MECS
Modern Energy Cooking Services

Cooking with Electricity in Uganda

Agnes Naluwagga and Derrick Kiwana

Stakeholders Consultation Webinar - October 29, 2020
Kampala, Uganda

CREEC
CENTRE FOR RESEARCH IN ENERGY AND ENERGY CONSERVATION
Energy for generations

Loughborough University

ESMAP
Energy Sector Management Assistance Program

UKaid
from the British people

OVERVIEW

- MECS - Uganda
- The cooking energy sector in Kampala
- 'Kitchen lab' controlled cooking test (CCT) – key findings
- Closing note

MECS - Uganda

Modern Energy Cooking Services (Uganda)

- Research activities focused on promoting the cooking needs of households into the investment and action on ‘access to affordable, reliable and sustainable modern energy for all’ in Uganda;
- Identify opportunities and support households’ transition to modern and efficient energy cooking services and technologies.
- Support Government’s commitment to promote and make energy efficient technologies accessible as per the National Development Plan (Energy Objective) and the draft National Energy Policy (2019).

MECS – Uganda Objectives

To assess the practicality of cooking with electricity:

- identify culturally appropriate opportunities for transitioning to cooking with modern energy;
- understand the barriers and opportunities to cooking with modern cooking technologies; and
- build a data supported understanding of households cooking related preferences and other context-specific factors related to cooking.

MECS - Uganda

Currently work focused in Kampala and studies done to date include:

- Households Survey: Oct 2019
- Online Survey: July 2020
- Controlled Cooking Test (CCT) - May to July 2020

  Under MECS referred to as a “kitchen lab CCT’

