

# ZAMBIA: RISING FUEL PRICES

The impact of rising fuel prices on the relative costs of cooking with different fuels – a case study



- The case study highlights how much cooking **fuel prices fluctuate**, and over relatively short periods of time – LPG has doubled over two years, charcoal increased by 50% over two years; and although Zambia has one of the lowest electricity tariffs on the continent, prices are expected to increase imminently.
- At current tariffs, cooking with an **electric pressure cooker (EPC) can save 85%** of the cost of cooking with LPG (even at the highest tariff band).
- Even with the highest level of proposed electricity price increases, **cooking with electricity will still be cheaper than cooking with LPG.**



*Image: Centre for Research in Energy and Energy Conservation (CREEC), 2022.*

[Zambia's modern energy cookbook](#), published by MECS, shows that cooking with an electric pressure cooker (EPC) is cheaper than cooking with LPG or charcoal. The charts below are taken from the cookbook and show the relative costs of cooking a couple of common dishes.

They are based on energy measurements from controlled cooking tests, combined with fuel prices prevailing in Lusaka at the time of the tests.

They show that even at the highest tier of the residential tariff (R3), it was cheaper to cook nshima in an EPC than to use LPG (at a price of 17 ZMW/kg) or charcoal (at a price of 5 ZMW/kg). They also show that much higher savings can be achieved when cooking energy intensive dishes such as bean stew in an EPC.

Colleagues from the Alternatives to Charcoal (A2C) programme in Zambia pointed out that more up to date price data is now available, which led us to explore the impact of changing prices on the relative costs of cooking.

household fuel choices are based ... on predictability and certainty.

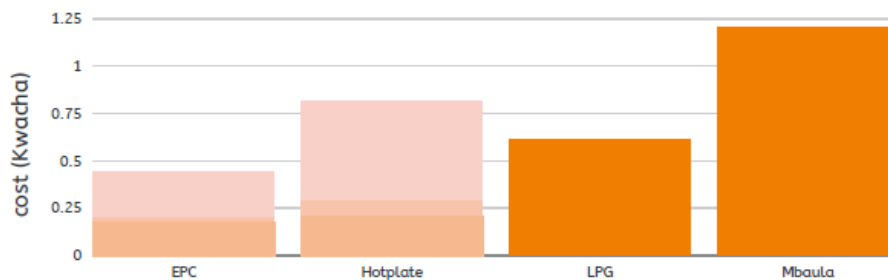
We have long recognised the importance of volatility in the prices of cooking fuels, both traditional and modern fuels. For example, Price pointed out that household fuel choices are

based not only on relative costs, but also on predictability and certainty, which in turn is based on experience and perceptions of factors such as fuel availability and price hikes ([Modern Energy Cooking Services: An Urban Perspective](#)).

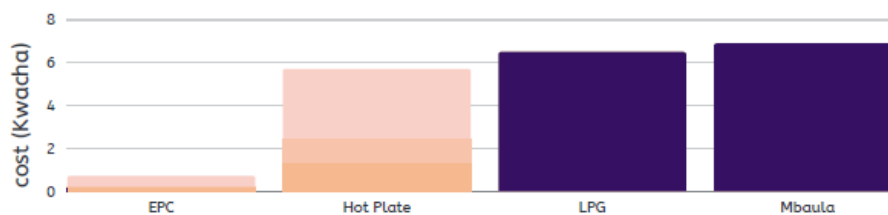
Charcoal prices

Our original costs were based on a spot price for charcoal bought in a local market in Lusaka. Since then, A2C have published a much more comprehensive set of 2022 charcoal price data in their Baseline Report [1].

They gathered data on prices charged for a range of charcoal bag sizes at three urban markets. They also weighed a sample of five bags of each measure because, although the price of each bag size was consistent, the amount of charcoal you actually get for your money varied from bag to bag. For each size of bag, this enables us to calculate the price per kg of charcoal (the specific price, in ZMW/kg) for all 15 samples (five in each of the three markets).



