

ZAMBIA: Energy efficient cooking

How an energy efficiency electric cooking campaign can contribute to substitution of biomass cooking fuels.



Key Takeaways:

- An **energy efficiency campaign** promoting the use of modern electric cooking appliances can reduce loads on the grid.
- **Energy-efficient** devices such as the Electric Pressure Cooker (EPC) use 40% of the electricity as compared to hotplates.
- Even if the Residential Tariff R3 were increased five-fold, an **EPC would still be cheaper than LPG**.
- Promotion of **energy-efficient** electric appliances by key stakeholders such as the Ministry of Energy and ZESCO can play a part in increasing access to clean cooking in Zambia.

Why are changes needed in cooking behaviours?

Zambia is losing forest cover at a rate of approximately 200,000 hectares a year [1], much of which is driven by unsustainable charcoal production. Zambia signed up to the Glasgow Leaders declaration on forests to stop deforestation by 2030. However, charcoal production is shifting to organized supply chains operating at scale, which transport charcoal to urban centres. Given that charcoal is predominantly used for cooking, progress can only be made if people switch to modern fuels and efficient practices.

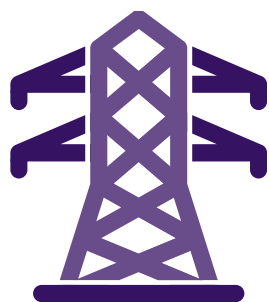
How will Zambia replace biomass with modern cooking fuels?

The Zambian Government are committed to increasing the use of modern cooking fuels to 60% in urban areas [2]. The emphasis is currently on reducing the use of electricity, charcoal and firewood, and increasing the use of LPG. Currently, 34% of the urban population cook with electricity, while only 1% of the population use LPG [3], so electricity is clearly a popular cooking fuel. This note argues that electricity can continue to play a positive role in the transition to modern cooking fuels.

Changes in electric cooking

Studies show three peaks in electricity demand during the day due to cooking [4]. These coincide precisely with existing network peaks, so cooking can contribute to demand on the grid. However, this effect can be reduced if consumers switch to using modern, energy efficient electric cooking devices.

This **new generation of devices** is just appearing in local markets. Although the cooking appliance market is largely dominated by low efficiency devices, such as hotplates, energy efficient devices such electric pressure cookers (EPCs), rice cookers, air fryers, induction stoves and thermopots can now be found in Lusaka [5]. High efficiency is achieved through a combination of automation, insulation, and pressurisation.



34% OF URBAN HOUSEHOLDS PRIMARILY USE ELECTRICITY FOR COOKING

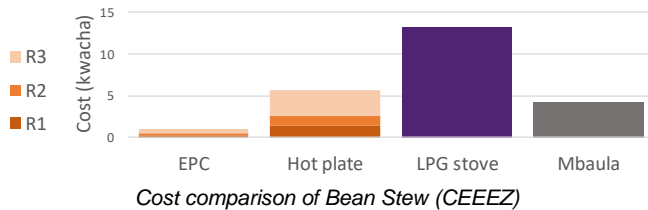


Efficient cooking devices (EPC, thermopot, air fryer, induction hob)

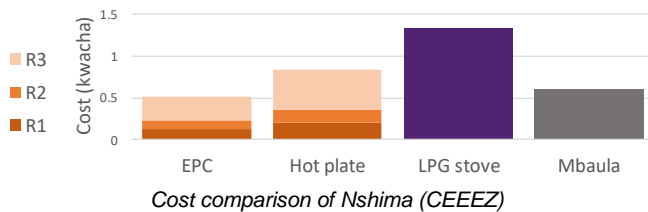
For example, EPCs are estimated to use only 40% of the energy required to cook using a hotplate [6]. This illustrates the reduction in network load that could be achieved if households currently cooking with electricity were to switch to efficient devices. These devices are rated around 1kW, much less than the power drawn by a 4-hob cooker (typically 3 – 5 kW), so reduction in maximum demand could be even greater.