MECS
Modern Energy Cooking Services

The cooking energy sector in Kampala: an overview

Loughborough University

ESMAP
Energy Sector Management Assistance Program

UKaid
from the British people

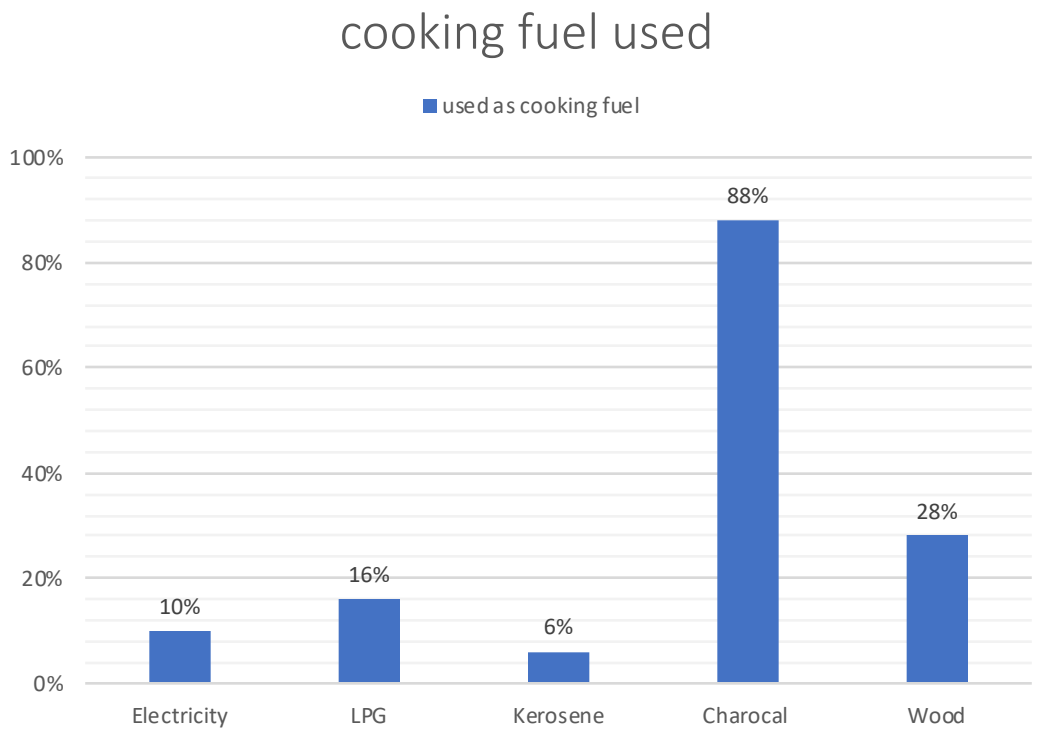
The (Cooking) Energy Sector in Uganda

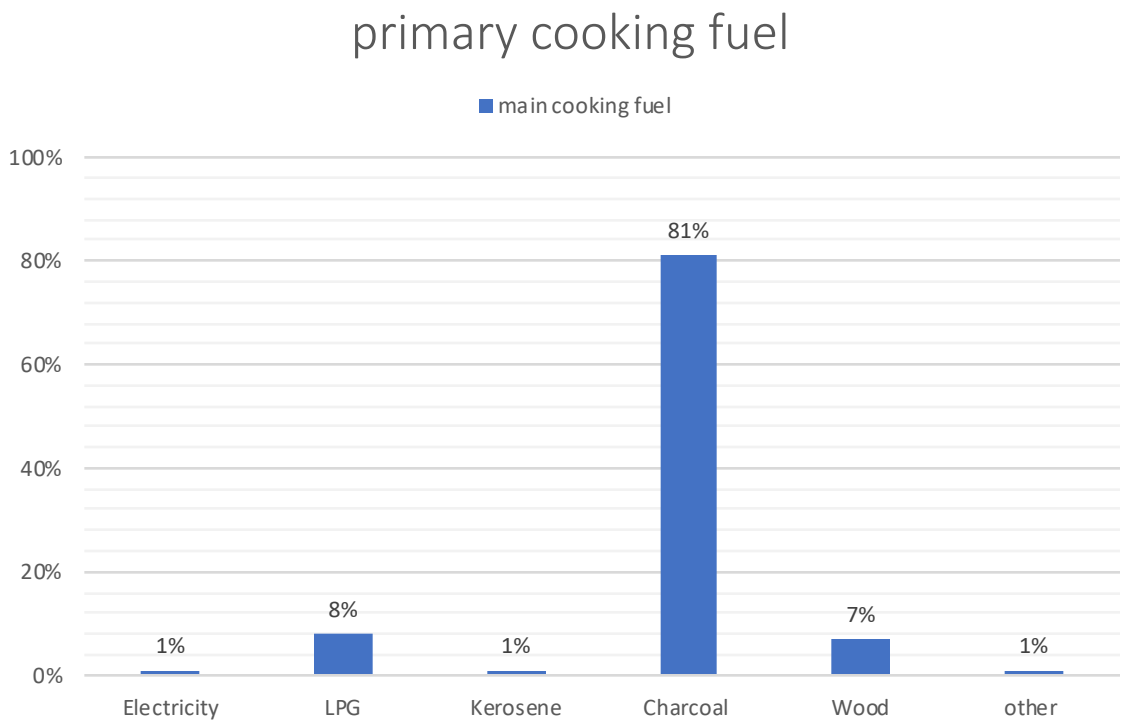
- According to the Ugandan Bureau of Statistics (2017), nationwide 94% of households rely on biomass for their cooking needs, while only 6% rely on electricity, kerosene, gas, etc.

- As per the National Charcoal Survey (2016) 9 out of 10 households use either firewood or charcoal for cooking.

- Most urban households (66%) use charcoal for cooking compared to only 16% in rural areas; in Kampala, 79.4% use charcoal for cooking and 20% used other fuels.

The (Cooking) Energy Sector in Kampala





Source: Discrete Choice Modelling Survey, Uganda (Scott et al, 2019)
https://mecs.org.uk/download-category/uganda/