Relative costs of cooking nshima



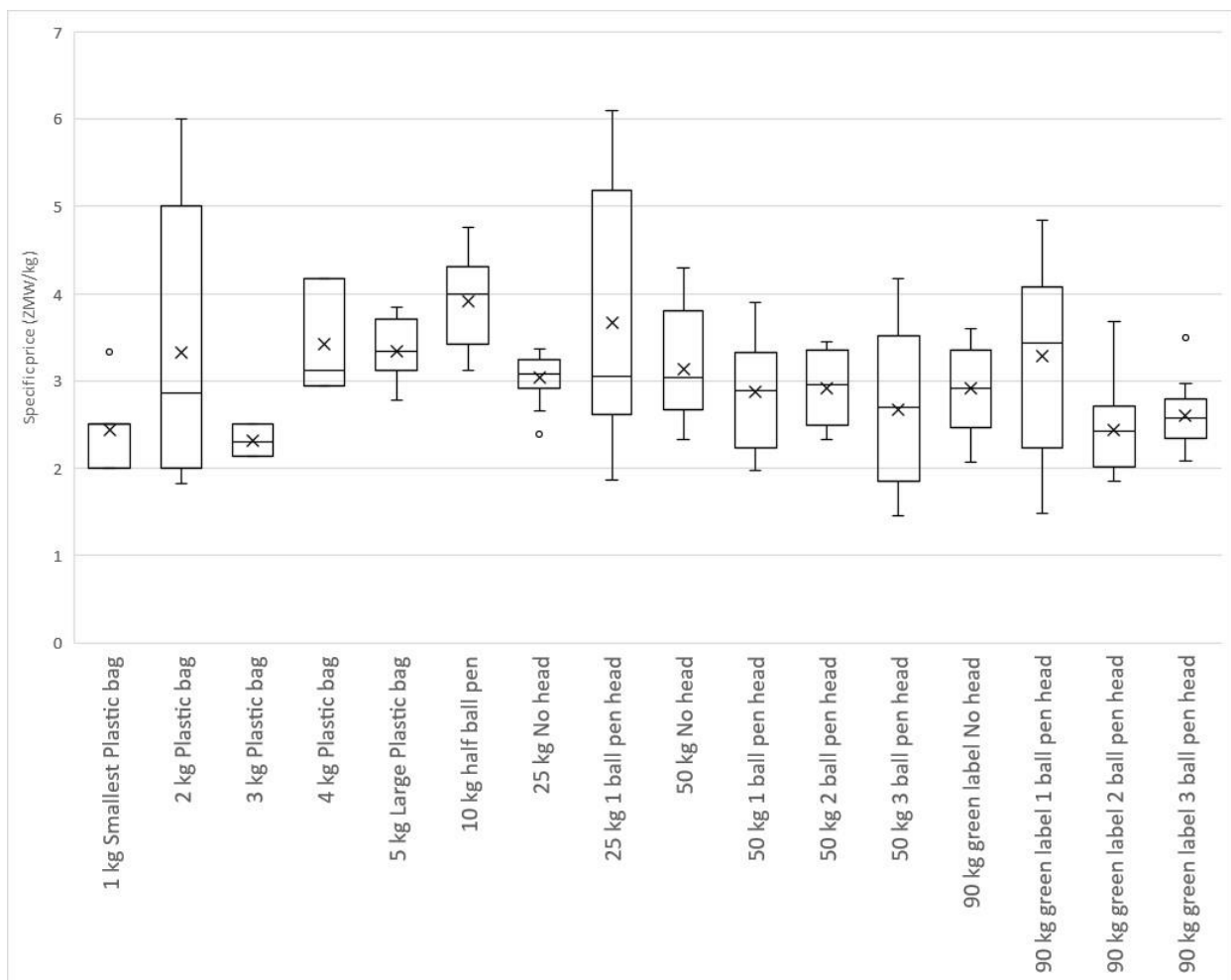
Relative costs of cooking bean stew

The chart below illustrates the range of prices paid for charcoal in each of the bag sizes (across all markets). The chart shows that there is the huge degree of overlap between the bag sizes, so it pays to shop around and make sure you get a well filled bag.

For each bag size, we have taken the average bag price across all three markets and divided by the average weight across all three markets to give an average specific price. The chart on the next page also shows that, overall, you tend to

pay more if you buy in small bags – but it’s really interesting to see that the specific price drops again if you buy the smallest bags. It is not clear what lies behind this effect, but it may reflect high levels of competition between multiple informal vendors who make marginal returns on reselling charcoal in small quantities.

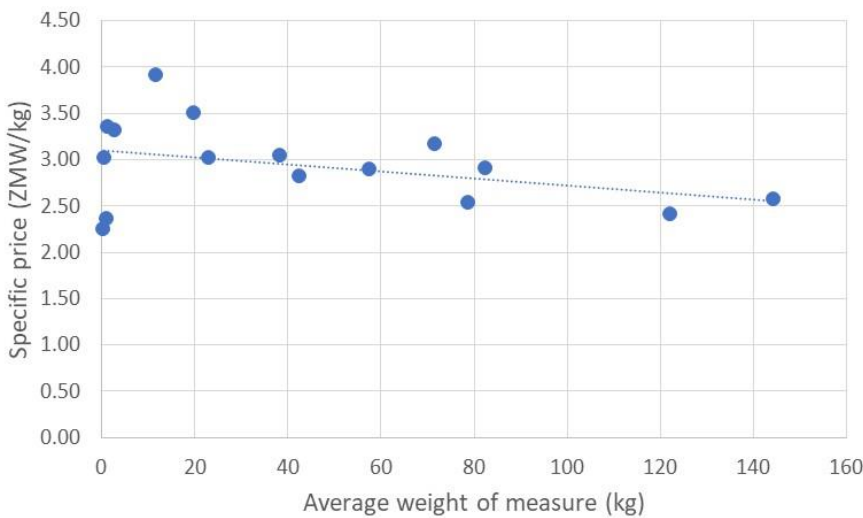
So how do we calculate a fair charcoal price? In their survey of urban households, A2C asked charcoal users (which accounted for 96% of all households surveyed) what size of bag they most