Cooking with efficient electric devices

Studies show that EPCs are consistently the **cheapest** option for cooking a range of dishes tested [7]. Savings are greatest when cooking long-cook dishes such as bean stew, where households can expect 80% cost savings compared to a hotplate and 75% - 95% savings compared to charcoal (R3 to R1 residential tariff tiers).

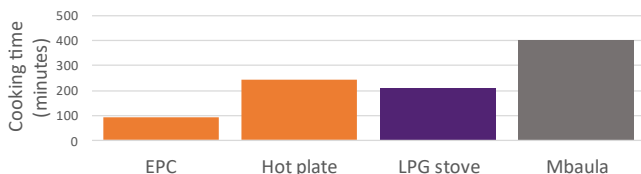


An EPC can also be used to fry, boil, or slow cook. When cooking nshima, for example, an EPC uses 60% of the energy of a hotplate, and is 80% cheaper than cooking with charcoal at the R1 tariff.



Automation not only eliminates energy waste, but also means that cooks can press a button and leave the device to cook a dish without worrying about the food burning or flames causing fires. Cooks consistently say that the most attractive feature of EPCs is convenience – they can get on with other tasks.

Cooks can expect to save 10-20 minutes when cooking most dishes in an EPC, and even more on long-boil dishes such as bean stew (saves 5 hours!).



Time comparison for cooking bean stew

Changes in the electricity grid

Power cuts remain a barrier to more widespread use of electricity for cooking. Despite a legacy of power cuts and load shedding, renewed efforts are ongoing to improve quality of supply [8] and to attract investment.

Improved cost recovery means that connection charges and tariffs are likely to increase. However, the evidence above indicates that cooking with electricity will still be cost-competitive at substantially higher tariffs.

With 85% of electricity produced from renewable hydropower, Zambia's electricity is very clean. Transitioning from cooking with biomass will have positive impacts on climate emissions, helping to meet Zambia's Nationally Determined Contributions commitments.

Recommendations

Based on the evidence above, an energy efficiency campaign to promote the use of energy-efficient electric cooking appliances would:

- Reduce maximum demand and energy load on the grid, contributing to improved quality of supply.
- Enable the urban population to continue to use an already popular cooking fuel.
- Maximize the number of households accessing clean cooking fuels, helping Zambia's progress towards SDG 7.1.2.
- Yield energy savings, contributing to progress towards SDG 7.3.

This note advocates for replacing the policy of reducing electric cooking with an energy efficiency campaign. A range of measures would encourage households that already cook with electricity to use more efficient appliances:

- Awareness raising using TV (e.g. [Shamba Shape-Up](#)), radio, public cooking demonstrations.
- Financial incentives including a cooking tariff, tax waivers on efficient devices.
- ZESCO (Demand Side Management) to promote and sell efficient devices to customers (e.g. on-bill payments).
- Establish communities of practice e.g. [Regional eCooking hubs](#).
- Integrate efficient electric cooking into Energy Efficiency Strategy & Action Plan.

References

[1] 8th National Development Plan 2022-2026, (2022).
 [2] The Republic of Zambia Ministry of Energy. (2019). Zambia SEforAll Action Agenda: Sustainable Energy for All Initiative.
 [3] Luzi, L., Lin, Y., Bonsuk Koo, B., Rysankova, D., & Portale, E. (2019). Beyond Connections Zambia. Energy Access Diagnostic Report Based on the Multi-Tier Framework.
 [4] Leary J. et al. (2019) eCook Zambia Cooking Diaries.
 [5] Njobu C. & Yamba F. (2022) Electric Appliance Availability Survey Report
 [6] Scott N. & Leach, M. (2022). Comparing energy consumption and costs - from cooking across the MECS programme (Issue April).
 [7] Njobvu, C., Serenje, N., Price, M., & Yamba, F. (2021). MECS Kitchen Laboratory – Zambia.
 [8] <https://www.moe.gov.zm/irp/>