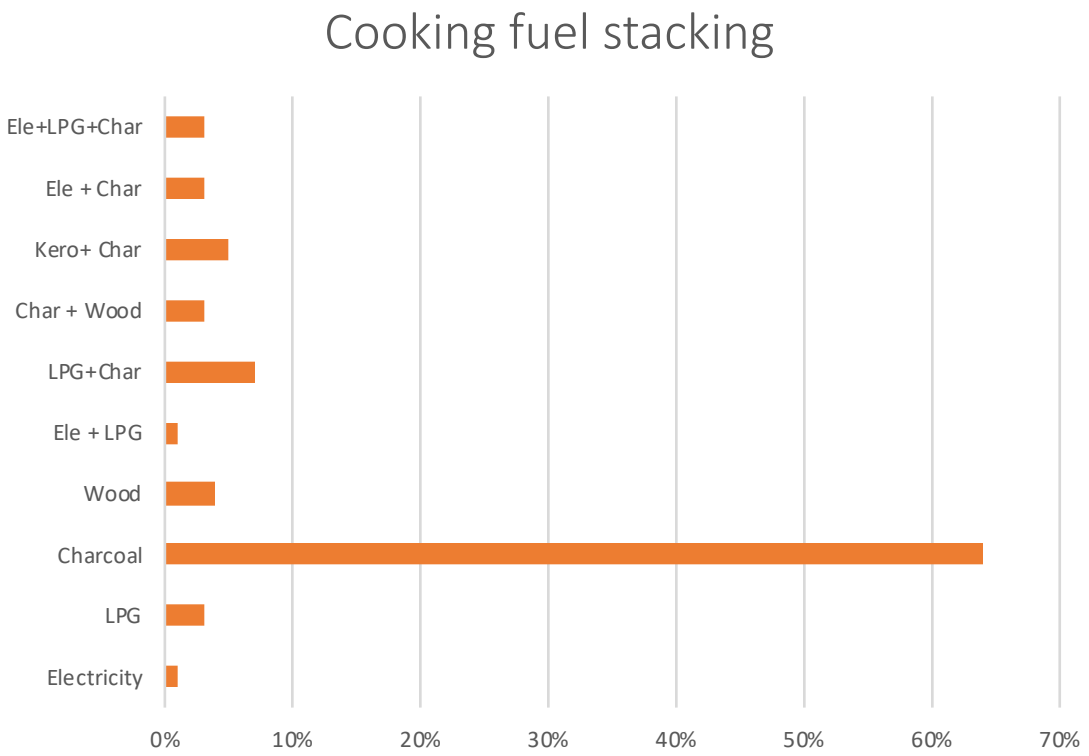
The (Cooking) Energy Sector in Kampala

Of the households that participated in the survey:

- **88%** rely on **charcoal** as their primary fuel for cooking and water heating.
- **8%** LPG
- **1%** Electricity

Though charcoal is always chosen as the main or only fuel, **Fuel stacking** is also common in Kampala:

- LPG with charcoal is the most common combination (7%)
- Followed by electricity with charcoal (5%)



Source: Discrete Choice Modelling Survey, Uganda (Scott et al, 2019)