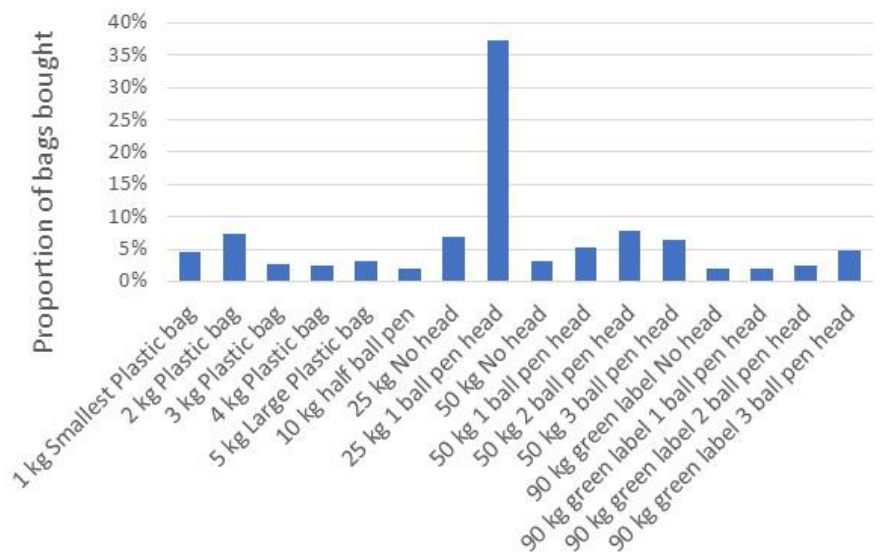
Specific price paid for charcoal - different bag sizes

commonly bought. The chart below shows that the 25 kg 1 ball pen head bag was by far the most popular choice. If we multiply the specific price paid for each size of bag by the proportion of people who buy that size of bag, then we arrive at a weighted price of 3.1 ZMW/kg of charcoal.

Please note that although this weighted average price is lower than the 5 ZMW/kg price used in the original analysis, this does not represent a fall in charcoal prices. On the contrary, Lusaka prices increased by almost 50% over a 2 year period from 2020 to 2022. The reduction simply represents the difference between a weighted average from diverse markets, and a high spot price found in Lusaka.



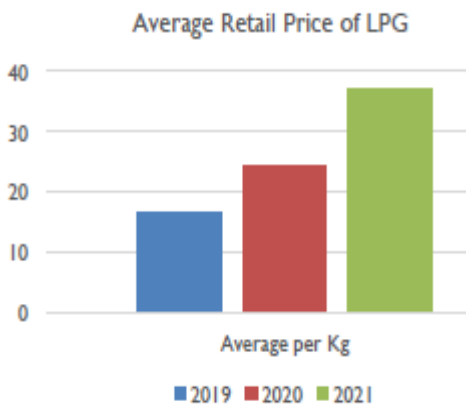
*Specific price paid for purchasing charcoal in different weights (averaged across three markets)*



*The size of charcoal bag most commonly purchased by households*

## LPG prices

Turning to LPG prices, A2C recently published the remarkable chart below in their Market Analysis report [2]. This shows how LPG prices have doubled over a two year period (and note that this was based on figures before the current energy crisis). Their report gives a detailed description of the LPG sector and factors lying behind this price increase.



LPG prices have doubled over a two year period

## Electricity prices

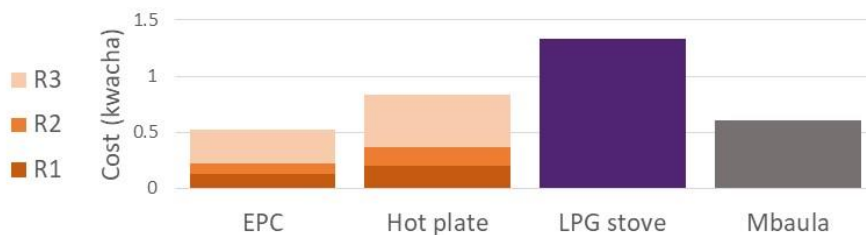
Zambia currently has some of the lowest electricity prices on the continent. The residential tariff has three bands:

