursuit of this objective, IESR, under the leadership of the CEO of KPLC, has initiated communication with the CEOs of these three key institutions—KEBS, KRA, and the Kenya National Chamber of Commerce (KNCC). The approved data request memos (Appendix 2-4) have been dispatched to these institutions, and feedback is awaited as of the report writing date.

3.6 Recommendations

To enhance the accuracy and comprehensiveness of the findings, it is advisable to undertake the following steps:

1. To ensure KPLC stays abreast of the sustained growth of the eCooking sector and market penetration of each type of appliance, it's crucial to establish a mechanism to regularly assess the availability and affordability of electric cooking appliances in the market. This could be achieved by repeating the appliance availability survey annually to track the growth in the appliance market, with a focus on the range and affordability of specific appliances rather than sales volumes. In addition, KPLC could implement the appliance availability survey as a nationwide survey to capture a broader representation of electric appliance volumes beyond Nairobi, or in locations where awareness campaigns are being targeted to ensure the supply chain is expanding to meet the growing demand.
2. Establish robust collaboration with key stakeholders, including the Kenya Revenue Authority (KRA), Kenya Bureau of Standards (KEBS), and the Kenya National Chamber of Commerce, to obtain crucial electric appliance data. Integrating verified data from these institutions will offer more comprehensive insights into the electric appliance volume in Kenya.
3. Engage in continuous monitoring and data collection, considering the dynamic nature of the electric appliance market. Regular updates will ensure that the information remains relevant for ongoing planning and decision-making.
4. Collaborate with international organizations or research institutions to benchmark findings and gain a global perspective on trends and best practices in managing electric appliance volumes.

5. Strategic partnerships with CEOs of appliance wholesale companies with assurance of confidentiality could unlock access to sales volume data from appliance wholesalers, however these relationships would have to be developed with each company active in the market.
6. The strategic partnership with KRA could also enable insight into the sales volumes of each company through VAT records.

In addition, the following recommendations are made to enhance the availability and demand for electric cooking appliances in the Kenyan market:

1. There is a pressing need to conduct extensive market awareness and education campaigns to inform consumers about the benefits and efficiency of electric cooking appliances, with a particular focus on induction stoves, which are much less prevalent than EPCs.

2. Implementing incentives for retailers to promote and stock a wider variety of electric cooking appliances is essential. These incentives can encourage retailers to diversify their offerings, thereby fostering a broader market presence for electric cooking appliances.

CHAPTER FOUR: CONCLUSIONS & FURTHER WORK

The Scalable Feedback Mechanisms project has provided valuable insights into the relationship between the adoption of electric cooking appliances and the stimulation of energy demand in Kenya. The empirical analysis of energy consumption patterns among customers who acquired electric cooking appliances has revealed a significant increase in household electricity consumption, aligning with the objectives of promoting electric cooking in the country. Additionally, the establishment of the Appliance Demand Platform (ADP) has proven to be a crucial tool in monitoring key metrics related to electric cooking appliances. The ADP not only offers a comprehensive overview of eCooking's contribution to the overall energy demand mix but also provides insights into energy savings and carbon emission reductions. Its scalability feature allows for future integration with a broader range of electric cooking devices, ensuring its continued relevance in monitoring and managing the energy landscape.

Recommendations have been proposed to further enhance the impact of the ADP, including the integration of IoT-based meters into electric cooking appliances, expanded display locations for increased visibility, and collaboration with eCooking sector players. These recommendations aim to optimize the functionality of the ADP and contribute to a more comprehensive understanding of energy demand in the context of electric cooking appliances.

The implementation of scalable data collection mechanisms, in collaboration with key organizations and through comprehensive surveys, has provided a rich understanding of the electric cooking landscape in Kenya. Insights from online and retail store surveys have highlighted the availability, pricing, and consumer preferences for electric pressure cookers and induction stoves. These findings serve as a foundation for informed decision-making and market strategies.

In moving forward, the recommendations provided, including continuous data collection systems, incentivizing appliance acquisition, infrastructure investment, grid reliability enhancement, and the establishment of affordable electric cooking tariffs, collectively form a holistic approach to further stimulate energy demand growth, ensure sustainable development, and optimize the integration of electric cooking appliances into the national energy landscape.

The Scalable Feedback Mechanisms project not only contributes to the understanding of the energy dynamics associated with electric cooking but also lays the groundwork for future initiatives and policy decisions to foster a more sustainable and energy-efficient cooking environment in Kenya.