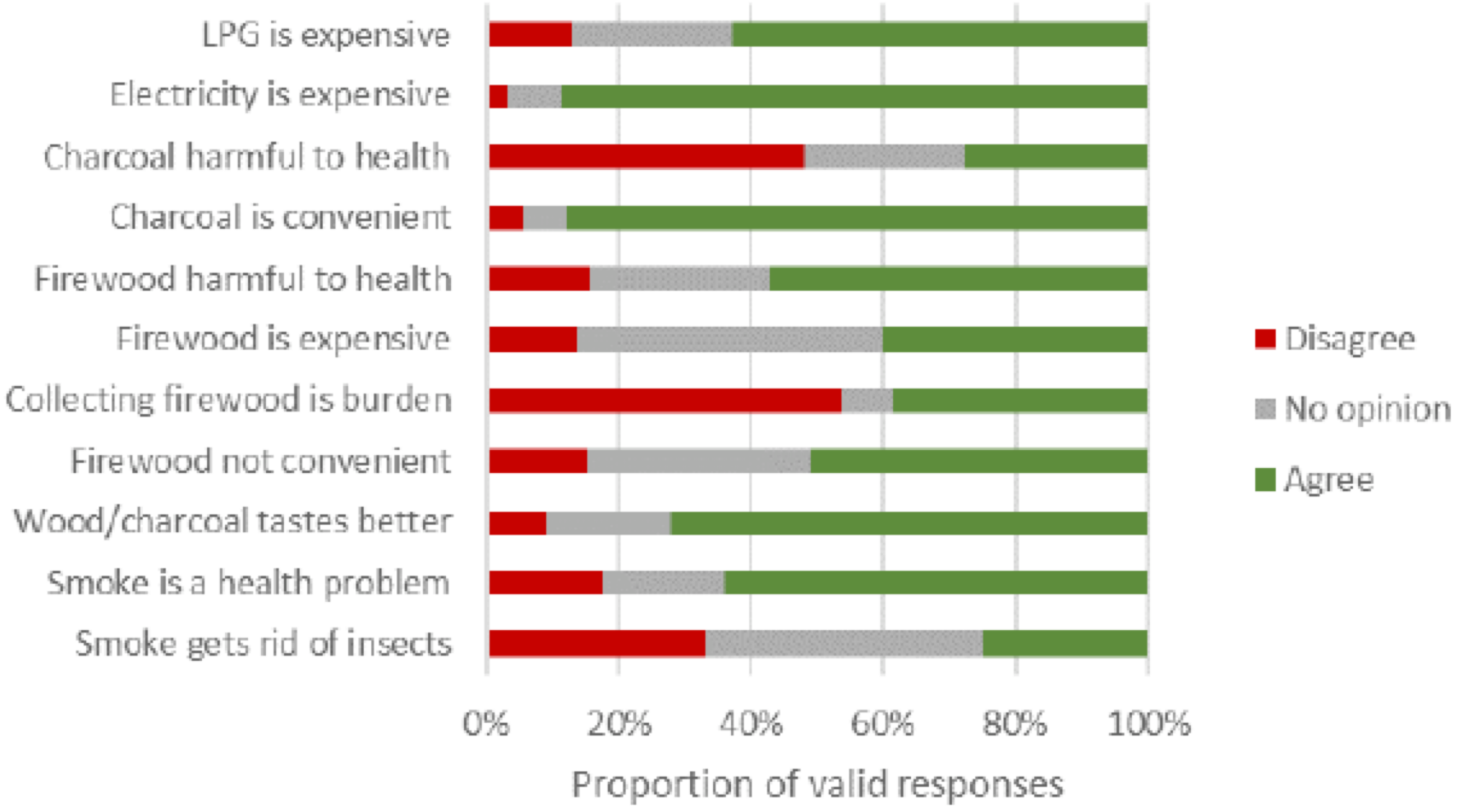
The (Cooking) Energy Sector in Kampala

Beliefs and attitudes

Almost universal agreement that electricity is expensive for cooking **(89%);** widespread agreement that LPG is expensive **(63%),** and even wood was regarded as expensive by **(40%)** all respondents.

The majority respondents agree smoke was a health problem (64%), but only 30% agree cooking with charcoal is harmful to health.

Source: Discrete Choice Modelling Survey, Uganda (Scott et al, 2019)



MECS
Modern Energy Cooking Services

Kitchen lab CCT – key findings

Loughborough University

ESMAP
Energy Sector Management Assistance Program

UKaid
from the British people

Controlled Cooking Test (the kitchen lab)

What happens when local cooks prepare typical local cuisines on different cooking fuels and devices to compare performance?

In Kampala, the test aimed to address questions such as;

1. On average, how much **energy** is consumed to prepare a typical (most commonly cooked) meal using electricity, LPG and charcoal?
2. On average, how much **time** did it take the cook to prepare the meal on each cooking device?
3. What is the average **cost** of preparing each meal using the different fuels?
4. And is the finished product as **tasty** as people would expect?

Dishes cooked

Category	Dish	Amount of food cooked per meal
Staple food	Matooke	1 kg
Stews	Beans (dry)	0.5 kg
	Beans (soaked) Meat	0.5 kg 0.5 kg
Vegetables	Sukumawiki	3 bundles worth 1,500 UGX

Meals were chosen not only for their popularity but also because they represent different categories of cooking time and techniques (boil, steam, saute, simmer).

Cooking devices used in the tests

From left (Electric pressure cooker, ceramic charcoal stove, LPG gas and an electric hot plate)

Why EPC?

- Successful use in the region e.g. Studies in Kenya showing households can save half of the amount of money/power especially on heavy staples by using the EPC *(Kenya eCookbook,2019)*
- Its features; pressurising and heat retention

Measured parameters

Parameter	Equipment used	Other tools used
Energy consumed (kWh)	Plug in energy meter (UK Plug Power Meter AC 230V~250V 13A Max)	○ 5 litre pot used for cooking on EPC ○ 7 litre flat bottomed used on the other devices ○ Data entry forms for raw data capture
Fuel used (kg)	30 kg digital weigh scale	
Time to prepare the meal (minutes)	Clock	
Cost of fuel to prepare the meal (UGX)	n/a	

Assumptions - for data calculation

Assumptions	Unit	Source
1 Unit of electricity	750.9 UGX	ERA quarterly report
1 L of gas	9,500 UGX	Market price
1 kg of charcoal	1,000 UGX	Market price, based on selling price
Energy content of charcoal	31 MJ/kg	
LPG default energy content	46.1 MJ/kg	
MJ conversion to kWh	0.2778	
kWh conversion to MJ	3.6	