- Up to 100 kWh (R1): 0.56 ZMW/unit (\$0.03/unit)
- 101 – 300 kWh (R2): 1.01 ZMW/unit (\$0.06/unit)
- Above 300 kWh (R3): 2.31 ZMW/unit (\$0.14/unit)

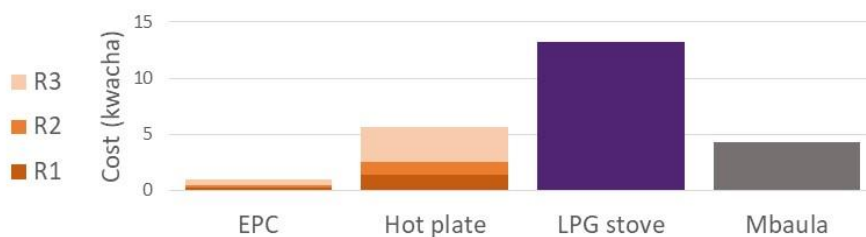
Although the residential tariff remains unchanged, planned price rises have been delayed pending the release of the [Cost of Service Study report](#). Now that this has been published, Zambians are braced for an increase in prices. The report says that residential tariffs need to be trebled in order to cover costs [3]. It considers how tariffs can be increased gradually so that cost reflective tariffs can be achieved over either five year or eight year time frames. It remains to be seen how the government will respond to these recommendations, but it does seem highly likely that tariffs will increase, albeit gradually. For the moment, we are still using the prevailing tariff rates.

## Updated cost comparison

The charts below show the cost comparison for the same two dishes when prices are adjusted to



Relative costs of cooking nshima – revised



Relative costs of cooking bean stew – revised

reflect the more recent fuel prices described above.

These charts show that cooking with LPG has become much more expensive than cooking with electricity, even when compared with the highest electricity tariff tier (R3), and even if you use an old fashioned hotplate.

## Potential cost savings

During the cooking tests, we measured the energy used to cook six common dishes that might make up a typical Zambian menu:

- nshima,
- bean stew,
- chicken stew,
- porridge,
- soup,
- rape.

If you take the total amount of energy needed to cook all of the dishes in this menu, then cooking with an electric hotplate will cost 11% - 46% of the cost of cooking with LPG (R1 and R3 tariff bands respectively); that's a saving of well over 50%. But if you cook all of these dishes using an EPC, the savings are still higher: the costs range from 4% - 15% of the cost of cooking with LPG (R1 and R3 tariff bands respectively), offering a cost saving of over 85%.

The cost comparison of greatest interest is that of electric cooking with LPG. This is the choice of modern fuels that will be relied upon to reduce the country's reliance on charcoal and firewood that is causing widespread deforestation.

### cooking with an efficient electric cooking device (the EPC) is cheaper than charcoal

Nevertheless, it is important to understand the cost implications for households wishing to switch from charcoal to one of the modern fuels. The revised charts show that cooking these dishes with an efficient electric cooking device (the EPC) is cheaper than charcoal, even when the electricity used for cooking is charged at the highest tier (R3). Cooking with a simple hotplate

is also cheaper than cooking with charcoal, but not if electricity is charged at the highest tier (R3).

For all of these dishes, switching from cooking with charcoal to LPG would entail a substantial increase in fuel costs.

## Conclusions

The revised cost comparison suggests that even **if electricity prices were to double**, it would still be cheaper to cook with an inefficient hotplate at the highest tariff (R3) than to cook with LPG (at today's LPG prices).

For households being charged at the R2 tier, **tariffs would need to be increased five-fold** before it would become cheaper to cook with LPG than a simple hotplate. Even higher tariff increases would be needed before the cost of cooking with an EPC would approach the cost of cooking with LPG.

This case study highlights just how much **cooking fuel prices can fluctuate**, and over relatively short periods of time – LPG has doubled over two years; charcoal increased by 50% over two years; electricity may treble, but possibly over an eight year time scale (the government has yet to decide how tariff increases will be implemented).

The case study also confirms that, even **with the highest level of proposed electricity price increases, cooking with electricity will still be cheaper** than cooking with LPG. The cost advantage of cooking with electricity will be amplified still further if people are encouraged to use the expanding range of energy efficient electric cooking devices, such as EPCs, air fryers, multi-cookers, and induction hobs.

## References

- [1] USAID. (2022). Alternatives to Charcoal: Baseline Report (Issue 72061121).
- [2] USAID Alternatives to Charcoal (A2C). (2021). Market Analysis Report.
- [3] Energy Market and Regulatory Consultants Limited. (2021). Zambia Electricity Cost of Service Study Task 10 – Tariff Adjustment Roll-Out Strategies.