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APPENDICES

Appendix 1 – Data request letter to KEBS CEO

MANAGING DIRECTOR & CHIEF EXECUTIVE'S OFFICE

Kenya Power

THE KENYA POWER & LIGHTING CO. PLC
P.O. Box 30099-00100, Nairobi, Kenya
Tel: 020-3201000

Our Ref: KP1/13/2/1/JKK/jk

19th October, 2023

[redacted]
Kenya Bureau of Standards
[redacted]

Dear CEO,

RE: REQUEST FOR DATA ON ELECTRIC COOKING APPLIANCE IMPORTS

We are currently working on a project that aims to assess the potential of electric cooking appliances, particularly electric pressure cookers (EPCs) and induction stoves, as a clean, safe, time-saving and efficient cooking technology for Kenyan households. This research is co-ordianted by KPLC - Institute of Energy Studies and Research. As part of the research, we would like to request data on electric cooking appliance imports from your organisation. This data will help us understand the current market, size trends and barriers to electric cooking appliance adoption in Kenya.

We are particularly interested in the following information:

1. The number, value and type of electric cooking appliance imports by Year, Country of Origin and tariff code.
2. The import duties, taxes and fees applied to different types of electric cooking appliance Imports
3. The standards, regulations and certifications required for electric cooking appliance imports.
4. The challenges and opportunities faced by electric cooking appliance Importers and Distributors.

We will acknowledge your contribution to our project reports and publications which we will share with you for review before official publication. If there are any sensitivities in relation to the use of this data, please do highlight these and we assure you that we shall act accordingly.

For any clarification, you can contact the project coordinator: Daniel Ngombe, [redacted]

Yours Faithfully,

DR. ENG. JOSEPH SIROR
MANAGING DIRECTOR & CEO

Stima Plaza, Kolobot Road, Parklands | www.kplc.co.ke

Appendix 2 – Data request letter to KRA Commissioner General

MANAGING DIRECTOR & CHIEF EXECUTIVE'S OFFICE

Kenya Power

THE KENYA POWER & LIGHTING CO. PLC
P.O. Box 30099-00100, Nairobi, Kenya
Tel: 020-3201000

Our Ref: KP1/13/2/1/JKK/jk

19th October, 2023

[redacted]
Kenya Revenue Authority
P O Box 48240-00100
NAIROBI

Att: Commissioner, Domestic Tax

Dear CG

RE: REQUEST FOR DATA ON ELECTRIC COOKING APPLIANCE IMPORTS

We are currently working on a project that aims to assess the potential of electric cooking appliances, particularly electric pressure cookers (EPCs) and induction stoves, as a clean, safe, time-saving and efficient cooking technology for Kenyan households. This research is co-ordianted by KPLC - Institute of Energy Studies and Research. As part of the research, we would like to request data on electric cooking appliance imports from your organisation. This data will help us understand the current market, size trends and barriers to electric cooking appliance adoption in Kenya.

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For any clarification, you can contact the project coordinator: Daniel Ngombe, [redacted]

Yours Faithfully,

DR. ENG. JOSEPH SIROR
MANAGING DIRECTOR & CEO

Appendix 3 – Data request letter to KCCI CEO

MANAGING DIRECTOR & CHIEF EXECUTIVE'S OFFICE

Kenya Power

THE KENYA POWER & LIGHTING CO. PLC
P.O. Box 30099-00100, Nairobi, Kenya
Tel: 020-3201000

Our Ref: KP1/13/2/1/JKK/jk

19th October, 2023

[redacted]
Kenya National Chamber of Commerce and Industry
P O Box 00200-47024
NAIROBI

Dear CEO,

RE: REQUEST FOR DATA ON ELECTRIC COOKING APPLIANCE IMPORTS

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2. The import duties, taxes and fees applied to different types of electric cooking appliance Imports
3. The standards, regulations and certifications required for electric cooking appliance imports.
4. The challenges and opportunities faced by electric cooking appliance Importers and Distributors.

We will acknowledge your contribution to our project reports and publications which we will share with you for review before official publication. If there are any sensitivities in relation to the use of this data, please do highlight these and we assure you that we shall act accordingly.