Methodology

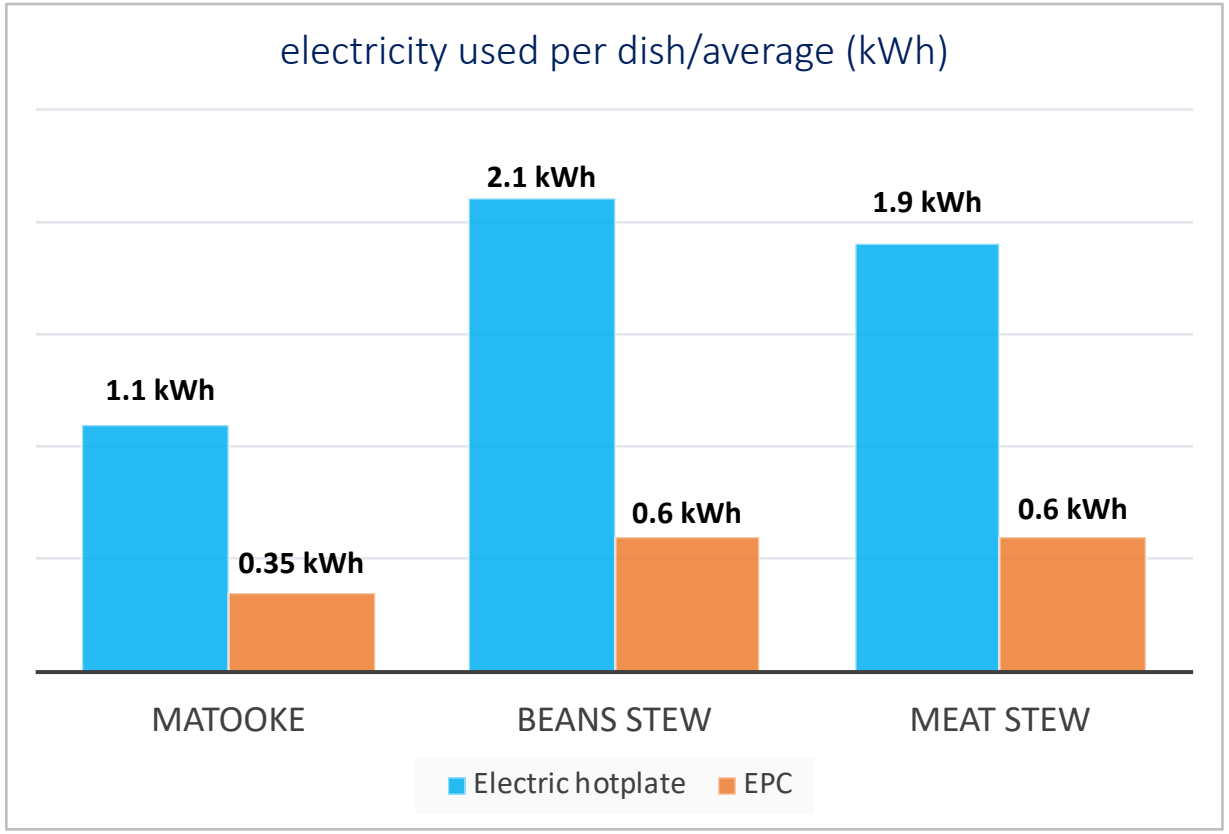
1. Same cooks
2. Three rounds of testing
3. One cook prepared the same dish three times on the different cooking appliance during each round
4. Cooks provided procedures on how each dish was prepared
5. Cooks cook in natural environment while research team captured data
6. Pots and lids were used as the cooks would normally use them




Some key findings - Energy

- EPC is the most energy and time-efficient as well as the least expensive option, especially for preparing meals that take a long time;

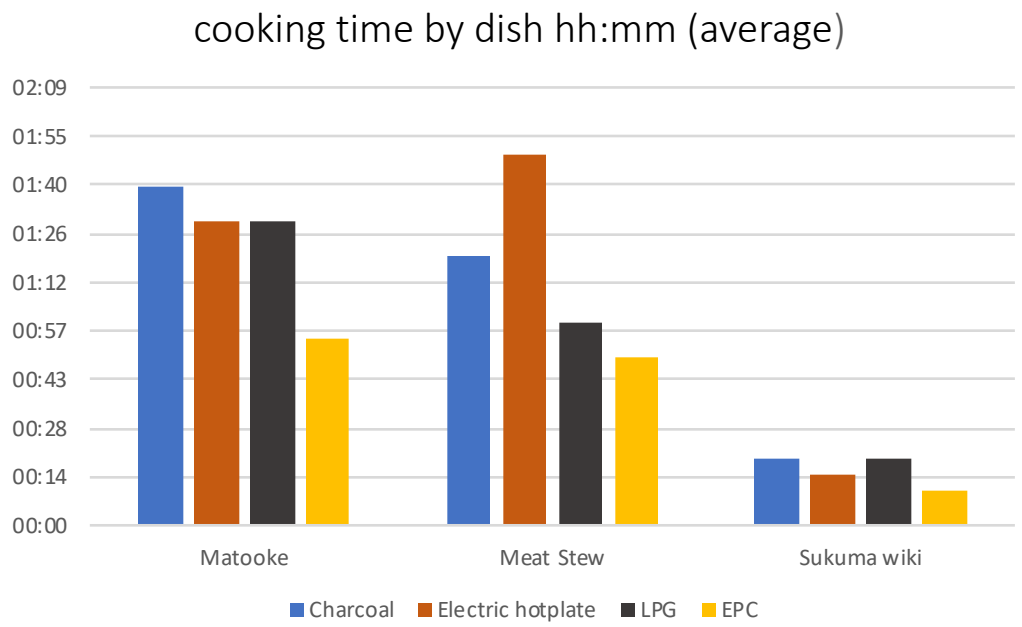
- For meals that require a long time and involve cooking techniques (steaming and boiling),
  - an EPC takes **three times less energy**;
  - saves half the time;
  - saves **60 - 90%** of the cost for fuel

