

The role of Biomass as energy storage

The case of cooking

Cooking requires a high amount of energy during a short time of the day – Biomass is the traditional solution for this – for over 2 billion people



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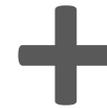


Cooking with biomass can be significantly improved both in efficiency and emissions



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advanced combustion technology
based on gasification



Processed biomass



Foto: Ekasi Energy



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The Cleanest, Most Efficient, Best Performing Biomass Stove.



61% thermal efficiency



Meets the WHO definition of clean



Automatic temperature control



IoT native for all Digital MRV



Lifetime Warranty



95% cleaner, half the cost of charcoal, and uses zero trees



Bildschirmfoto

Comparing the storage of electric energy and biomass energy



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= 30 x



**600g = 1,5 kWh delivered
12-18 USD cent**

**6,7 kg
approx. 600 USD**

Cost of conversion to electric cooking and modern biomass cooking for Rwanda



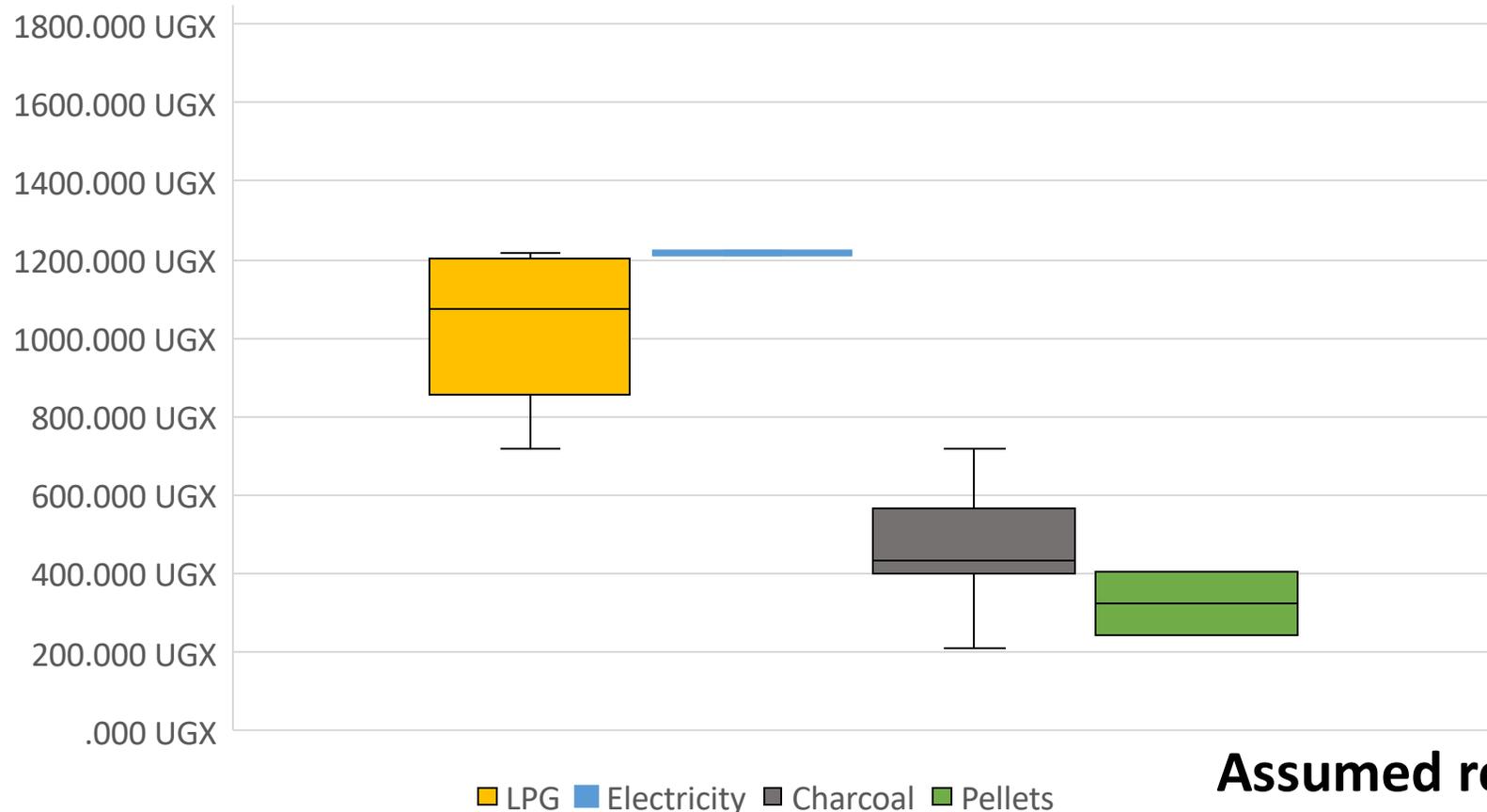
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- Study of MIT, Princeton & Rwandan researchers: cost of adding 1 kW of capacity: 1245 \$
- For a household of 5 persons approx. 2 kW would be needed for cooking: 2.490 \$
- A pellet plant providing fuel for 50.000 households will cost 2 - 5 Million \$ – approx. 40 - 100 \$ per household
- The pellet cookstove stove will cost approx. 50 \$

Cost per energy delivered



Kampala - UGX/kWh delivered



Assumptions of this calculation

Fuel	kWh/kg (or l)	Therm. Eff.	kWh/kg delivered	Sources
LPG	13,6	0,57	7,752	Environmental Science & Technology 55 (22): 15333–42. https://doi.org/10.1021/ac.s.est.1c03390 .
Charcoal	8,3	0,38	3,154	
Pellets	4,6	0,497	2,2365	
Electricity	1	0,74	0,74	ESMAP Papers. Washington DC: World Bank. http://hdl.handle.net/10986/38418 .

Assumed retail pellet price: 150-250\$/t

Data source: survey by Vestal Energy Consultants, Aug. 2023



Conclusion

- **The possibility of biomass to release high amounts of stored energy in a short period of time is a great advantage for cooking needs**
- **Cost advantages in terms of needed investment are larger than an order of magnitude**
- **Cost advantages of running costs are approx. a factor of 3**

Thank you for your attention!

Feel free to contact me!

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