For any clarification, you can contact the project coordinator: Daniel Ngombe, [redacted]

Yours Faithfully,

DR. ENG. JOSEPH SIROR
MANAGING DIRECTOR & CEO

Stima Plaza, Kolobot Road, Parklands | www.kplc.co.ke

Appendix 4 – Appliance availability Survey Questionnaire – Outlet stores

Kenya Power

ELECTRIC COOKING APPLIANCE AVAILABILITY SURVEY

a) **Informed Consent**

Survey background:

This is a survey on the availability of different types of electric cooking appliances in the Kenyan market as carried out by a team from the Institute of Energy Studies and Research (IESR), Kenya Power. The data to be collected is on the types and brands of electric cooking appliances available at your store for sale to the market, and the number of units of these appliances sold in the past financial year. The survey shall request information on:

1. Location of your business and category of the outlet
2. Data on electric cooking appliances available at your outlet

Please be aware that the data collected shall be used in the publishing of a section of a report on electric cooking appliances in Kenya, namely the types and availability of different electric cooking technologies found around different regions in Kenya. The name of your store shall only be mentioned in the report in the context of the different appliances available in the region and a sample of the stores holding these appliances. There shall be no direct link to the sales volumes published as these shall be reported as aggregated appliance sales statistics over the region and not specific to the different stores.

Consent:

I understand the aforementioned content of the survey. I hereby consent to the collection of electric cooking appliance availability data and sales volumes from this business concerning the same as part of a survey by the IESR Team:

Name: _____ Sign: _____

Date: _____

b) **Survey**

Please fill in the boxes below:

1. **Business Details**

Name of Outlet			
County			
Town/City			
Outlet Category *(Tick where appropriate)*	Stand-alone retail stall ☐	Supermarket Chain ☐	Wholesaler ☐

2. **Appliance Details**

i. Which of the appliances indicated below do you stock in your store? *(Tick where appropriate)*

- ☐ Electric Pressure Cookers
- ☐ Induction Stoves
- ☐ Electric Hotplates
- ☐ Electric Oven & Gas Burner combined
- ☐ Rice Cookers
- ☐ Microwaves
- ☐ Electric Kettles
- ☐ Air Fryers

ii. Give details on the appliances indicated above as directed in the table below

Appliance	Brand name	Model	Power rating(range)	Price(Kes)	FY22/23 Sales Volume (units)

Appendix 5 – Appliance Wholesaler Sales Volumes Questionnaire

Kenya Power

MANAGING DIRECTOR & CHIEF EXECUTIVE'S OFFICE

Our Ref: KP1/13/2/1/JKK/jk

THE KENYA POWER & LIGHTING CO.PLC
P.O.Box 30099-00100, Nairobi, Kenya
Telephone: 020-3201000
DATE

CEO ADDRESS
P.O.Box
Nairobi, Kenya
Telephone :020 2666348/6
CITY

Dear Sir/ Madam,

RE: REQUEST TO ACCESS DATA ON SALES VOLUMES

Kenya power aims to improve services to Kenyans in providing quality power in the quantity required. We are aware that with new modern cooking appliances in the market, Kenya Power may need to increase electricity supply as demand grows. To quantify the additional electricity demand generated, we are working on a survey to understand how many of these appliances are being sold in the Kenyan market.

This letter is to request for your sales volume estimates for EPCs and induction stoves for the periods outlined in *Appendix A*. We would also like to know whether any of these EPCs and induction stoves sold have integrated smart-metering capabilities (*Appendix B*).

The final report built from the data obtained during this market research will only present anonymised data aggregated over the entire market. however, if there are any sensitivities with the use of this data, please highlight these and we assure you that we shall act accordingly. For any clarification, you can contact the project coordinator: Daniel Gombe, [redacted]

Yours Faithfully,

DR. ENG. JOSEPH SORIR
MANAGING DIRECTOR & CEO

Appendix A

Table of total sales estimates

	Last year (Jan-Dec 2022)	*This year (Jan-Dec 2023)*	*Next year (Jan-Dec 2024)*
EPCs	0-100, 100-1,000, 1,000-5,000, 5,000-10,000, 10,000-50,000, 50,000-100,000, 100,000+	0-100, 100-1,000, 1,000-5,000, 5,000-10,000, 10,000-50,000, 50,000-100,000, 100,000+	0-100, 100-1,000, 1,000-5,000, 5,000-10,000, 10,000-50,000, 50,000-100,000, 100,000+
Induction cookers	0-100, 100-1,000, 1,000-5,000, 5,000-10,000, 10,000-50,000, 50,000-100,000, 100,000+	0-100, 100-1,000, 1,000-5,000, 5,000-10,000, 10,000-50,000, 50,000-100,000, 100,000+	0-100, 100-1,000, 1,000-5,000, 5,000-10,000, 10,000-50,000, 50,000-100,000, 100,000+

Appendix B

Do any of the EPCs and induction stoves you have sold have integrated smart-metering capabilities?

- If so, roughly what proportion?
    a. Smart EPCs:
    b. Smart induction stoves:
- If not, do you plan to introduce it in the future?