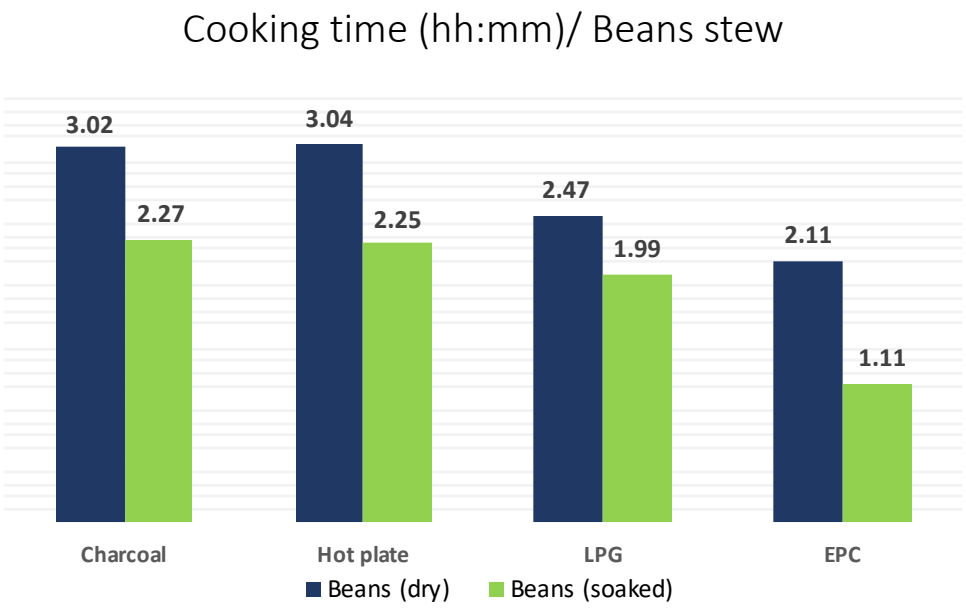


Some key findings - Time

- Comparing to the other appliances, an EPC also takes half the time to prepare the same dishes to the same standard and 'doneness'

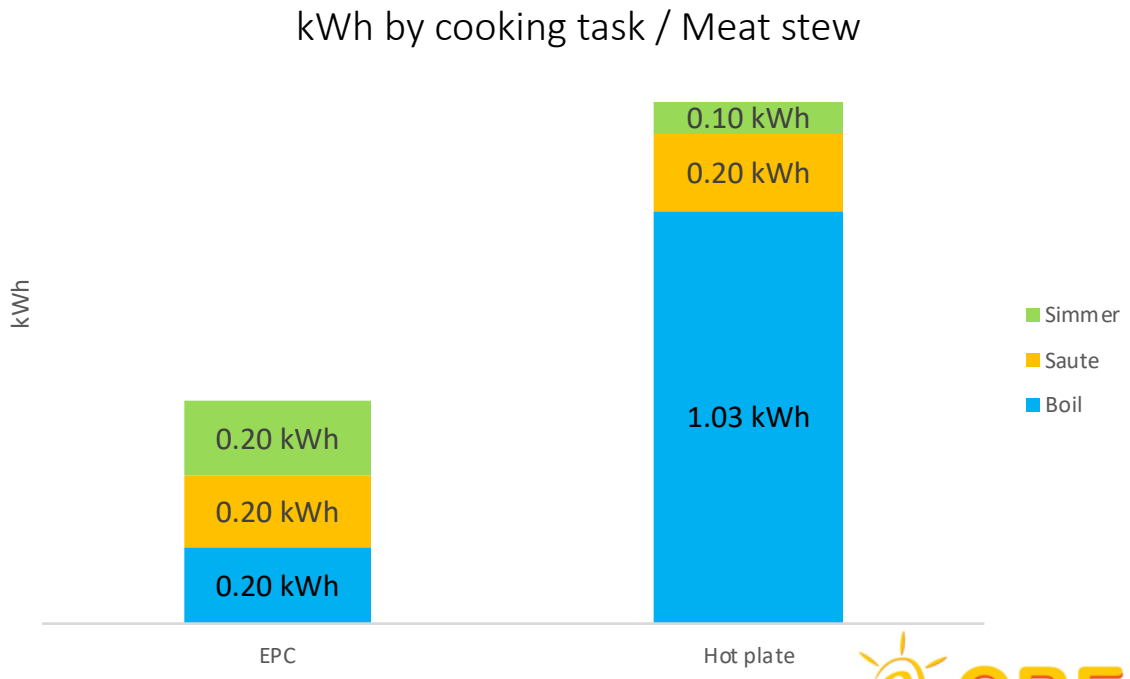
When cooking appliance combined with energy saving cooking practice it enhances the time saving potential of the appliance:

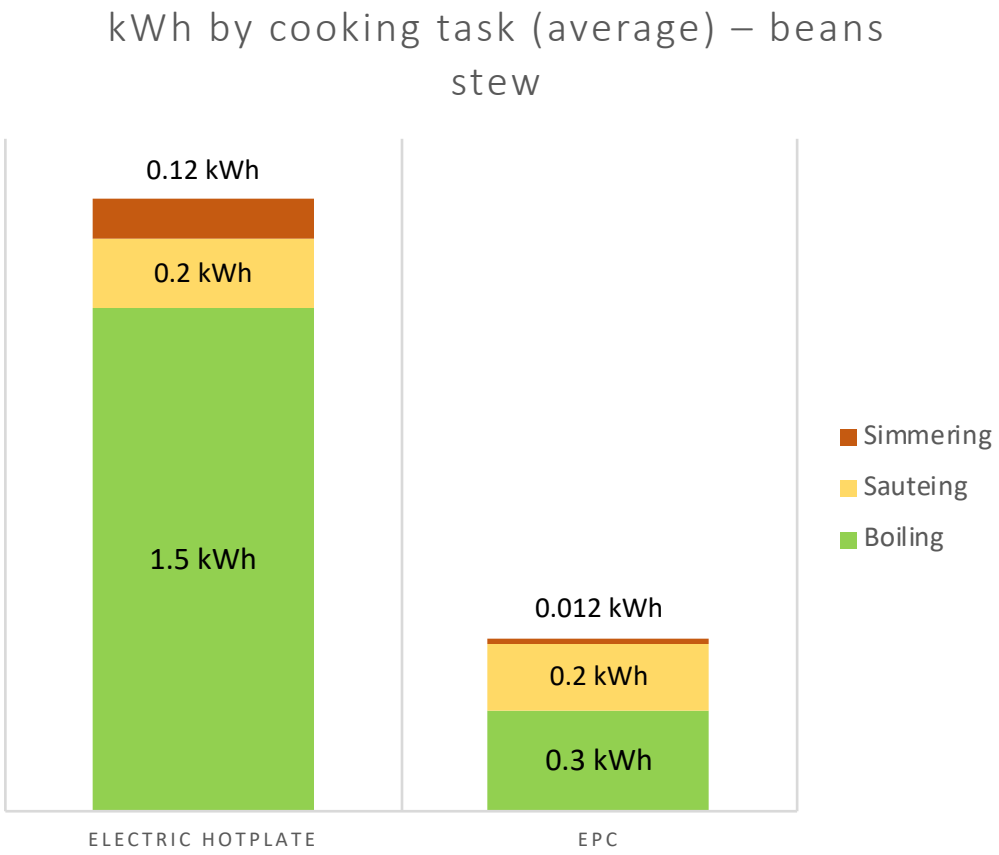




Some key findings – efficiency by cooking task

- When disaggregating cooking by different cooking tasks and activities, we observe the energy and cost saving potential of an EPC is particularly high for activities that require long term steaming and boiling due to the insulation and pressurizing features.

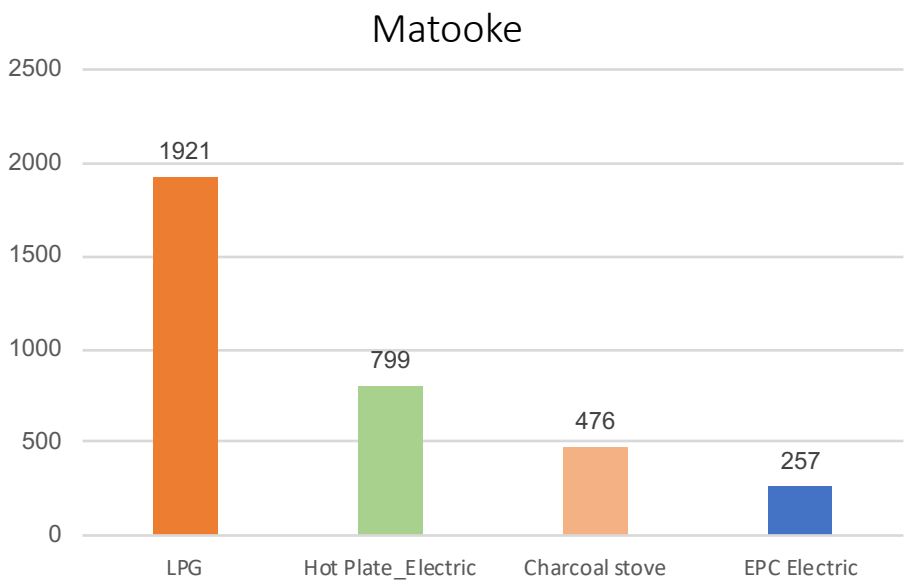


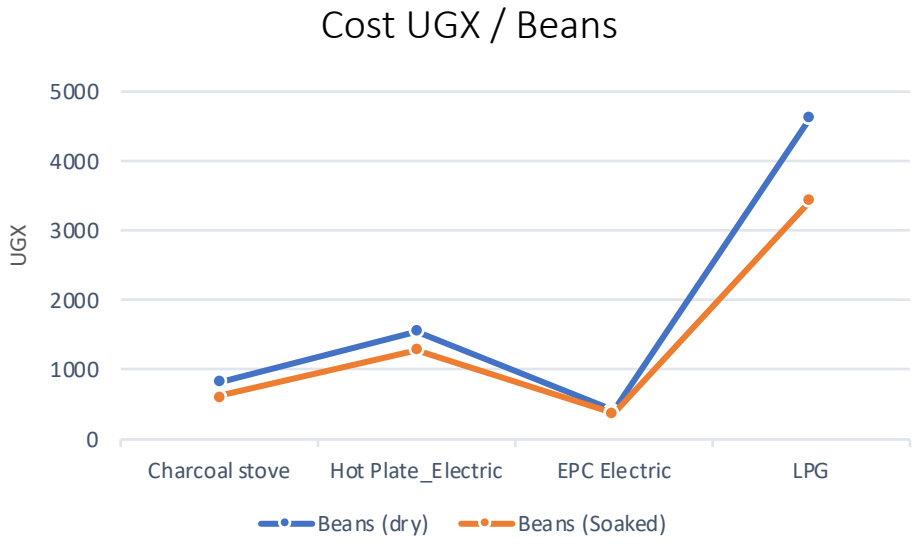


Some key findings – Cost

First note is how expensive is it to prepare heavy meals with LPG. This confirms how most HHs us LPG as a back up. Although significantly lower, the hot plate is also not an option hence the competition is between EPC and charcoal

Soaking beans prior to cooking is a good practice in improving device efficiency. Using the EPC is the cheapest option for cooking beans stew (soaked / dry), though charcoal is in close competition given the unit cost differences (electricity & charcoal)





Some key findings – what did the cooks say?

Convenience

Efficiency

Less water used

Safe to use once you learn how to use it

The cooked food was tasty

EPC Video

Study Limitations

1. The study was done during the intense Covid restriction period and as such meant overall efforts were restricted; from number of cooks used to devices etc.
2. 1st time for cooks to use the EPC, thus a learning curve before proper use
3. Only one meal at a time was cooked, while real-world use likely involves varying / cooking one meal after another (hence not an exact replication of what a normal kitchen would be like)
4. Kerosene and firewood not considered given the low usage with in the study location of Kampala
5. The cooks may not use the stove the exact way they would at home

Conclusion

Energy-efficient modern cooking technologies like the EPC are not only compatible but also represent the most efficient (both financial and energy) option.

At the moment, cooking with electricity is not seen as an option by households due to the unit cost of electricity and because the market for efficient domestic electric cooking technologies is not well developed.

Increasing awareness and creating a conducive policy environment for the development of the market for energy-efficient domestic cooking appliances is going to be critical.

MECS
Modern Energy Cooking Services

The End

Loughborough University

ESMAP
Energy Sector Management Assistance Program

UKaid
from the British people